Rio Tinto

Annual Report 2021

Rio Tinto acknowledges the First Nations custodians of land where we work and live around the world. We respect their unique connection to land, waters and the environment.

The photography in this report may not reflect the COVID-19 regulations in place on site at the time of publication.

Cover | Operations Centre, Perth. Western Australia.
Inside front cover | QIT Madagascar Minerals (QMM).

The photography in this report may not reflect the COVID-19 regulations in place on site at the time of publication.

Contents

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Amrun operations, Chith Export Facility. Weipa operations, Australia.

All-injury frequency rate

0.40

(2020: 0.37)

Consolidated sales revenues

$63.5bn

(2020: $44.6bn)

Fatalities

Zero

(2020: zero)

Net cash generated from operating activities

$25.3bn

(2020: $15.9bn)

Scope 1 and 2 greenhouse gas emissions (equity Mt CO_2e)

31.1Mt

(2020: 31.5Mt)

Underlying EBITDA[2]

$37.7bn

(2020: $23.9bn)

People who undertook cultural awareness training[1]

22,400

(2020 comparative dataset is not available due to programme changes)

Profit after tax attributable to owners of Rio Tinto (net earnings)

$21.1bn

(2020: $9.8bn)

Women in our workforce

21.6%

(2020: 20.1%)

Total dividend per share

1,040 cents

(2020: 557 cents)

1. People who undertook cultural awareness training included employees and contractors. Course content and length varied depending on cultural and operational context.
2. A reconciliation of underlying EBITDA to its closest IFRS measure is presented on page 343.

2021 at a glance

Our business comprises a portfolio of world-class assets that help meet society's current and future needs and generate strong cash flows through the cycle.

Product groups

Iron Ore

Iron ore is the primary raw material used to make steel. Steel is strong, long-lasting and cost-efficient, making it perfect for everything from wind turbines to skyscrapers and ships.

In the Pilbara region of Western Australia, we produce five iron ore products, including the Pilbara Blend™, the world's most traded brand of iron ore.

Our Dampier Salt operations in Western Australia are the world's largest exporter of seaborne salt, produced from evaporating seawater.

This quality product suite is well positioned to benefit from continued demand across China, Japan and other markets.

Gross product sales

$39.6bn

(2020: $27.5bn)

Underlying EBITDA

$27.6bn

(2020: $18.8bn)

Production (100% basis)

319.7Mt
iron ore

(2020: 333.4Mt)

CO_2e emissions (our share)

3.0Mt

(2020: 3.0Mt)

All-injury frequency rate

0.67

(2020: 0.53)

Aluminium

Aluminium is one of the world's fastest-growing major metals. Lightweight and recyclable, it is found in everything from solar panels to electric vehicles and smartphones.

Our vertically integrated aluminium portfolio spans high-quality bauxite mines, alumina refineries and smelters which, in Canada, are powered entirely by clean, renewable energy.

Our unique assets allow us to provide responsible aluminium with a low-carbon footprint, traceable from mine to metal.

Our low-cost, hydro-based aluminium smelters will continue to grow their distinct structural advantages as we move towards a net zero world.

Gross product sales

$12.7bn

(2020: $9.3bn)

Underlying EBITDA

$4.4bn

(2020: $2.2bn)

Production (our share)

54.3Mt
bauxite

(2020: 56.1Mt)

3,151kt
aluminium

(2020: 3,180kt)

CO_2e emissions (our share)

21.9Mt

(2020: 21.8Mt)

All-injury frequency rate

0.33

(2020: 0.34)[1]

1. Our Gove operations' closure unit was transferred from Aluminium to Closure, causing change in historical AIFR, previously noted as 0.36 in our 2020 Annual Report.

Iron Ore Company of Canada (IOC), operations.

Copper

Copper is essential to the transition to a low-carbon future as it plays a key role in electrification and power generation, including in renewable energy and electric vehicles.

Our operations span the globe, from Mongolia to Chile to the US, and occupy various stages of the mining lifecycle.

With global decarbonisation goals set to drive growing demand for copper and other key commodities, our pipeline of growth projects strongly positions us as a partner in sustainable growth.

In addition to copper, our product group also includes the Simandou iron ore project in Guinea, the largest known undeveloped high-grade iron ore deposit in the world[2].

Gross product sales

$7.8bn

(2020: $5.0bn)

Underlying EBITDA

$4.0bn

(2020: $2.1bn)

Production (our share)

494kt

mined copper

(2020: 528kt)

CO_2e emissions (our share)

2.2Mt

(2020: 2.6Mt)

All-injury frequency rate

0.21

(2020: 0.25)

Minerals

Our Minerals product group provides materials essential to a wide variety of industries, ranging from agriculture to renewable energy and electric vehicles.

We produce high-grade, low-impurity iron ore pellets and concentrate, titanium dioxide, diamonds and borates from our operations in Canada, Madagascar, South Africa and the US.

We contribute to Rio Tinto's sustainable growth by unlocking value from our high-grade orebodies and developing new materials.

By reprocessing mining waste to extract valuable by-products, we are expanding our frontiers and meeting the increasing demand for critical minerals, such as lithium and scandium.

Gross product sales

$6.5bn

(2020: $5.2bn)

Underlying EBITDA

$2.6bn

(2020: $1.7bn)

Production (our share)

1,014kt

titanium dioxide slag

(2020: 1,120kt)

9.7Mt

iron ore pellets and concentrates

(2020: 10.4Mt)

CO_2e emissions (our share)

3.4Mt

(2020: 3.6Mt)

All-injury frequency rate

0.38

(2020: 0.43)

2. Simandou is an iron ore project but is reported under Copper due to the management structure.

Chairman's statement

In 2021, Rio Tinto focused on rebuilding relationships and strengthening our social licence, while producing record financial results as the developed world and China recovered strongly from the economic dislocation caused by the COVID-19 pandemic.

During the first half of 2021, the Board appointed Jakob Stausholm as Chief Executive and Peter Cunningham as Chief Financial Officer, and nine members of the Executive Committee also took up new roles. After this unprecedented period of management change, consolidation and planning for the future were the major focus during the remainder of the year.

Following extensive engagement with management and the Board, the new team led by Jakob established four objectives – to become the best operator; achieve impeccable environmental, social and governance (ESG) credentials; excel in development; and secure a strong licence to operate. In addition, we introduced three new values – care, courage and curiosity – and a new strategy, including significantly more ambitious targets to address climate change.

With the new leadership team and a clearly articulated strategy in place, in 2022 we will focus on delivering the strategy, in collaboration with our partners and other stakeholders.

Safety and wellbeing

Rio Tinto achieved zero fatalities for a third consecutive year in 2021. This reflects the hard work and dedication of our employees and contractors worldwide. Sadly, however, people are still getting injured at work, so we must remain vigilant and focused.

While some countries are gradually adapting to life with COVID-19, the pandemic continues to exact a heavy toll, particularly in developing countries, including Mongolia, South Africa and India, and at our non-managed operations in South America. I am very proud of the care shown by our employees and contractors, for each other and for their local communities, by prioritising safety controls, supporting vaccination programmes and setting up vaccination clinics near many of our operations.

Recognising that our responsibility for ensuring the wellbeing of our employees and contractors extends beyond the traditional areas of health and safety, Rio Tinto launched the Everyday Respect initiative in 2021. The objective is to create a safer, more respectful and inclusive environment by preventing, and improving how we respond to, unacceptable behaviour in the workplace.

I am grateful to Elizabeth Broderick, formerly the Australian sex discrimination commissioner, for advising the Everyday Respect task force that we set up to drive this initiative, and to the more than 10,000 employees and contractors worldwide who participated in listening sessions and surveys as part of the discovery phase. The findings of the Everyday Respect task force were published in February 2022 and made confronting reading. Having established and acknowledged the extent of the problem, we are urgently implementing the recommendations set out in the report.

Financial performance, economic contribution and dividend

Our operating and project development performance in 2021 was adversely impacted by COVID-19-related travel restrictions and labour shortages, and the transition to improved communities and heritage management processes in the Pilbara and elsewhere.

Nevertheless, the Group achieved record financial results, with underlying earnings of $21.4 billion (2020: $12.4 billion) and net cash generated from operating activities of $25.3 billion (2020: $15.9 billion). Profit after tax attributable to owners of Rio Tinto was $21.1 billion (2020: $9.8 billion) and our balance sheet remains exceptionally strong with net cash of $1.6 billion (2020: net debt of $0.7 billion). These results reflect the quality of Rio Tinto's assets and strong commodity prices, particularly during the first half of 2021.

The Group's direct economic contribution to the countries where we operate, including payments to employees, suppliers, governments and shareholders, amounted to $66.6 billion (2020: $47 billion). Corporate tax paid in 2021 was $8.5 billion (2020: $5.3 billion), which when combined with royalties and other taxes, and with our share of taxes and royalties paid by equity accounted units, resulted in payments to governments of over $13 billion (2020: $8.4 billion), including over $11 billion (2020: $6.8 billion) paid in Australia.

In recognition of this strong performance, the Board is recommending a final dividend of 417 US cents (2020: 309 US cents) and a special dividend of 62 US cents per share (2020: 93 US cents), taking total dividends declared to shareholders this year to a new record of $16.8 billion.

Environmental, social and governance (ESG) credentials

Climate change is the defining issue of our time. In October 2021, Jakob and I travelled to Glasgow for COP26, the UN Climate Change Conference, to meet governments, civil society organisations, financiers and business leaders seeking solutions to the common goal of tackling climate change.

While the UN conference achieved some important breakthroughs, it also underlined the urgent need for greater action if the world is to meet its commitments under the Paris Agreement and achieve a just transition to a low-carbon economy.

Just two weeks before COP26, we announced our new strategy, setting out our plans for growth in materials, such as copper and lithium, that are essential for the energy transition, as well as significantly more ambitious carbon reduction targets in our operations. We have accelerated our target of a 15% reduction in absolute Scope 1 and 2 emissions from 2030 to 2025, and established a challenging new target to achieve a 50% reduction by 2030.

To thrive in the long-term, we need to be part of net zero value chains, particularly for steel and aluminium production, so we also have ambitious plans to work in collaboration with our customers and suppliers to reduce our indirect Scope 3 emissions. In 2019, we established our flagship partnership with China Baowu and Tsinghua University, followed by our partnership with Nippon Steel Corporation in 2020. In 2021 we added two new steel decarbonisation partnerships with POSCO in South Korea and BlueScope in Australia. Our efforts to decarbonise aluminium smelting include scaling-up the breakthrough ELYSIS™ technology, for commercialisation by 2024. We also have the ambition to reduce our shipping emissions intensity by 40% by 2025 and to reach net zero by 2050.

One of the themes at COP26, and the earlier G7 meeting, was an increasing awareness that constraints in the supply of critical raw materials, such as copper, lithium and certain rare earth elements, potentially threaten to delay the transition to a low-carbon economy. We were disappointed to hear recent announcements by the Government of Serbia in relation to the Jadar lithium project. While the benefits of projects like Jadar are significant and global in enabling the energy transition, we acknowledge the concerns of the local community and have worked hard to mitigate local impacts while maximising the potential social and economic benefits to Serbia. Taken together with the responsible development of the Resolution Copper project in the US, our growing lithium portfolio has the potential to strengthen the resilience of supply chains serving the renewable energy sector and electric vehicle manufacturers.

We are also evaluating the use of our landholdings to develop verifiable, nature-based carbon offsets for those parts of our business where abatement is technologically challenging or prohibitively expensive. These carbon offset projects also have the potential to deliver significant biodiversity, community and water management benefits. In addition, we are participating in two early-stage carbon mineralisation research projects, in Iceland and the US.

In September 2021, we published an interim report on our communities and social performance commitments, as we continue to implement the recommendations arising from the Juukan Gorge tragedy. We have initiated numerous other workstreams to strengthen our relations and build mutually beneficial partnerships with Traditional Owners and other Indigenous peoples around the world. Further details are set out on pages 94-95 of this report.

Leadership, culture and values

Following his appointment as Chief Executive on 1 January 2021, Jakob moved rapidly to appoint his new leadership team and to roll out a new development programme for our top managers, designed to achieve a more collaborative, inclusive and effective senior leadership team. Over the coming months, over 400 General Managers will join a similar programme. Their leadership will be crucial as we seek to embed the desired values and behaviours.

Stakeholder and workforce engagement

Despite the travel restrictions imposed by the pandemic, Board members engaged extensively with stakeholders throughout the year, including having regular updates with shareholders, governments, local communities, and Traditional Owners, and hosting three civil society roundtables, in Australia, Europe and North America.

The Board expanded its engagement with the workforce, through site visits, in-person and virtual town halls, podcasts, videos, and listening sessions. Feedback from these events suggests that our employees are generally optimistic about the future and the changes taking place across the Group. There is good support for the new leadership team, our new strategy and values, and the Everyday Respect initiative, coupled with a realistic acknowledgement that cultural change takes time and the leadership team will be judged by their actions, not their words.

Sadly, we are seeing increasing staff turnover, and usage of our Employee Assistance Programme remains high, reflecting the pressures, both at home and at work, that many of our employees are experiencing, in part because of the pandemic.

Board and Executive Committee

It is a testament to the strength of Rio Tinto's talent pool and succession planning that all but two of the positions created by the significant management changes that were necessary at the start of 2021, were filled with internal candidates. The new team, under Jakob's leadership, has worked tirelessly to ensure a smooth transition and to co-create our new strategy and values. I am very grateful to them and to all our employees and contractors for their hard work and commitment during another challenging, but successful, year.

We were delighted to welcome Ben Wyatt to the Board in September. Ben's knowledge of finance, public policy, trade and Indigenous affairs has already proved to be invaluable. As previously announced, I will step down as Chairman following the Australian annual general meeting in May 2022. I am delighted that the Board has announced the appointment of Dominic Barton as Chair-designate. Dominic has extensive business and international relations knowledge as well as deep understanding of the linkages between business, governments and society. I wish him every success.

Reflections and outlook

As I reach the end of my eight years on the Board, it has been a privilege to be part of the leadership team of this great company and I am proud of the direction that Rio Tinto is taking and of the talent, resilience and enthusiasm of our employees and contractors around the world.

Our third successive fatality-free year underlines our commitment to safety and strengthens a mindset where zero fatalities has become the expectation, not the exception. The Group's response to COVID-19 has also been exemplary. We have kept all our managed operations worldwide running safely and smoothly, protecting thousands of jobs at our suppliers and customers, while safeguarding our employees, contractors and local communities. In many ways, the pandemic brought out the best of Rio Tinto. It was inspiring to see how the organisation pulled together to support each other and their communities.

We have emerged from the challenges of the last few years with a firm commitment to become a more inclusive, respectful and caring company that values genuine partnerships with all our stakeholders. Our purpose remains to produce minerals and metals essential to human progress, and we have set out a new strategy that seeks to re-establish Rio Tinto as a leader in an industry that has a uniquely important and challenging role to play in creating a sustainable and prosperous future for people and the planet. The strategy is designed to achieve a 50% reduction in our greenhouse gas emissions by 2030 and net zero by 2050, including breakthrough technology to decarbonise the production of aluminium, one of the most energy-intensive industrial processes in the world.

We have also increased the diversity of our workforce, our management team and the Board, and have taken important steps to ensure that all our operations provide a safe, inclusive workspace, where everyone can achieve their full potential. And last, but not least, we have produced record financial results.

Let me finish by thanking my colleagues on the Board, and especially Jakob, for their hard work, commitment and dedication to Rio Tinto over the past year and for their insights, advice and support during my time as Chairman.

S R Thompson

Simon Thompson
Chairman

23 February 2022

Statement from Dominic Barton, Chair-designate

It is a great honour to succeed Simon Thompson as Chair of Rio Tinto, starting on 5 May 2022.

I am delighted to be joining the Board of this great, long-standing company of almost 150 years. Rio Tinto truly is a global business, with a dedicated and talented workforce, world-class assets, safe and well-run operations, and a strong balance sheet.

Importantly, Rio Tinto has the opportunity to make a significant contribution to society at a pivotal moment in history – by effectively facilitating the transition to a lower-carbon economy. Through our products, people, partnerships and technologies, we aim to help enable a decarbonising world, while maintaining our focus on capital discipline, pursuing growth, and delivering attractive returns to shareholders.

Building even stronger relationships with our customers, partners and local communities will be an important part of this journey, and something that I am particularly passionate about. I am also keen to ensure that we create a safe, respectful and inclusive work environment. I welcome the proactive commissioning and subsequent publication of the recent review into workplace culture at Rio Tinto, and I fully support Jakob and the management team in implementing the recommendations.

There is much work ahead as we navigate a shifting competitive landscape, grapple with the ongoing pandemic and other societal challenges, reset and strengthen relationships, progress our growth projects, and embed a change in mindset and behaviours throughout the organisation in line with Rio Tinto's new values.

I am encouraged by the company's resolve as it seeks to realise these opportunities, and I look forward to working closely with Jakob Stausholm, Peter Cunningham and my Board colleagues as we implement our strategy. With the new strategic direction that we have set in 2021, I am really excited about the opportunities that lie ahead to deliver sustainable growth for Rio Tinto, our shareholders and our wider stakeholders.

Dominic Barton
Chair-designate

23 February 2022

We have set out a new strategy that seeks to re-establish Rio Tinto as a leader in an industry that has a uniquely important and challenging role to play in creating a sustainable and prosperous future for people and the planet.

Simon Thompson
Chairman

Chief Executive's statement

2021 was a defining year as we set a new direction to take Rio Tinto forward.

When I began leading this company as Chief Executive, it quickly became clear that we needed to reset the dial with a clearer sense of purpose – putting respect for people, communities and land at the heart of our contribution. Building on our strengths and learning from our past, we are determined to shift the way we see ourselves and the world and ensure that Rio Tinto thrives in the decades to come.

Some of my first actions were to stabilise our company, start to rebuild damaged relationships, and set the overall direction to make Rio Tinto stronger. We implemented the biggest management change in our corporate history and rallied our efforts around four objectives: being the best operator, achieving impeccable environmental, social and governance (ESG) credentials, excelling in development, and strengthening our social licence.

The four objectives are underpinned by the launch of our Rio Tinto Safe Production System (RTSPS), our new strategy, and a set of simple values that connect us all as human beings – care, courage and curiosity. I am proud of the depths of talent, energy and commitment in our organisation as well as the progress we made in 2021. I know there is still much to do, and we are all committed to making Rio Tinto an even better company.

Safety above all

Safety is at the core of how we operate each and every day. Nothing matters more than the safety and wellbeing of our employees and contractors, and I am pleased that we have experienced our third consecutive year with no fatalities at our managed operations. While this is good news, being able to go home to one's family at the end of a shift should be a given, not an achievement.

I was extremely saddened when a colleague from Richards Bay Minerals (RBM) was tragically killed this year in a violent incident off-site. To ensure the safety of our team in South Africa, we made the decision to curtail operations at the site for a number of months.

Our all-injury frequency rate (AIFR) increased slightly in 2021, and we are still seeing situations where colleagues could have died, most often from falling objects or falling from heights. While we have made some safety improvements and are on the right path, every injury is one too many. We fundamentally believe that all incidents and injuries are preventable.

The ongoing pandemic has touched all of us in some way, affecting both our physical and our mental wellbeing. Sadly, we have lost colleagues around the world to this virus. Many of us also lost family and friends, saw people close to us battling COVID-19, or experienced it ourselves. Our thoughts and condolences go out to the families, co-workers and friends of all those who left us in 2021.

Over the last two years, we have continued to prioritise the safety, health and wellbeing of our people, their families and the communities where we operate. I am grateful for the incredible teamwork, resilience and care across Rio Tinto – prioritising controls, supporting government vaccination campaigns, setting up vaccination clinics near our operations, and working tirelessly to help our colleagues and communities with vital supplies and safety protection, such as in India and South Africa. I am also thankful for all those who sacrificed time away from family for extended periods as a result of COVID-19 restrictions, to help us keep the business running and deliver the products our customers need.

A strong financial performance

Despite challenging operating conditions from prolonged COVID-19 disruptions, we achieved record financial results in 2021, with net cash generated from operating activities of $25.3 billion (2020: $15.9 billion), which flowed through to free cash flow of $17.7 billion (2020: $9.4 billion). Profit after tax attributable to owners of Rio Tinto was $21.1 billion (2020: $9.8 billion) and our balance sheet remains exceptionally strong with net cash of $1.6 billion (2020: net debt of $0.7 billion).

As a result, the Board has recommended a final ordinary dividend of 417 US cents per share and a special dividend of 62 US cents per share, resulting in total shareholder returns declared this year of $16.8 billion. This is our highest total dividend ever. We recognise that these strong results were supported by the recovery of the global economy and driven by industrial production, which resulted in significant price strength for our major commodities.

Best operator

One of our key objectives is restoring Rio Tinto's reputation as the best operator in the business. We are one of the safest mining companies to work for, with pockets of operational excellence across the business, but we know that we can do better. Through RTSPS, we want to further sharpen the consistency of our performance and unlock real and sustainable improvements at each of our assets.

This is not a one-off improvement programme, but rather a journey. It is being led by our Chief Operating Officer, Arnaud Soirat, whose extensive experience is invaluable. We have begun developing and implementing RTSPS, which leverages all of our people, empowering them to develop and share sustainable, best practice solutions to define the way we work safely and optimally at Rio Tinto.

In 2021, we launched RTSPS at five different sites – our copper concentrator at Kennecott; Yandicoogina Fixed Plant and drill and blast at West Angelas, both in the Pilbara; the casthouse system at Grande-Baie in the Saguenay; and the concentrator at Iron Ore Company of Canada (IOC). We supplemented these deployments with a series of rapid improvement projects targeting short-term bottlenecks.

We are very excited about where RTSPS will take us, and we will be launching it at many more of our sites over the coming months. It has a long-term focus as we want to build momentum and ensure we facilitate deployment, maximise value and properly embed the gains for the future.

Impeccable ESG credentials

If anything became clear in the past year, it is that we must align our business priorities with society's expectations and ensure all of our stakeholders benefit from our success.

Society is demanding a greater commitment on climate change. I was fortunate to attend COP26, the UN Climate Change Conference, in Glasgow, where engaging conversations with civil society organisations, governments and other companies convinced me more than ever that Rio Tinto is an integral part of the solution. We produce materials that are necessary to the world today – and even more so for the transition to a lower-carbon planet. We recognise that we have a major carbon footprint, with significant Scope 1 and 2 emissions and very material indirect Scope 3 emissions. This is a major challenge but also a major opportunity to urgently decarbonise our business and be part of the solution the world is looking for.

In 2021, we launched our new business strategy, with the low-carbon transition at its heart. This prioritises the opportunity for growth in the materials that will enable the energy transition and accelerates the decarbonisation of our assets. We brought forward our 15% reduction target for our own Scope 1 and 2 emissions from 2030 to 2025, and we more than tripled the target for 2030, seeking to reduce our carbon footprint by 50%.

To achieve these targets, we will need to switch to renewable power, electrify processing and run electric mobile fleets, and we intend to invest about $7.5 billion in climate-related projects from now to 2030. These projects deliver a range of returns but overall are positive at a modest carbon price. Most importantly, they safeguard the integrity of our assets over the longer term and reduce the risk profile of our cash flows. Our long-term ambition remains to reach net zero by 2050.

We recognise that processing our products also generates very material indirect Scope 3 emissions. Over 90% of these Scope 3 emissions are generated in countries that have carbon neutrality pledges and 28% of our iron ore sales are directly to steel producers who have set public targets for their Scope 1 and 2 (our Scope 3) emissions, and have ambitions to reach net zero by around mid-century. In 2022, we commit to engage with all our direct iron ore customers to share information on our respective climate change goals and roadmaps, and actively seek areas of mutual collaboration on pathways to net zero.

Decarbonisation partnerships will be key – and we have seen some great examples in 2021, including with BlueScope and POSCO, to explore low-carbon steelmaking pathways. In addition, we have committed to increasing our research and development spend to speed up the development of technologies to enable our customers to decarbonise.

Culture is key to delivering on our strategy. In 2020, reflecting on how we want to think and act, we began to evolve our culture, striving to become a more outward-looking, humble and humane company. In 2021, we launched new values that we can all stand by as individuals and as a company – showing care for people, communities and the planet, having the courage to stand up for what we believe in, and being curious and open to diverse ideas and learning continuously.

"Our society and our company are both at a pivotal moment in history, with challenges and lots of hard work still ahead. But we are excited about the future."

As a company, we have made mistakes and are continuing to learn from these. We believe we can and will do better. That starts with making sure that everyone at Rio Tinto can count on a safe, respectful and inclusive workplace. In 2021, we asked experts Elizabeth Broderick & Co. to conduct an independent study to understand the experiences of our workforce and make recommendations on how we can prevent and respond to harmful behaviours such as bullying, sexual harassment, racism and other forms of discrimination in our business. At the beginning of 2022, we published the findings in a comprehensive report – these findings are deeply disturbing and I offer my heartfelt apology to every team member, past and present, who has suffered as a result of these behaviours. This is not the kind of company we want to be. The report also contained 26 detailed recommendations, all of which we will implement. I am determined that by implementing appropriate actions to address the recommendations, and with the management team's commitment to a safe, respectful and inclusive Rio Tinto in all areas, we will make positive and lasting change and strengthen our workplace culture for the long term.

We also launched an innovative, company-wide leadership programme focused on developing our most senior leaders to be the best versions of themselves. And in 2022, we have started to extend this programme to the next level of leaders throughout the company. Unlocking their full potential will help foster a high-achieving and caring culture and will be critical in achieving the business objectives and strategy we have set.

Excel in development

Our strategy also focuses on growing in materials required to support the energy transition, such as copper, lithium, aluminium and high-quality iron ore. This will ensure our portfolio remains relevant and is well-placed to meet the commodity needs of future generations.

Our ambition is to increase our investment in growth capital expenditure to up to $3 billion annually by 2023 to 2024, and to prioritise our investments in commodities that are essential for the drive to net zero. We will look for new options and innovative ways of bringing projects on stream faster, but we will only do this in line with our ESG standards and while maintaining our absolute commitment to capital discipline.

Included in the growth capital expenditure is the $2.4 billion committed to funding the Jadar lithium-borates project in Serbia. This project remains subject to receiving all relevant approvals, permits and licences. In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar Project and required all related permits to be revoked. We acknowledge concerns from the local communities and are committed to exploring all options. We are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.

In support of our commitment to the battery materials sector, in December 2021, we entered into a binding agreement to acquire the Rincon lithium project in Argentina from Rincon Mining, for $825 million. This acquisition is strongly aligned with our strategy to prioritise growth capital in commodities that support decarbonisation and to continue to deliver attractive returns to shareholders. This project holds the potential to deliver a significant new supply of battery-grade lithium carbonate, to capture the opportunity offered by the rising demand driven by the global energy transition.

We also began to broaden our approach to developing our pipeline of growth options, organic and inorganic. To support our focus on excelling in development, we will further strengthen the capabilities in project development, evaluation and execution required to create the portfolio for the next decade and beyond.

Social licence

None of our other objectives described above would be possible without trust, meaningful relationships and mutually beneficial partnerships. This is our social licence to operate. It is judged by others and is essential for our long-term future.

The 24th of May 2021 marked one year since the destruction of the rock shelters at Juukan Gorge in Western Australia. Earlier in the year, I was very grateful to meet with the Puutu Kunti Kurrama and Pinikura (PKKP) people on their land and personally express my sincere regret for the damage. Being there with them had a profound impact on me. At the end of 2021, the relationship between the PKKP leadership and Rio Tinto Iron Ore is constructive and considered. Together, we are charting new territory. This takes time, but we are moving forward on a model which is respectful and looks to provide certainty of protection for cultural heritage and mining.

Throughout the year, my colleagues and I reflected on how we interact with others, and we invested significant time and effort in resetting relationships and developing stronger connections. In my first year as Chief Executive, despite COVID-19 restrictions, I met many external stakeholders, including in Australia, Canada, the US, Serbia, Mongolia, New Zealand and Guinea – I have a deep appreciation for the importance of relationships and genuinely finding out what is on the minds of various stakeholders.

We continued to work hard to elevate our approach to social performance to the same level as we do with health, safety and environment. And we remained focused on shaping a shared future and ensuring that Indigenous communities and cultural heritage sites, wherever we operate, are treated with the care they deserve.

These efforts include growing Indigenous leadership, building cultural awareness capability and competency across the Group as well as a number of other actions to strengthen our cultural heritage approach, processes and performance more broadly and increase transparency. In 2021, we released our Communities and Social Performance Commitments Disclosure Interim Report, Rio Tinto's first report dedicated to sharing the progress on these actions.

We appreciate there is still more work to do. We know this is a long journey, and we are dedicated to working with and earning the trust of our hosts in every region where we operate worldwide.

Looking ahead

It has been an intense and extraordinary time on many levels. Our society and our company are both at a pivotal moment in history, with challenges and lots of hard work still ahead. But we are excited about the future.

We have a clear direction and strategy centred on the transition to a low-carbon economy. We are rebuilding relationships and evolving our culture, supported by simple, human values. We have world-class assets, high-quality products and a strong balance sheet. And in my travels in 2021 to our operations such as in Australia, the US and Canada, I was tremendously impressed by our talented and dedicated people, all of whom want to make a difference.

As we look ahead to our 150th anniversary in 2023, I want to thank our thousands of employees and contractors as well as host governments and communities, our customers, our shareholders and our partners. You make our success possible, and we are determined to do the right things to succeed together well into the next 150 years.

Jakob Stausholm
Chief Executive

23 February 2022

Strategic context

Our strategy is informed by a deep analysis and understanding of global megatrends across key dimensions related to geopolitics, society and technology. These trends set the context for our industry and influence commodity choices for the future of our business as well as expectations about how we produce them.

Geopolitical tensions

Economic responses to COVID-19 have differed widely and the past year has been marked by supply chain disruptions as returning demand in some jurisdictions occurred concurrently with pandemic-related production losses and logistical issues. This has resulted in uncertainty in the supply of goods and services and considerable price inflation and volatility.

In recent years, we have witnessed an evolution in the global geopolitical context, marked by an erosion of global trust in elites and institutions and a backlash in some quarters against globalisation. Despite this, we saw some renewed momentum on global collaboration to tackle climate change around the UN Climate Change Conference (COP26) in 2021.

Tensions between the US and China continue to evolve, but their economies remain closely intertwined, resulting in a mix of competition and cooperation dependent on the issues at hand, from technology leadership to climate change. Balancing our relationships with our host country governments and other stakeholders, alongside those with China as a key customer, partner and shareholder, is a strategic priority.

Climate action

Many countries and companies have announced long-term pledges to achieve net zero emissions. However, these commitments fall short of what is required to limit the global temperature rise to 1.5°C above pre-industrial levels. In recognition of this, and faced with increasing societal demands, governments are setting more ambitious targets and creating policies to support the development of low-carbon economies.

Efforts to contain a global temperature rise will create challenges and opportunities for the mining sector, and companies will need to set aside capital to tackle their carbon footprints. This is also important for our customers attempting to reduce their carbon emissions. Failure to achieve targets on time and within budget, coupled with increasing carbon prices and environmental regulations, could result in an erosion of profit, licence to operate and investor confidence.

Increasing electrification and the construction of renewable energy infrastructure will drive demand for several commodities critical for the energy transition, including lithium, copper, aluminium, green steel and related high-grade iron ore. Meanwhile, demand for fossil fuels is expected to decline as governments and companies strive to meet their carbon emissions reduction targets.

Sustainable value chains

While a lot of focus has been on reducing carbon emissions, there has been a more holistic shift towards increasingly transparent, sustainable and circular value chains. This is encouraging companies to improve their performance across a broad range of sustainability metrics and map their contributions towards the UN Sustainable Development Goals (UN SDGs).

An emerging theme in the development of more sustainable value chains is the circular economy, which is built around the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems. The concept offers a transition away from linear "take-make-use-dispose" value chains to building more sustainable and resilient supply ecosystems.

The circular economy presents a risk to primary metal demand growth in some markets, but it also offers unique growth opportunities, from scrap recycling to the monetisation of waste streams. It could also provide a pathway to greatly reduce the environmental and social impacts of metal value chains, while increasing supply security for customers. An increasing number of downstream participants are actively participating in responsible sourcing initiatives (such as the Aluminium Stewardship Initiative and the European Battery Alliance) to help create more ethical and sustainable metal supply chains.

Convergence of technologies

The continued development and cost reduction of low-carbon technologies is an ongoing trend that is accelerating many global movements, including the global energy transition and potentially future climate outcomes.

2021 saw unprecedented investment in emerging technologies that could significantly improve the sustainability of the mining sector. These include innovative carbon capture technologies, novel metal-extraction processes (for full-value mining and tailings reuse), innovative electrolyser technologies (for green hydrogen production), biofuels and environmental monitoring solutions.

The pandemic has also accelerated the use of digital solutions, such as offering customers the opportunity to buy products and conduct end-to-end digital transactions using blockchain technology. This is continuing to improve the efficiency and transparency of global value chains.

In the mining sector, technology is playing an important role in addressing productivity, growth and sustainability challenges. To find solutions, companies will increase investment in research and development in partnerships with suppliers, technology providers, start ups and other stakeholders across the value chain and other sectors.

Our strategy

In 2021, we announced a new integrated strategy bringing together a set of new commitments across three pillars of activity with four objectives guiding how we seek to improve our business. We have positioned climate change and the low-carbon transition at the heart of our strategy to strengthen our resilience and pursue new growth opportunities and partnerships. Our culture, underpinned by our new values of care, courage and curiosity, will be a key enabler in the successful execution of our new strategy and the delivery of superior returns to our shareholders and contributions to society.

The energy transition will create additional demand for our commodities – such as copper, lithium and aluminium. Iron ore will also continue to be an essential raw material for the production of steel, not only for ongoing urbanisation, but also in the development of the infrastructure needed for the low-carbon transition. We expect steel, particularly green steel, to have a bright future as the steel industry decarbonises, supporting stronger demand for high-quality iron ore. Crucially, there are often no alternatives to the commodities we produce.

At the same time, we are also part of the climate challenge. We have a major carbon footprint with significant Scope 1 and 2 emissions and very material indirect Scope 3 emissions. This needs to change and we are addressing this with urgency, deploying large-scale renewable energy and working in partnerships to develop new low-carbon technologies for both our operations and those of our customers, across our value chains.

Our new strategy has three key elements:

	Accelerate the decarbonisation of our assets	Develop products and technologies that help our customers decarbonise	Grow in materials enabling the energy transition
Commitments	To strengthen our alignment with the Paris Agreement and our long-term ambition of achieving net zero emissions by 2050: – We are bringing forward to 2025 our previous 2030 target of a 15% reduction in Scope 1 and 2 carbon emissions. – We are more than tripling our previous 2030 target from a 15% reduction to a 50% reduction in our Scope 1 and 2 emissions against our 2018 equity baseline.	Our products are essential today as enablers of the energy transition and in a net zero world, but we recognise that the processing of our products is resulting in very material indirect Scope 3 emissions. We have a role to play in the decarbonisation of the supply chains we are part of, particularly the steel value chain. We will step up our customer engagements to help them meet their Scope 1 and 2 emissions goals and will continue to work towards our 2050 ambition of net zero emissions from the shipping of our products.	The pursuit of the Paris Agreement goals will create additional demand for materials such as copper, lithium, aluminium and high-quality iron ore. These are essential enablers of the energy transition and the development of infrastructure for a low-carbon world. Our ambition is to increase our growth capital to \$3.0 billion annually in 2023 to 2024, depending on opportunities, while continuing to provide attractive returns to our shareholders.
Actions	To achieve our raised decarbonisation ambition and targets, we will switch to renewables at scale, with a priority focus in the Pilbara. We will accelerate the electrification of our mobile equipment and processes, and empower our people to think differently about energy solutions. We expect to invest an estimated \$7.5 billion in decarbonisation projects this decade, including around \$500 million in each of the next three years. In parallel, we will continue to review and enhance the resilience of our assets to physical climate risk.	We will increase our investment in research and development to speed up the development of products and technologies that will enable our customers to decarbonise. This includes the continued development of ELYSIS™ for aluminium, finding future pathways for Pilbara ores as the industry transitions to green steel, and studying a hydrogen-based hot briquetted iron (HBI) plant in Canada. Our effort will require deep collaboration across our industry and beyond, including partnerships with customers, technology providers, research institutes, governments and other stakeholders.	We will seek to grow further in copper and battery materials, and to bring additional tonnes of high-grade iron ore to market from the Iron Ore Company of Canada (IOC) and the Simandou project in Guinea. We will continue to align our exploration spend to supplement our existing growth pipeline.

Our four objectives

We recognise that our success is based on our ability to build and strengthen our resilience and form partnerships that enable us to adapt rapidly to future realities and opportunities. Delivering on our strategy depends on four objectives set out at the start of 2021: to be the best operator, to achieve impeccable environmental, social and governance (ESG) credentials, to excel in development, and to protect our social licence. These essential components will help improve productivity and reduce capital intensity, and assist us in becoming a partner of choice globally.

Best operator

Improving the consistency of the safety and operational performance across our assets is the foundation of our business. We will become the best operator by replicating capabilities from existing pockets of excellence and empowering our people.

Impeccable ESG credentials

We must ensure all our stakeholders benefit from the success of Rio Tinto. We will achieve impeccable ESG performance by aligning our business priorities with society's expectations. This is essential to the future of our business.

Excel in development

Our portfolio is well-placed to meet the commodity needs of future generations, but we also need to build a pipeline of organic and inorganic growth opportunities and establish a strong track record of capital-efficient delivery.

Social licence

Our social licence to operate is essential and will be judged by all our stakeholders. We know we need to be more responsive and humble, building meaningful relationships with our stakeholders by listening, learning and respecting diverse perspectives.

	Best operator	Impeccable ESG credentials	Excel in development	Social licence
Objective	Strong safety performance remains our first priority – we will never be complacent. We are developing and implementing the Rio Tinto Safe Production System (RTSPS) as a new, people-centric approach to engage our workforce to develop and share best practice solutions across our assets in a sustainable way.	We are integrating sustainability at the core of our business strategy, from our community work to addressing climate change. We are striving to be a responsible and trusted steward of resources and are committed to making meaningful contributions towards addressing some of the world's most urgent challenges, as captured in the United Nations Sustainable Development Goals (UN SDGs).	We are broadening our approach to developing our pipeline of growth options and are testing innovative ways of bringing projects online faster. Through it all, we will maintain our absolute commitment to capital discipline and only pursue opportunities that create value. We are also focused on further building our capabilities in business development and project execution.	We are stepping up our external engagements to develop deeper connections with all stakeholders and build mutually beneficial partnerships. We are building cultural capability and competency across the Group to ensure that we fully understand, value and partner with our host communities.
2021 Highlights	We created a new Chief Operating Officer role. We completed extensive performance benchmarking of our assets. We deployed RTSPS at five sites, supplemented by a series of rapid improvement projects (kaizens) targeting short-term bottlenecks.	We launched new Scope 1 and 2 carbon reduction targets for 2025 and 2030. We established a Communities and Social Performance (CSP) Area of Expertise and created an end-to-end CSP leadership team from all parts of our business to drive best practice, standards and assurance. We set a new standard in transparency and traceability for the aluminium industry with the launch of START™, a "nutrition label" for responsible aluminium.	We announced the aim to increase our growth capital, while maintaining our well-established capital allocation policy and discipline. We entered into a binding agreement to acquire the Rincon lithium brine project in Argentina. We announced an investment to increase low-carbon aluminium production with 16 new smelting pots at our AP60 smelter in Quebec, Canada.	We continued on our journey to improve our engagement with Traditional Owners to better understand their priorities and concerns, minimise our impacts, and responsibly manage Indigenous cultural heritage within our operations – moving to a co-management of Country model. We continued to deliver a dedicated programme to increase Indigenous leadership and employment in our business. Building on the learnings from the Australian programmes, we established a steering group in North America to develop a plan to lead, coordinate and boost Indigenous recruitment, inclusion and retention.

Our values

Reflecting on the past, how we want to evolve and how we want to think and act, we introduced a new set of values expressed in three simple words: care, courage, curiosity.

Our values connect us as human beings and guide how we work and treat each other. They are essential to build meaningful relationships and deliver on our purpose and strategy.

Care

We act with care by prioritising the physical and emotional safety and wellbeing of those around us.

We respect others, build trusting relationships and consider the impact of our actions.

We look for ways to contribute to a better future for our people, communities and the planet.

Courage

We act with courage by showing integrity, speaking up when something is not right and taking decisive action when needed.

We are not afraid to try new things.

We respond positively in difficult situations and demonstrate commitment to achieving shared goals.

Curiosity

We act with curiosity by inviting diverse ideas and collaborating to achieve more together than can be done alone.

We are continuously learning and developing ourselves, and looking for better and safer ways of doing things.

We draw inspiration from others and the world around us.

As a company, we know we may not always get it right, but we are committed to learning and improving. And through it all, safety – the essence of caring – remains our number one priority.

Our culture

Our culture is a product of Rio Tinto people's collective mindsets and beliefs, and the processes and decision-making architecture that sit across all levels of the organisation.

This culture helped us achieve zero fatalities for the third year in a row. It also underpins the resilience, commitment and teamwork of our people during the global pandemic, in supporting colleagues and host communities while delivering high-quality products to our customers.

At the same time, we know that we did not always meet expectations and aspects of our culture do not fully reflect who we aspire to be. We need to continuously evolve our culture, guided by our new values and strategy.

In particular, everyone deserves to be in a workplace free of bullying, sexual harassment, racism and other forms of discrimination – without exception. In 2021, we initiated a comprehensive, independent review of our workplace culture to better understand, prevent and respond to harmful behaviours in the workplace. The Board and Executive Committee fully endorse the recommendations set out in the report and we are grateful to everyone who came forward to share their experiences to help inform this work.

A change in mindset and behaviours is being embedded throughout the organisation. We are changing the way that we lead by investing in developing our senior leaders to be their best. Similarly, through the Rio Tinto Safe Production System (RTSPS), we are empowering and upskilling our frontline people to be more effective leaders, bringing out the best in their teams to become the safest and best operator in the industry.

We also continue to elevate our approach to social performance, including respect for cultural heritage, to the same level as we do with health, safety and environment. And we remain committed to engaging respectfully and meaningfully with Indigenous communities in every region where we operate worldwide.

A cultural shift takes time. Together, we will ensure that our values of care, courage and curiosity are reflected in all that we do – so that we can become the company we want to be and contribute to a better future for society.

Karratha Rail, the Pilbara. Western Australia.

Our stakeholders

Our business touches the lives of many people around the world. Partnerships and collaboration are essential to the long-term success of our business; they give us a competitive edge and allow us to work more thoughtfully and responsibly. We work with technology experts, universities, suppliers, governments, community groups, industry leaders and civil society organisations at all stages of the mining lifecycle, from exploration to rehabilitation and closure. By continuously engaging with our stakeholders and listening to their views, we can make a more meaningful contribution to society while becoming a more valuable company for our shareholders.

Workforce

In 2021, we focused on providing support and care to our people as we continued to face challenges and fatigue due to the ongoing COVID-19 pandemic and associated disruptions.

We also made progress in our efforts to create a more respectful workplace by changing the way we engage, interact and operate. Our people are driving the operational and cultural change that we need to become the best operator.

In 2021, we launched our new values and strategy, with our people at the centre. We believe that our values of care, courage and curiosity will drive superior performance by enabling our people and guiding our decisions and behaviours. We recognise that embedding our values will not happen overnight, and that it is part of a cultural shift that will take time. This will be a main focus for 2022.

Empowered and engaged people are key to our success. In 2021, we spent a lot of time listening and reflecting on how we can do better. To understand people's experiences of sexual harassment, bullying and racism in the workplace, we launched the Everyday Respect task force and initiated a comprehensive, independent review of our workplace culture. Following the feedback from more than 10,000 of our people, we have set out an action plan to address these issues. This will, over time, contribute to a safer, more respectful and inclusive work environment.

In our most recent employee survey, conducted in October and November, we saw that many employees like our new strategy. Our new values of care, courage and curiosity also resonated for many, who felt they have more human connection and show the type of company we want to be. However, our employee satisfaction (eSAT) score has gone down from 73 to 71. This is the first decline since 2017, and it happened across most levels, geographies and parts of the business. This is consistent with what Glint, our survey provider and expert in engagement, is seeing across organisations. After a broad increase in eSAT during the first year of the pandemic, there is a general decline across many organisations as fatigue and workload have increased. We are using these insights to guide our actions to support our colleagues and restore employee satisfaction.

Our priorities for our people focus on improving overall safety performance and health; transforming our culture to make it more inclusive and welcoming; finding ways to simplify work and make it more efficient; developing our leaders; offering competitive pay and benefits; and ensuring work-life balance, including a focus on strengthening mental health.

Communities

Communities are the places where we operate, live, work and call home – from the Pilbara, Western Australia, to KwaZulu-Natal, South Africa, to Saguenay–Lac-Saint-Jean, Quebec, Canada. Our communities are made up of people – employees, Indigenous peoples, suppliers and neighbours – with whom we strive to build long-term, positive partnerships. Our strength is built upon their strength and we want everyone to have a stake in our success. We recognise that, in parts of our business, we have work to do to meet our own standards on open, transparent engagement. We continue to strive to engage consistently and honestly with communities on issues such as jobs and local procurement as well as the impact of our operations on the local environment.

Our Communities and Social Performance (CSP) Area of Expertise has been set up and follows the same model as our well-established Health, Safety, Environment and Security (HSES) function. The CSP Area of Expertise supports and complements our asset-based teams by monitoring external societal trends, developing standards, systems and risk and assurance processes, building capability, and providing strategic and technical subject matter advice. Operational leaders within the product groups now have direct responsibility for building and maintaining relationships with their host communities, including Indigenous peoples, ensuring that they have a voice in our mine planning and decision making.

In 2021, we continued our work to rebuild trust and strengthen the relationships that were damaged by the destruction of the rock shelters at Juukan Gorge in May 2020. We are engaging with Traditional Owners in the Pilbara to modernise and improve agreements. We are also moving to an informed, consultative approach to mine development, together with a broader partnership which will enhance the protection of heritage and provide better outcomes for both Indigenous peoples and our business. More information can be found on pages 94-95.

Civil society organisations

Civil society organisations play an important role in society. They raise awareness of key issues, advocate for social change, provide input to policy development, and help to hold businesses and governments accountable for their actions. We believe that preventing and addressing the world's many complex and multifaceted environmental, social and governance challenges, such as climate change, human rights violations and bribery and corruption, can only be achieved through genuine dialogue with civil society organisations and other stakeholders. As a result, we regularly engage with civil society organisations and, although our opinions may differ from time to time, we respect their views and value the challenges they set for us to be better across different areas of our business.

Since 2018, we have held annual roundtables with civil society organisations to listen, learn and understand how we can improve. The roundtables provide an opportunity for us to explore and discuss key social, environmental and economic issues facing society and our business. They also provide an important touch point to sense check the issues that matter most to society and help us to better understand evolving expectations. The roundtables are attended by senior Rio Tinto leadership, including members of the Board and Executive Committee. In late 2021, we held three roundtables across Australia, Europe and the UK, and North America. A wide range of topics was discussed, including climate change, biodiversity and water management, human rights, Indigenous engagement and cultural heritage and transparency. A number of agreements were made regarding information-sharing and follow-up meetings, including smaller sessions where more issue and thematic focused dialogues could take place to advance progress on specific shared challenges. More information can be found on page 141.

Governments

Governments – federal, state and provincial, and local – are important stakeholders for our business. We regularly engage with officials at all levels on matters including how we explore, mine and process ore; conditions of land tenure; health, safety and environmental issues, including climate change; securities; taxation; intellectual property; competition and foreign investment; data privacy, conditions of trade and export; and infrastructure access.

We are proud of the economic contribution our business makes to governments around the world. We were the first company in our industry to disclose our payments to governments in detail, and we have been reporting on our taxes and royalties paid, and our economic contribution, in increasing detail, for more than a decade. Over the past ten years, we have paid $74 billion in taxes and royalties globally, of which 78%, or $58 billion, was paid in Australia. Corporate tax paid in 2021 was $8.5 billion (2020: $5.3 billion), which when combined with royalties and other taxes, and with our share of taxes and royalties paid by equity accounted units, resulted in payments to governments of over $13 billion (2020: $8.4 billion), including over $11 billion (2020: $6.8 billion) paid in Australia. This is important because our businesses' economic contribution to governments and communities supports the basic infrastructure of society – bridges and roads, schools and hospitals – as well as other local development priorities, like job creation and skills training.

At the global level, we engage with multilateral organisations such as the World Bank, the International Finance Corporation, the United Nations, and the Organisation for Economic Co-operation and Development (OECD). We also engage with multi-stakeholder initiatives in which governments participate, such as the Extractive Industries Transparency Initiative (EITI) and the Voluntary Principles on Security and Human Rights. These bodies help to define the industry's operating environment and contribute to joint problem solving.

Investors

Our investors include pension funds, global fund managers, bondholders, and tens of thousands of individuals around the world, including approximately 25,000 Rio Tinto employees who own shares in the company primarily through myShare, our global employee share plan. They have trusted us with their investment, and in return, they expect their investment to grow. They are also increasingly focused on how that return is made, with a shift toward supporting companies that consider long-term sustainability as part of their operations, and behave responsibly across environmental, social and governance (ESG) measures.

We engaged with current and potential investors through virtual forums for the majority of 2021, providing an opportunity for meetings with our Executive Committee, the Chairman and Non-Executive Directors. Additionally, our two annual general meetings (AGMs) in the UK and Australia provided an opportunity for all investors to question and engage with the Board. Given the growing importance of issues such as climate change, governance, social performance and environment, we present and engage regularly on these topics.

In March, we held an investor sustainability seminar focused on our approach to cultural heritage. The Chair of the Sustainability Committee, members of the Executive Committee and subject matter experts provided an update on the actions we are taking to improve the Traditional Owner partnerships and cultural heritage aspects of our business, including in the Northern Territory, Western Australia and Canada. In October, we hosted our Capital Markets Day, with the Executive Committee setting out our long-term vision, including how we will deliver value-adding growth, accelerate the decarbonisation of our portfolio, and continue to pay attractive dividends to our shareholders. In 2022, we will hold further environmental, social and governance forums in response to growing investor interest in the company's progress in a number of areas, including climate change, heritage and communities, closure and environment.

> This stakeholder section, together with our stakeholder pages in the governance section, explains how the Board takes account of stakeholder interests, our "section 172(1) Statement".

Customers

The world's journey towards achieving the goals of the Paris Agreement will require nothing less than a green-energy revolution. The minerals and metals we produce and sell to our customers are vital ingredients in meeting this challenge.

The needs of our customers are central to our operational decision making. Using the insights generated from everything we buy, sell and move around the world, our Commercial team works closely with customers to ensure that we deliver industry-leading products that meet their specific requirements. Our new offering, START Responsible Aluminium, which is the first sustainability label for aluminium using blockchain technology, is just one example of our responsiveness to customer requirements.

Building trust with our customers is critical, and it requires us to deliver on our promises consistently, and to act with care, courage and curiosity. For the third year, we asked our customers for their feedback via a survey. The insights from this survey are helping us deliver new and better products and initiatives.

Suppliers

Engaging with suppliers is an important way in which we can have a positive impact on communities. In the areas where we operate, we work hard to partner with and develop local businesses so they can share in our success. In 2021, we spent $19.4 billion with suppliers globally, including almost A$8 billion in Western Australia.

We increased our spend with Indigenous suppliers in Australia by 40% from 2020 to 2021 to A$400 million. In Mongolia, between 2010 and the end of 2021, Oyu Tolgoi spent $4.1 billion on national procurement*.

Quality relationships with our suppliers are vital to ensure that we remain at the forefront of technological and market developments, and we continually strive to improve our supplier experiences. As with our customers, we ask our suppliers to participate in a yearly survey to ensure we capture their feedback for improvement. To further support our suppliers, in 2021, we introduced new faster payment terms in Australia to ensure Indigenous, small and regional suppliers are paid more quickly.

We also continue to engage with both customers and suppliers on innovative climate change partnerships, including with BlueScope in Australia, China Baowu in China, Nippon Steel Corporation in Japan and POSCO in South Korea, to tackle emissions across the steel value chain. On the supplier side we are partnering with Komatsu and Caterpillar on zero-emissions haul trucks. More information on some of these partnerships can be found in the Innovation pages 70-71.

*Oyu Tolgoi's (OT) national procurement figure represents spend with suppliers registered in Mongolia and more than 50% owned by Mongolian citizens. It relates to the OT operations only, and does not include the underground project.

Time off in Broome. Fly-in, fly-out (FIFO) programme. Western Australia.

Our business model

Our ability to create value is underpinned by the quality of our assets, the capabilities of our people, our operational and sustainability performance, innovative partnerships, and disciplined capital allocation.

1. Explore and evaluate

We use some of the most advanced exploration technologies in the world to find potential sources of minerals and metals. We consider new commodities and products with an understanding of customers' and communities' needs. We are also mindful of our potential future social and environmental impact as well as the diversity and balance of our portfolio.

With the low-carbon transition at the heart of our business, we will continue to focus our exploration efforts on commodities essential for the energy transition. We are also evaluating emerging opportunities in the circular economy and green energy production.

2. Develop and innovate

We assess each potential opportunity with a focus on risk, potential returns, and long-term value and sustainability. Once we have approved an investment, we design and build each operation, informed by input from our partners and those stakeholders most affected. We aim to develop every potential site with safety as our first priority and to achieve optimal, long-term productivity while minimising risks and our environmental footprint. We also consider closure from the start, in the way we design, build and run every site.

We work in partnership with a growing network of stakeholders – governments, communities, customers and suppliers – who help expand our understanding, capabilities and, ultimately, our ability to be the best operator and a responsible steward of resources.

3. Mine and process

We share best practices across our assets to support safe, productive and environmentally responsible operational performances. Our operations benefit local economies by contributing training and skills development, jobs, taxes and royalties, contracts with local businesses, and social and community investment. We also support the economic diversification of regions where we are based, in alignment with national and regional development plans, ensuring host communities can thrive long after our operations close. Our ambition is for our operations to reach net zero carbon emissions by 2050.

By understanding and respecting our business partners, employees, communities and the environment, we can create sustainable value for all our stakeholders.

4. Market and deliver

We align our products with market and customer needs. Our minerals and metals are essential as enablers of the energy transition and are used in a vast array of everyday products – from electric vehicles to smartphones to skyscrapers. The transition to net zero will create additional demand for materials such as copper, lithium, aluminium and high-quality iron ore. We will support growth in these commodities while developing new technologies and products that help our customers decarbonise.

Our network of rail, ports and ships enables us to control end-to-end logistics to deliver our products safely, efficiently and reliably.

5. Repurpose and renew

We aim to design and run our assets to create a positive legacy once our mining or processing activity concludes. We engage stakeholders of our sites nearing closure – including Indigenous peoples, government, employees and host communities – and actively involve them in the planning.

Each of our sites has rehabilitation plans that we review every year. Planning and operating with the future in mind is integral to running a safe, responsible and profitable business.

Underpinned by disciplined capital allocation

Our business is underpinned by a disciplined approach to capital allocation; we strive to use every dollar prudently. Today, our balance sheet is a key strength, providing a resilient platform for strong and consistent shareholder returns, as well as enabling us to invest throughout the commodity cycle.

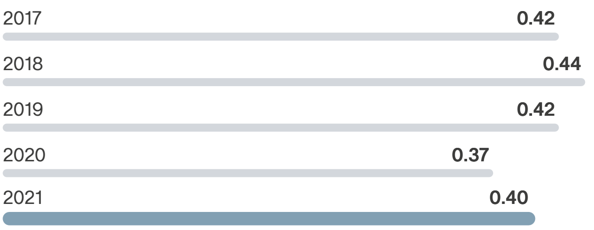
Key performance indicators

We use a range of financial and non-financial metrics to measure Group performance against our four objectives: best operator, impeccable environmental, social and governance (ESG) credentials, excel in development, and social licence.

Alignment to our four objectives

All-injury frequency rate (AIFR)

per 200,000 hours worked



Definition

The number of injuries per 200,000 hours worked by employees and contractors at the operations that we manage. AIFR includes: medical treatment cases, restricted workday and lost-day injuries.

Alignment to our four objectives

- Best operator
- Impeccable ESG credentials

Associated risks

- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

Our global workforce is the foundation of our business. Supporting our people and their safety is our number one priority; and essential to everything we do. We are committed to having a safe work environment for all our people. We focus on maintaining zero fatalities, preventing catastrophic events and reducing safety risk everywhere we work. We are a learning organisation enabling a safe, responsible and productive business that protects and cares for people. We continue to implement our safety maturity model which brings together the key elements to building a strong safety culture and leadership maturity. Our facilities developed improvement plans and continued to enhance their safety maturity throughout the pandemic-related challenges faced during 2021. We are focused and committed to strengthening our partnerships with industry and associated committees (eg ICMM), contracting partners and local communities with the priority of learning and sharing to protect everyone's health, safety and wellbeing.

Link to executive remuneration

Included as a performance metric in the safety component of the short-term incentive plan (see pages 175-176).

Our performance in 2021

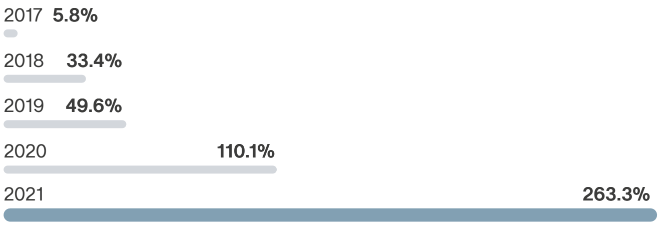
We achieved a third year in a row of zero fatalities and we had zero permanent damage injuries. Our all-injury frequency rate (AIFR) slightly increased to 0.40 from 0.37 in 2020. Fatigue, labour shortages and other pressures from COVID-19 have presented new challenges in our day-to-day operations and remind us that there is no room for complacency.

Forward plan

- Continue our critical risk management programme
- Implement enhancements to the safety maturity model programme
- Continue to implement our major hazard standards, including process safety, underground safety and tailings, and apply strong assurance processes
- Innovate to reduce exposure to safety and health risks

Total shareholder return (TSR)[1]

measured over the preceding five years (using annual average share price)



Definition

Combination of share price appreciation (using annual average share price) and dividends paid and reinvested to show the total return to the shareholder over the preceding five years.

Alignment to our four objectives

- Best operator
- Impeccable ESG credentials
- Excel in development
- Social licence

Associated risks

- Strategic
- Economic
- ESG

(see page 117)

Relevance to strategy and executive remuneration

Our strategy aims to maximise shareholder returns through the commodity cycle, and TSR is a direct measure of that.

Link to executive remuneration

Reflected in the long-term incentive plan, measured equally against the EMIX Global Mining Index and the MSCI World Index (see pages 181-182).

Our performance in 2021

TSR performance over the five-year period was driven principally by movements in commodity prices and changes in the global macro environment. Rio Tinto significantly outperformed both the EMIX Global Mining Index and the MSCI World Index over the five-year period.

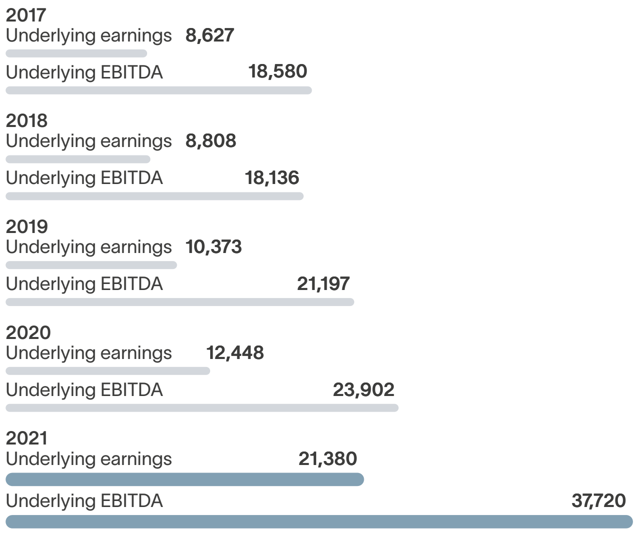
Forward plan

We will continue to focus on generating the free cash flow from our operations. This allows us to return cash to shareholders (short-term returns) while investing in the business (long-term returns).

1. The TSR calculation for each period is based on the change in the calendar-year average share prices for Rio Tinto plc and Rio Tinto Limited over the preceding five years. This is consistent with the methodology used for calculating the vesting outcomes for Performance Share Awards (PSA). The data presented in this chart accounts for the dual corporate structure of Rio Tinto.

Underlying earnings and underlying EBITDA

$ millions



Definition

Underlying earnings represent net earnings attributable to the owners of Rio Tinto, adjusted to exclude items which do not reflect the underlying performance of the Group's operations. These items are explained in note 2 of the financial statements.

Underlying EBITDA represents profit before tax, net finance items, depreciation and amortisation. It excludes the EBITDA impact of the items mentioned above.

For more information please refer to Alternative Performance Measures on pages 343-347.

Alignment to our four objectives

- Best operator

Associated risks

- Economic
- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

These financial KPIs measure how well we are managing costs, increasing productivity and generating the most revenue from each of our assets.

Link to executive remuneration

Underlying earnings are reflected in the short-term incentive plan; in the longer term, both measures influence TSR, which is the primary measure for the long-term incentive plan (see pages 180-182).

Our performance in 2021

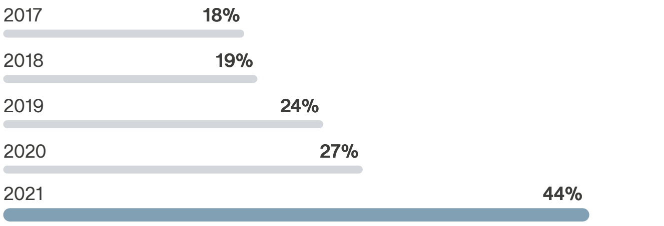
Underlying earnings of $21.4 billion were $8.9 billion higher than in 2020. Underlying EBITDA of $37.7 billion was $13.8 billion higher than in 2020. The 58% increase in underlying EBITDA resulted from higher iron ore, aluminium and copper prices, partly offset by lower sales volumes and higher energy costs.

Forward plan

We will continue to drive superior margins and returns through our focus on becoming the best operator and unlocking full potential across our value chains.

Underlying return on capital employed (ROCE)

%



Definition

Underlying return on capital employed ("ROCE") is defined as underlying earnings excluding net interest divided by average capital employed (operating assets). For more information please refer to Alternative Performance Measures on pages 343-347.

Alignment to our four objectives

- Best operator
- Excel in development

Associated risks

- Strategic
- Economic
- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

Our portfolio of low-cost, long-life assets delivers attractive returns throughout the cycle and has been reshaped significantly in recent years. Underlying ROCE measures how efficiently we generate profits from investment in our portfolio of assets.

Link to executive remuneration

Underlying earnings, as a component of underlying ROCE, is included in the short-term incentive plan. In the longer term, underlying ROCE also influences TSR, which is included in the long-term incentive plan (see pages 180-182).

Our performance in 2021

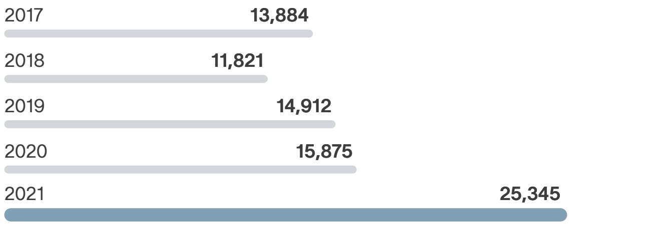
Underlying ROCE increased 17 percentage points to 44% in 2021, reflecting the increase in underlying earnings driven by higher commodity prices, partially offset by an increase in capital employed due to capital expenditure.

Forward plan

We will continue to focus on maximising returns from our assets over the short, medium and long-term. We will also maintain our disciplined and rigorous approach and invest capital only in projects that we believe will deliver returns that are well above our cost of capital.

Net cash generated from operating activities

$ millions



Definition

Cash generated by our operations after tax and interest, including dividends received from equity accounted units and dividends paid to non-controlling interests in subsidiaries.

Alignment to our four objectives

- Best operator

Associated risks

- Economic
- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

This KPI measures our ability to convert underlying earnings into cash.

Link to executive remuneration

Included in the short-term incentive plan; in the longer term, the measure influences TSR, which is included in the long-term incentive plan (see pages 180-182).

Our performance in 2021

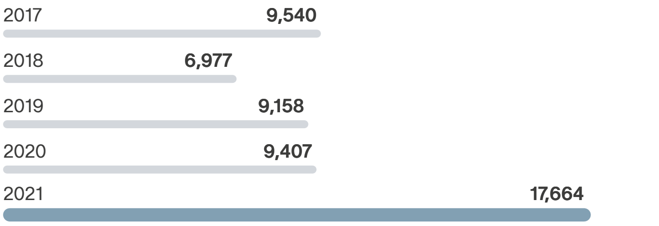
Net cash generated from operating activities of $25.3 billion was 60% higher than 2020. This was primarily due to higher commodity prices, partially offset by higher taxes paid, higher dividends paid and an increase in working capital.

Forward plan

We will focus on effectively converting earnings into cash, underpinned by operational and commercial excellence, including our careful management of working capital.

Free cash flow

$ millions



Definition

Free cash flow is defined as net cash generated from operating activities minus purchases of property, plant and equipment and intangibles and payments of lease principal, plus proceeds from the sale of property, plant and equipment and intangible assets. For more information please refer to Alternative Performance Measures on pages 343-347.

Alignment to our four objectives

- Best operator
- Excel in development

Associated risks

- Strategic
- Economic
- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

This KPI measures the net cash returned by the business after the expenditure of sustaining and growth capital. This cash can be used for shareholder returns, reducing debt and other investment.

Link to executive remuneration

Included in the short-term incentive plan; in the longer term, the measure influences TSR, which is included in the long-term incentive plan (see pages 180-182).

Our performance in 2021

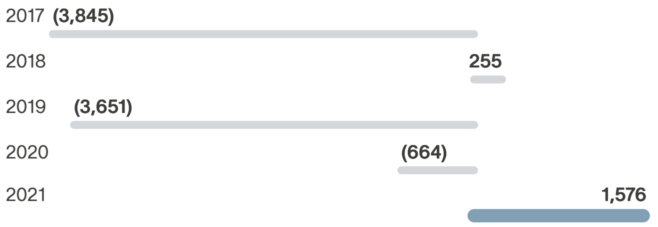
Free cash flow increased by $8.3 billion to $17.7 billion in 2021, primarily due to the increase in net cash generated from operating activities. This was partially offset by an increase in replacement and development capital expenditure as we ramp up our projects.

Forward plan

We will focus on effectively converting earnings into cash, underpinned by operational and commercial excellence, including our careful management of working capital.

Net cash/(debt)

$ millions



Definition

Total borrowings plus lease liabilities less cash and cash equivalents and other liquid investments, adjusted for derivatives related to net cash/(debt) (see note 23 of the financial statements). For more information please refer to Alternative Performance Measures on pages 343-347.

Alignment to our four objectives

- Best operator
- Excel in development

Associated risks

- Strategic
- Economic
- Operational
- ESG

(see page 117)

Relevance to strategy and executive remuneration

This measures how we are managing our balance sheet and capital structure. A strong balance sheet is essential for giving us flexibility to take advantage of opportunities as they arise, and for returning cash to shareholders.

Link to executive remuneration

Net cash/(debt) is, in part, an outcome of free cash flow, which itself is reflected in the short-term incentive plan. In the longer term, net cash/(debt) influences TSR, which is reflected in the long-term incentive plan (see pages 180-182).

Our performance in 2021

Net debt decreased by $2.2 billion to a net cash position of $1.6 billion. This reflects $17.7 billion of free cash flow in 2021, partially offset by $15.4 billion of cash returns to shareholders through dividends.

Forward plan

We will focus on effectively converting earnings into cash, underpinned by operational and commercial excellence, including our careful management of working capital.

Scope 1 and 2 greenhouse gas emissions

(equity Mt CO_2e)

2018[1]	32.5
2019	31.5
2020	31.5
2021	31.1

Prior to 2018 we reported our greenhouse gas emissions on a 100% managed basis.

1. The 2018 figure is the baseline for our 2025 and 2030 emissions targets and has been adjusted for acquisitions and divestments.

Definition

Equity greenhouse gas emissions: equity share of Scope 1 and 2 emissions from managed and non-managed operations expressed in million metric tonnes of carbon dioxide equivalent.

Alignment to our four objectives

- Best operator
- Impeccable ESG credentials
- Excel in development
- Social licence

Associated risks

- Strategic
- ESG

(see page 117)

Relevance to strategy and executive remuneration

Climate risks and opportunities have formed part of our strategic thinking and investment decisions for over two decades. We have put the net zero transition at the heart of our business strategy; combining actions to reduce greenhouse gas emissions from our assets with investments in commodities that enable the energy transition, so that we can provide products that will help our customers to decarbonise.

Link to executive remuneration

Climate change is included in our ESG metrics for executive remuneration with a weighting of 5% of the short-term incentive plan. In 2021, the business achieved the approval of 0.26Mt CO_2e of abatement projects and exceeded the total 0.5Mt CO_2e targeted for 2020 and 2021. For more information, see page 177.

Our performance in 2021

Our absolute emissions in 2021 were 31.1Mt CO_2e, 4% below our 2018 equity emissions baseline. The reductions achieved since 2018 are primarily the result of switching to renewable electricity contracts at Kennecott in the US and the Escondida mine in Chile (managed by BHP; Rio Tinto owns 30%), and also relate to unplanned operational disruptions in 2021 at Richards Bay Minerals in South Africa and the Kitimat aluminium smelter in Canada.

Forward plan

As part of our new Group strategy, we announced new targets in 2021 and aim to reduce absolute emissions by 15% by 2025 and by 50% by 2030. We are committed to reaching net zero emissions by 2050. Our decarbonisation roadmap to meet these targets is detailed in the Climate Action Plan section of our 2021 Climate Change Report, which can be found at riotinto.com/climatereport.

Gender diversity

Representation of women within our workforce

2017	18.0%
2018	17.7%
2019	18.4%
2020[2]	19.0%
2020[2]	20.1%
2021	21.6%

2. Baseline reset with definition for 2020 to 2021 gender diversity.

Definition

Includes our total workforce based on managed operations (excludes the Group's share of non-managed operations and joint ventures)[3].

Alignment to our four objectives

- Best operator
- Impeccable ESG credentials
- Social licence

Associated risks

- Strategic
- ESG

(see page 117)

Relevance to strategy and executive remuneration

Inclusion and diversity are imperative for the sustainable success of the business. Our sustained performance and growth rely on having workforce diversity that is representative of the communities in which we operate and having a workplace where people are valued for who they are and encouraged to contribute to their full potential.

Link to executive remuneration

In 2021, our target was to increase the proportion of women in our workforce by 2%. This target is included in our ESG metrics for executive remuneration, with a weighting of 5% of the short-term incentive plan. For more information, please see page 177.

Our performance in 2021

In 2021, we increased our representation of women by 1.5%, from 20.1% to 21.6%. This falls short of our 2% target. However, it is the largest increase in gender diversity in the past five years. The increases were distributed across all levels of the organisation, with senior leaders increasing from 26.1% to 27.4% and managers increasing by 1.7% to 31.9%.

Forward plan

Our target to increase the proportion of women in our workforce by 2% year on year will continue in 2022. We will keep promoting initiatives to support this target, including the Everyday Respect task force recommendations. For more information, please see page 101.

3. In 2020, we updated our definition of our total workforce to include those employees who were unavailable for work (eg on parental leave) and temporary contractors. Note: less than 1% of the workforce gender is undeclared.

Chief Financial Officer's statement

We have an outstanding foundation of long-life assets, producing vital commodities for a decarbonising world.

Net cash generated from operating activities

$25.3bn

(2020: $15.9bn)

Profit after tax attributable to owners of Rio Tinto (net earnings)

$21.1bn

(2020: $9.8bn)

Underlying earnings

$21.4bn

(2020: $12.4bn)

Robust financial results

The recovery of the global economy resulted in significant price strength for our major commodities. We maintained our financial discipline throughout 2021 and were able to capture around 80% of the price uplift, achieving record financial results, with net cash generated from operating activities of $25.3 billion, underlying earnings of $21.4 billion and net earnings of $21.1 billion.

Our financial position is strong and stable and we ended the year with a net cash position of $1.6 billion. However, we are not satisfied with our operating performance and progress on our capital projects has been challenging. Our teams continue to adapt to difficult conditions with COVID-19 still prevalent, creating significant restrictions on the availability of labour and supply chains. The Rio Tinto Safe Production System has a long-term focus to ensure we properly embed any gains for the future, including enhancing operating and leadership capabilities. However, we are not ignoring the near term and are already rolling out this significant improvement programme.

Disciplined allocation of capital remains at our core

There is one thing that will not change at Rio Tinto, and that is our approach to capital discipline. Our aim is to invest consistently through the cycle, balancing near-term returns to shareholders with reinvestment and de-risking future cash flows. It involves carefully testing all opportunities and taking controlled risks.

"Over the last six years, we have paid out at the top end of the range for the ordinary dividend at 60% of underlying earnings."

We are focusing on the highest risk areas and ensuring that all capital is deployed with discipline. Essential capital expenditure to maintain future cash flows remains our priority for capital allocation. It includes sustaining capital to ensure the integrity of our assets, high-returning replacement projects and investment to increase and accelerate decarbonisation. This latter investment is set to rise in line with our strategic priorities, with our focus over the next three years on repowering the Pilbara with renewables.

Our next priority is the ordinary dividend within our well-established returns policy. We then test investment in compelling growth against debt management and additional cash returns to shareholders.

In 2021, we increased our capital expenditure overall by 19% to $7.4 billion, targeting disciplined investment in key projects and commodities. This was comprised of $0.6 billion of growth capital, $3.3 billion of replacement and $3.5 billion of sustaining capital. Our most significant growth project remains the Oyu Tolgoi copper/gold underground mine in Mongolia where we invested around $0.6 billion, on a 100% basis as we fully consolidate Oyu Tolgoi. Much of the 2021 increase in capital relates to our Pilbara replacement iron ore mines as we ramped up the pace of construction.

Attractive dividends remain paramount

Our shareholder returns policy dates back to 2016. We have committed to returning 40 to 60% of underlying earnings on average through the cycle, with additional returns in periods of strong earnings and cash generation. It is tried and tested and has resulted in record returns. It is a variable policy, in terms of the absolute number, with the denominator moving up and down, mostly in line with commodity prices.

We have paid out at the top end of the range for the ordinary dividend at 60% of underlying earnings. Overall, due to our strong cash flows, we have consistently exceeded the policy, with a total payout ratio averaging 74% over the last six years, when you include special dividends and share buy-backs and exclude divestment proceeds. For 2021, we are returning 79% of underlying earnings to shareholders. This is comprised of the full year ordinary dividend of 793 US cents per share and special dividend of 247 US cents per share, bringing the total dividend to 1,040 US cents, or $16.8 billion. While encouraged by growth prospects in the coming year, we remain vigilant in relation to potential disruption from new COVID-19 variants and geopolitical tensions.

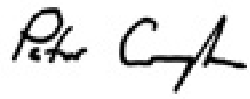
We see the dividend as paramount for maintaining discipline. Our financial strength means that we can reinvest for growth, accelerate our decarbonisation and continue to pay attractive dividends through the cycle.

Strong foundation for growth, decarbonisation and shareholder returns

We have an outstanding foundation of long-life assets, producing vital commodities for a decarbonising world. Our balance sheet is stronger than ever and we have a world-class pipeline of projects.

This means that we have the financial capacity for our ambition to double investment in value-adding growth and accelerate the decarbonisation of our portfolio, while continuing to pay attractive dividends in line with our policy.

By accelerating our own decarbonisation transition, we will de-risk the company, generate growth, maintain our financial discipline and enhance our competitive advantage.



Peter Cunningham
Chief Financial Officer

23 February 2022

“We have the financial capacity for our ambition to double investment in value-adding growth and accelerate the decarbonisation of our portfolio, while continuing to pay attractive dividends in line with our policy.”

Financial review

Non-GAAP measures

In addition to IFRS measures, management uses non-GAAP measures internally to assess performance. Full reconciliations are provided on pages 343-347. These measures are highlighted with the symbol: ●

At year end	2021	2020	Change
Net cash generated from operating activities (US$ millions)	**25,345**	15,875	60%
Purchases of property, plant and equipment and intangible assets (US$ millions)	**7,384**	6,189	19%
Free cash flow[1] (US$ millions) ●	**17,664**	9,407	88%
Consolidated sales revenue (US$ millions)	**63,495**	44,611	42%
Underlying EBITDA[1] (US$ millions) ●	**37,720**	23,902	58%
Profit after tax attributable to owners of Rio Tinto (net earnings) (US$ millions)	**21,094**	9,769	116%
Underlying earnings per share[1] (EPS) (US cents) ●	**1,321**	770	72%
Ordinary dividend per share (US cents)	**793.0**	464.0	71%
Special dividend per share (US cents)	**247.0**	93.0	166%
Total dividend per share (US cents)	**1,040.0**	557.0	87%
Net cash / (debt)[1] (US$ millions) ●	**1,576**	(664)	
Underlying return on capital employed (ROCE)[1] ●	**44%**	27%	

Our financial results are prepared in accordance with International Financial Reporting Standards (IFRS). Footnotes are set out on page 35.

Key financial highlights

- $25.3 billion net cash generated from operating activities was 60% higher than 2020 driven by higher prices. This flowed through to 88% higher free cash flow[1] of $17.7 billion, which included a 19% rise in capital expenditure to $7.4 billion.
- $21.1 billion of net earnings, 116% higher than 2020, reflected the higher prices, the impact of closure provision increases at Energy Resources of Australia (ERA) and other non-operating sites, $0.5 billion of exchange and derivative gains and $0.2 billion of impairments[2]. Effective tax rate on net earnings of 27.7% compared with 33.1% in 2020.
- $37.7 billion underlying EBITDA[1] was 58% above 2020, with an underlying EBITDA margin[1] of 57%.
- $21.4 billion underlying earnings[1] (underlying EPS[1] of 1,321.1 US cents) were 72% above 2020 with a 28.0% effective tax rate on underlying earnings[1], compared with 29.5% in 2020.
- $1.6 billion of net cash[1] at year end, compared with net debt[1] of $0.7 billion at the start of the year, reflected the free cash flow[1] of $17.7 billion, partly offset by $15.4 billion of cash returns to shareholders.
- $16.8 billion full-year dividend, equivalent to 1,040 US cents per share and 79% of underlying earnings, includes $6.7 billion record final ordinary dividend (417 US cents per share) and $1.0 billion final special dividend (62 US cents per share) declared today.

$16.8 billion* of dividends declared for 2021: payout ratio averages 74% over past six years

Ordinary dividend	US$ billion	US cents per share
Interim ordinary dividend paid in September 2021	6.1	376
Final ordinary dividend to be paid in April 2022	6.7	417
Full-year ordinary dividend represents 60% payout	12.8	793
Additional returns		
Special dividend paid in September 2021	3.0	185
Special dividend to be paid in April 2022	1.0	62
Combined total is 79% of 2021 underlying earnings	16.8	1,040

* Based on weighted average number of shares and declared dividends per share for the respective periods excluding foreign exchange impacts on payment.

Strong cash flow from operations

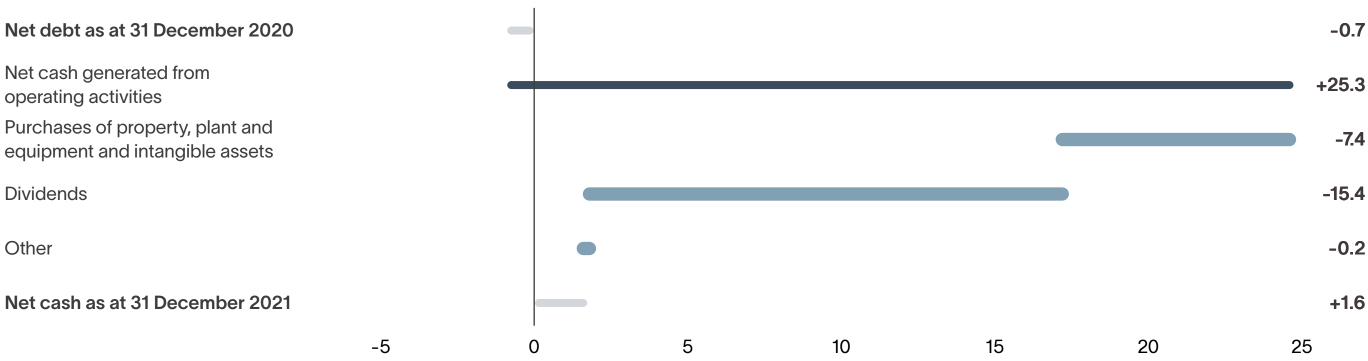
	2021 US$m	2020 US$m
Net cash generated from operating activities	**25,345**	15,875
Purchases of property, plant and equipment and intangible assets	**(7,384)**	(6,189)
Sales of property, plant and equipment	**61**	45
Lease principal payments	**(358)**	(324)
Free cash flow[1]	**17,664**	9,407
Disposals	**4**	10
Dividends paid to equity shareholders	**(15,357)**	(6,132)
Share buy-backs	**—**	(208)
Other	**(71)**	(90)
Decrease in net debt[1]	**2,240**	2,987

Footnotes are set out on page 35.

- $25.3 billion in net cash generated from operating activities, 60% higher than 2020, primarily driven by higher prices for our major commodities, which also led to an increase in dividends received from equity accounted units and paid to joint venture partners. It is net of an increase in taxes and royalties paid in line with higher profits and a rise in working capital, primarily due to higher iron ore portside inventories following higher volumes of SP10 and constrained availability of high-grade blending stocks in the fourth quarter.
- $7.4 billion capital expenditure was comprised of $0.6 billion of growth capital, $3.3 billion of replacement capital and $3.5 billion of sustaining capital. In 2021, we funded our capital expenditure from operating activities and expect to continue funding our capital programme from internal sources, except for the Oyu Tolgoi underground development, which is currently project-financed.
- $15.4 billion of dividends paid in 2021 was comprised of the 2020 final paid in April 2021 ($6.4 billion) and the 2021 interim paid in September ($9.0 billion, including foreign exchange impacts).
- As a result of the above, net debt[1] improved by $2.2 billion in 2021, ending the year with net cash[1] of $1.6 billion.

Net debt turned into net cash at 2021 year-end

($ billion)



Our projects and development options

- We increased our exploration and evaluation spend by 16% to $726 million in 2021, as we advanced our evaluation projects, progressed our greenfield exploration programmes and unlocked new opportunities.
- Commissioning and ramp-up of Pilbara growth and brownfield mine replacement projects has been impacted by ongoing COVID-19 restrictions, including labour access and supply chain quality issues. The latter have been exacerbated by an inability to conduct pre-delivery quality assurance and control at international steel and equipment manufacturers due to limitations on travel.
  - The $2.6 billion[3] Gudai-Darri greenfield iron ore mine in Western Australia is advancing. The first train was loaded from the mobile crushing and screening facilities in December and first production from the main plant is expected in the second quarter of 2022, subject to the continuing impacts of COVID-19. This first phase of Gudai-Darri, with a 43 million tonne annual capacity, will replace depleting orebodies and provide some incremental capacity.
  - The $0.9 billion[3] (Rio Tinto share) investment in the Robe River Joint Venture replacement iron ore mines is progressing. First ore at West Angelas (C and D deposits) was achieved in June and are now fully commissioned. First ore at Robe Valley (Mesa B, C, H) was achieved in August. Ongoing Mesa A wet plant construction and commissioning challenges have impacted production ramp-up. New wet plant components are on order and production will operate at a reduced capacity until repairs are completed.
  - The $0.8 billion[3] Western Turner Syncline phase 2 mine, which will also replace existing iron ore production, achieved first ore in October, following commissioning of the autonomous mining truck fleet. Some residual brownfield plant works are due to be complete during mid-year shutdowns.
- Underground operations are now under way at the Oyu Tolgoi underground copper/gold project in Mongolia, following the comprehensive agreement reached with our partners on 25 January 2022. Sustainable production is expected in the first half of 2023, with the capital forecast at $6.925 billion, including $175 million of estimated COVID-19 impacts to the end of 2021[4].
- The $0.9 billion first phase of the south wall pushback at Kennecott in the US, extending mine life to 2026, is now complete and we are gradually accessing higher copper grades. Stripping for the $1.5 billion second phase, extending operations to 2032, remains on track. In July, we announced a $108 million investment for underground characterisation studies: potential underground mining would occur concurrently with open pit operations and result in increased output.
- At the Jadar lithium-borates project, we committed $2.4 billion of funding in July, subject to receiving all relevant approvals, permits and licences. In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We are disappointed by this announcement and are committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.
- The Zulti South project at Richards Bay Minerals (RBM) in South Africa remains on full suspension.
- At the Winu copper-gold project in Western Australia, there has been progress towards securing consent from the Traditional Owners to the Project Agreement in advance of submitting the necessary environmental and regulatory approvals. Drilling, fieldwork and study activities continue to progress to schedule.
- At the Resolution Copper project in Arizona, we continue to work with the US Forest Service to secure approval of the Final Environmental Impact Statement. In parallel, mine studies and engagement with the Native American tribes and local communities continue to progress.
- At the Simandou iron ore project in Guinea, we continue to engage with key stakeholders in-country including the Government of Guinea. We remain committed to an inclusive partnership, seeking mutual and sustainable benefits by developing our project in line with international social and environmental standards. A new drilling programme has commenced, and expressions of interest are being sourced for construction and early development works expected to be carried out in 2022.

Underlying EBITDA and underlying earnings by product group

	Underlying EBITDA			Underlying earnings		
	2021	2020 Adjusted	Change	2021	2020 Adjusted	Change
Year ended 31 December	US$m	US$m	%	US$m	US$m	%
Iron Ore	27,592	18,837	46%	17,323	11,398	52%
Aluminium	4,382	2,152	104%	2,468	471	424%
Copper	3,969	2,084	90%	1,579	754	109%
Minerals	2,603	1,710	52%	888	580	53%
Reportable segment total	38,546	24,783	56%	22,258	13,203	69%
Other operations	(28)	24	(217)%	(84)	(48)	75%
Inter-segment transactions	42	(94)	(145)%	19	(32)	(159)%
Product group total	38,560	24,713	56%	22,193	13,123	69%
Central pension costs, share-based payments, insurance and derivatives	110	117	(6)%	133	118	13%
Restructuring, project and one-off costs	(80)	(133)	(40)%	(51)	(108)	(53)%
Other central costs	(613)	(545)	12%	(585)	(455)	29%
Central exploration and evaluation	(257)	(250)	3%	(215)	(216)	—%
Net interest				(95)	(14)	579%
Total	37,720	23,902	58%	21,380	12,448	72%

The financial information by Product group has been recast in accordance with the organisational restructure announced on 28 January 2021. See page 320 for further information. Underlying EBITDA and underlying earnings are non-GAAP alternative performance measures ("APMs") used by management to assess the performance of the business, and provide additional information which investors may find useful. APMs are reconciled to directly comparable IFRS financial measures on pages 343 to 347.

Continuing to prioritise our central exploration programmes

We have a strong portfolio of exploration projects with activity in 18 countries across seven commodities in early exploration and studies stages, reflected in our pre-tax central spend of $257 million. All projects have followed government COVID-19 requirements, while focusing on protecting the wellbeing and health of local communities. In 2021, we continued to prioritise our exploration portfolio, with a particular focus on copper projects in Australia, Canada, United States, Kazakhstan and Zambia and increased activity on greenfield nickel projects in Canada and Finland. We continue to partner with other companies in all regions where we explore: examples are our agreement with KoBold Metals for copper and nickel exploration and our agreement with Western Copper and Gold Corporation, where we made a strategic investment to advance exploration on the Casino copper-gold project located in Yukon, Canada. We also signed a mineral investment contract with the Republic of Angola and Endiama to explore for diamonds, and continued mine-lease exploration at our managed businesses including Pilbara Iron in Australia and Diavik in Canada. We renewed our exploration technology strategy and further invested in technology to support our exploration teams on the ground.

Commentary on financial results

To provide additional insight into the performance of our business, we report underlying EBITDA and underlying earnings. The principal factors explaining the movements in underlying EBITDA are set out in this table.

	US$m
2020 underlying EBITDA	**23,902**
Prices	17,464
Exchange rates	(606)
Volumes and mix	(583)
General inflation	(690)
Energy	(398)
Operating cash unit costs	(1,051)
Higher exploration and evaluation spend	(101)
Non-cash costs/other	(217)
2021 underlying EBITDA	**37,720**

Strong financial results driven by significant momentum from higher prices

We have continued to safely run our world-class assets and are working hard to improve our operational performance, despite challenging operating conditions from prolonged COVID-19 disruptions. The recovery of the global economy resulted in significant price strength for our major commodities: we maintained our financial discipline in 2021 and were able to retain around 80% of the benefit from higher prices, achieving record financial results.

The strong commodity prices drove a $17,464 million uplift in underlying EBITDA compared with 2020. This was primarily from the strength in the Platts index for 62% iron fines, partially offset by a higher proportion of lower quality products (+$11,589 million). Higher London Metal Exchange (LME) prices were the main driver for a significant price uplift for copper (+$1,896 million) and for our Aluminium business (+$3,027 million). We have included a table of prices and exchange rates on page 418.

The 2021 monthly average Platts index for 62% iron fines converted to an FOB basis was 45% higher on average compared with 2020. There was a strong resurgence in demand for iron ore, with global crude steel production estimated to have grown by 6%. Chinese demand strength was most apparent in the first half of 2021 while the recovery in demand for steel and iron ore in developed and other emerging economies maintained its momentum. At the same time, seaborne iron ore supply recovered, albeit at a slower than anticipated rate.

The average LME price for copper was 50% higher, while the LME aluminium price was 46% higher, compared with 2020. The gold price rose 2%.

The mid-west premium duty paid for aluminium in the US averaged $584 per tonne, 119% higher than in 2020.

Australian and Canadian dollars strengthened during 2021

Compared with 2020, on average, the US dollar weakened by 9% against the Australian dollar, by 7% against the Canadian dollar and by 11% against the South African rand. Currency movements lowered underlying EBITDA by $606 million relative to 2020.

Lower iron ore sales volumes impact underlying EBITDA

Lower sales volumes and changes in product mix across the portfolio reduced underlying EBITDA by $583 million compared to 2020. This was mostly attributable to a 3% decline in iron ore shipments from the Pilbara, as a result of above average rainfall in the first half of the year, our focus on cultural heritage management and delays in growth and brownfield mine replacement tie-in projects. Other key variances included lower volumes at Iron Ore Company of Canada (labour and equipment availability challenges) and reduced copper sales volumes at Escondida (prolonged COVID-19 impact leading to lower recoveries and throughput). These were partly offset by higher product premiums in our Aluminium business, increased gold sales from Oyu Tolgoi (the significant improvement in grades is expected to reverse in 2022) and higher refined copper sales at Kennecott despite a furnace failure in September 2021 (2020 was significantly impacted by an earthquake and a major smelter maintenance shutdown).

1. This financial performance indicator is a non-GAAP Alternative Performance Measure (APM). It is used internally by management to assess the performance of the business and is therefore considered relevant to readers of this document. It is presented here to give more clarity around the underlying business performance of the Group's operations. APMs are reconciled to directly comparable IFRS financial measures on pages 343 to 347.
2. Refer to page 243 for pre-tax analysis of impairment charge.
3. Potential for capital cost to rise by around 15% due to ongoing COVID-19 restrictions on commissioning and ramp-up of Pilbara growth and brownfield mine replacement projects, including labour access and supply chain quality issues. The latter has been exacerbated by an inability to conduct pre-delivery quality assurance and control at international steel and equipment manufacturers due to limitations on travel.
4. These estimates exclude any impacts of delays to work schedules caused by restricted approved budgets since the start of 2021. This, together with any ongoing COVID-19 impacts, will be assessed following the commencement of underground operations with further updates provided to the market in due course. Panels 1 and 2 studies will be ongoing throughout 2022. Further study work is also under way to assess the extraction methodology and ultimate recovery of the Panel 0 recoverable pillars.

Impact of rising inflation and rebound in energy prices

Average movements in energy prices compared with 2020 reduced underlying EBITDA by $398 million, mainly due to higher diesel prices for our trucks, trains and ships and an increase in power costs at Kennecott. Rising general price inflation across our global operations resulted in a $690 million reduction in underlying EBITDA.

Focus on cost control

We remained focused on cost control throughout the year, in particular maintaining discipline on our long-run fixed costs: however, a rise in our operating cash unit costs reduced underlying EBITDA by $1,051 million (on a unit cost basis) compared with 2020. This reflects fixed cost inefficiencies from the reduction in volumes, along with temporary cost pressures over and above general inflation, reflecting higher market-linked prices for raw materials and the constraints that COVID-19 has placed on resourcing and supply chains. We also made targeted investments in our ESG and CSP teams in 2021, in order to advance our social licence priorities. Unit costs at our Pilbara iron ore operations rose to $18.6 per tonne ($19.1 per tonne including COVID-19 costs) contributing to the variance, reflecting: higher input prices, including labour and explosives, an increase in the mine work index, operational readiness costs for our growth and brownfield mine replacement tie-in projects and fixed cost inefficiencies from lower volumes. At our Aluminium business, we incurred cyclical cost increases for coke, pitch and alloys, while our Bauxite business in Queensland experienced higher maintenance costs following overruns on planned shutdowns. These cost pressures were partly offset by fixed cost efficiencies at Oyu Tolgoi in line with higher copper and gold production.

Increasing our global exploration and evaluation activity

We increased our exploration and evaluation spend by $101 million, or 16%, to $726 million. This was focused on our greenfield programmes across 18 countries and our highest value evaluation projects, particularly the Winu copper-gold project in Western Australia, Resolution Copper in Arizona, Simandou iron ore in Guinea and Jadar lithium-borates in Serbia.

Non-cash costs/other

Movements in non-cash costs, one-off and other items lowered underlying EBITDA by $217 million compared with 2020. This mainly reflected the impact of community disruption at RBM in 2021 (-$162 million); reduced capacity at the Kitimat aluminium smelter (-$280 million) following the strike which commenced in July, with agreement reached in October; and additional provisions (-$218 million), mainly environmental, for our legacy operations and Pacific Aluminium smelters. This was partly offset by the non-recurrence of the pot failures at Kitimat in 2020 ($206 million) and the impact of community disruption at RBM in 2020 ($91 million). COVID-19 costs across the Group were $39 million lower than in 2020.

Net earnings

$21.1bn

116% increase

Net earnings

The principal factors explaining the movements in underlying earnings and net earnings are set out here.

	US$m
2020 net earnings	**9,769**
Total changes in underlying EBITDA	13,818
Increase in depreciation and amortisation (pre-tax) in underlying earnings	(372)
Decrease in interest and finance items (pre-tax) in underlying earnings	(100)
Increase in tax on underlying earnings	(3,574)
Increase in underlying earnings attributable to outside interests	(840)
Total changes in underlying earnings	**8,932**
Changes in exclusions from underlying earnings:	
Movement in net impairment charges	918
Gain on recognition of a new wharf at Kitimat, Canada	336
Movement in exchange differences and gains/losses on debt	1,810
Movement in closure estimates (non-operating and fully impaired sites)	(671)
2021 net earnings	**21,094**

Depreciation and amortisation, net interest, tax and non-controlling interests

The depreciation and amortisation charge was $372 million higher than 2020, mainly due to the impact of the stronger Australian and Canadian dollars against the US dollar.

Lower interest and finance items (pre-tax) were reflective of a lower level of net debt on average during the year, in part due to repayment of $526 million of Euro Bonds, which matured in May 2020. It also reflected more of our debt being at floating interest rates and lower LIBOR rates.

The 2021 effective corporate income tax rate on underlying earnings, excluding equity accounted units, was 28.0%, compared with 29.5% in 2020, mainly due to the re-recognition of deferred tax assets in Australia. The effective tax rate on underlying earnings in Australia was 30% in 2021 compared with 32% in 2020. We anticipate an effective tax rate on underlying earnings of approximately 30% in 2022.

Items excluded from underlying earnings

Net impairment charges decreased by $918 million compared with 2020. In 2021, we impaired the value of the Kitimat aluminium smelter by $197 million: as a result of a workforce strike in mid-2021, output was reduced to 25% and ramp-up to full capacity will extend through 2022, giving rise to an impairment test. In 2020, we recognised $1,115 million of impairment charges, consisting of $472 million related to three of our Pacific Aluminium smelters (NZAS, Bell Bay and Boyne), $131 million related to the ISAL smelter in Iceland, $220 million for the Sohar smelter in Oman and $292 million related to our interest in the Diavik Diamond Mine.

There is a detailed explanation of the impairment process on pages 243 to 245.

On 3 December, we gained control over a new wharf at Kitimat, Canada that was built and paid for by LNG Canada. The $336 million gain on recognition has been excluded from underlying earnings on the grounds of materiality and linkage to the impairment.

In 2021, we recognised non-cash exchange and derivative gains of $546 million. This was mainly on US dollar debt in non-US dollar functional currency Group companies, intragroup balances, and the revaluation of certain derivatives which do not qualify for hedge accounting. These gains compared with a 2020 loss of $1,264 million, giving rise to a positive year-on-year movement of $1,810 million. The exchange gains are largely offset by currency translation losses recognised in equity. The quantum of US dollar debt is largely unaffected and we will repay it from US dollar sales receipts.

In 2021, we recognised a $671 million increase in closure costs relating to the Diavik Diamond Mine, Gove refinery, ERA and some of our legacy sites, where the environmental impact preceded our ownership. The adjustments at ERA and the Gove refinery have been recognised in the income statement as these are non-operating sites, and excluded from underlying earnings due to the magnitude of the individual updates and materiality when aggregated. In 2020, we initially recognised an increase in the Diavik closure provision based on our preliminary findings from the pre-feasibility study. On completion of the study in 2021 a true-up was recorded and has been excluded, in line with the treatment of the initial increase in 2020, which was excluded from underlying earnings as Diavik was fully impaired during the year. Other closure costs excluded in 2020 were the increase in the Gove refinery provision offset by a decrease in the Argyle mine provision on completion of pre-feasibility studies at each site. These are included in Movement in closure estimates. Further analysis can be found on page 240.

Profit

Net earnings and underlying earnings refer to amounts attributable to the owners of Rio Tinto. The net profit attributable to the owners of Rio Tinto in 2021 was $21.1 billion (2020: $9.8 billion). We recorded a profit after tax in 2021 of $22.6 billion (2020: $10.4 billion) of which a profit of $1.5 billion (2020: $0.6 billion) was attributable to non-controlling interests.

Net earnings and underlying earnings

The differences between underlying earnings and net earnings are set out in this table (all numbers are after tax and exclude non-controlling interests).

	2021 US$m	2020 US$m
Underlying earnings	**21,380**	12,448
Items excluded from underlying earnings		
Impairment charges net of reversals	**(197)**	(1,115)
Gain on recognition of a new wharf at Kitimat, Canada	**336**	—
Foreign exchange and derivative gains/(losses) on net debt and intragroup balances and derivatives not qualifying for hedge accounting	**546**	(1,264)
Net losses from movements to closure estimates (non-operating and fully impaired sites)	**(971)**	(300)
Net earnings	**21,094**	9,769

On page 240 there is a detailed reconciliation from underlying earnings to net earnings, including pre-tax amounts and additional explanatory notes. The differences between Profit after tax and underlying EBITDA are set out in the table on page 343.

Balance sheet

Net debt reduced by $2.2 billion in 2021, resulting in a net cash position of $1.6 billion at 31 December 2021. This reflected our strong free cash flow, partly offset by dividend payments of $15.4 billion.

Our net gearing ratio (net (cash) / debt to total capital) improved to -3% at 31 December 2021 (31 December 2020: 1%).

Our total financing liabilities excluding net debt derivatives at 31 December 2021 (see page 256) were US$13.5 billion (31 December 2020: $13.8 billion) and the weighted average maturity was around 11 years. At 31 December 2021, approximately 85% of these liabilities were at floating interest rates (94% excluding leases).

On 28 October, we issued $1.25 billion 30-year fixed rate SEC-registered bonds with a coupon of 2.75%. The proceeds of the new issuance were used to fund the early redemption and extinguishment of the company's $1.20 billion 3.75% bonds due to mature in June 2025. The maximum amount within non-current borrowings maturing in any one calendar year is $1.4 billion, which matures in 2024.

We had $15.2 billion in cash and cash equivalents plus other short-term cash investments at 31 December 2021 (31 December 2020: $12.9 billion). In November, we took advantage of strong market conditions and completed the renewal of our $7.5 billion of fully committed Revolving Credit Facilities with 26 participating banks. The Facilities remained undrawn throughout the period, mature in November 2026 (previously November 2023) and include two consecutive one-year extension options.

Provision for closure costs

At 31 December 2021, provisions for close-down and restoration costs and environmental clean-up obligations were $14.5 billion (31 December 2020: $13.3 billion). The principal movements during the year were weaker Australian and Canadian currencies (-$0.5 billion), increases in existing and new provisions adjusted to mining properties ($0.5 billion) and charged to profit ($1.5 billion), partly offset by utilisations of the provision through spend (-$0.5 billion). Of the $14.5 billion in provisions, $10.7 billion relates to operating sites and $3.8 billion is for legacy sites. Remaining lives of operations and infrastructure range from one to over 50 years with an average for all sites, weighted by present closure obligation, of around 16 years (2020: 17 years).

The provisions are based on risk-adjusted cash flows using a real-rate discount rate of 1.5% to reflect the obligations at present value.

In 2022, we expect to utilise around $0.7 billion of the provisions as we advance our closure activities at Argyle, ERA, Gove alumina refinery and legacy sites.

We have disclosed further information, including the composition of the provision by cost category and by geography, on pages 258 to 259.

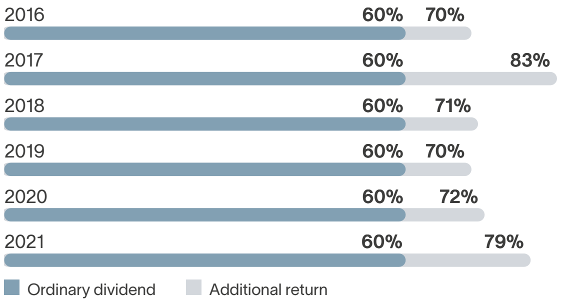
Our shareholder returns policy

The Board is committed to maintaining an appropriate balance between cash returns to shareholders and investment in the business, with the intention of maximising long-term shareholder value.

At the end of each financial period, the Board determines an appropriate total level of ordinary dividend per share. This takes into account the results for the financial year, the outlook for our major commodities, the Board's view of the long-term growth prospects of the business and the company's objective of maintaining a strong balance sheet. The intention is that the balance between the interim and final dividend be weighted to the final dividend.

The Board expects total cash returns to shareholders over the longer term to be in a range of 40 to 60% of underlying earnings in aggregate through the cycle. Acknowledging the cyclical nature of the industry, it is the Board's intention to supplement the ordinary dividend with additional returns to shareholders in periods of strong earnings and cash generation.

Our payout ratio has averaged 74% over the past six years



Record cash returns* declared: 74% average payout over past six years

	2021 US$ billion	2020 US$ billion
Ordinary dividend		
Interim	6.1	2.5
Final	6.7	5.0
Full-year ordinary dividend	12.8	7.5
Additional returns		
Special dividend announced in July 2021, paid in September 2021	3.0	n/a
Special dividend announced in February, paid in April of the following year	1.0	1.5
Total cash returns to shareholders declared for each year	16.8	9.0
Combined total as % of underlying earnings	79%	72%

*Based on weighted average number of shares and declared dividends per share for the respective periods and excluding foreign exchange impacts on payment.

We determine dividends in US dollars. We declare and pay Rio Tinto plc dividends in pounds sterling and Rio Tinto Limited dividends in Australian dollars. The 2021 final dividend has been converted at exchange rates applicable on 22 February 2022 (the latest practicable date before the dividend was declared). American Depositary Receipt (ADR) holders receive dividends at the declared rate in US dollars.

Ordinary dividend per share declared	2021 dividends	2020 dividends
Rio Tinto Group		
Interim (US cents)	376.00	155.00
Final (US cents)	417.00	309.00
Full-year (US cents)	793.00	464.00
Rio Tinto plc		
Interim (UK pence)	270.84	119.74
Final (UK pence)	306.72	221.86
Full-year (UK pence)	577.56	341.60
Rio Tinto Limited		
Interim (Australian cents)	509.42	216.47
Final (Australian cents)	577.04	397.48
Full-year (Australian cents)	1,086.46	613.95

Special dividend per share declared	2021 dividends	2020 dividends
Rio Tinto Group		
Interim (US cents)	185.00	—
Final (US cents)	62.00	93.00
Rio Tinto plc		
Interim (UK pence)	133.26	—
Final (UK pence)	45.60	66.77
Rio Tinto Limited		
Interim (Australian cents)	250.64	—
Final (Australian cents)	85.80	119.63

The 2021 final ordinary dividend and the special dividend to be paid to our Rio Tinto Limited shareholders will be fully franked. The Board expects Rio Tinto Limited to be in a position to pay fully franked dividends for the foreseeable future.

On 21 April 2022, we will pay the 2021 final ordinary dividend and the special dividend to holders of ordinary shares and holders of ADRs on the register at the close of business on 11 March 2022 (record date). The ex-dividend date is 10 March 2022.

Rio Tinto plc shareholders may choose to receive their dividend in Australian dollars, and Rio Tinto Limited shareholders may choose to receive theirs in pounds sterling. Currency conversions will be based on the pound sterling and Australian dollar exchange rates five business days before the dividend payment date. Rio Tinto plc and Rio Tinto Limited shareholders must register their currency elections by 29 March 2022.

We will operate our Dividend Reinvestment Plans for the 2021 final dividend – see our website riotinto.com for details. Rio Tinto plc and Rio Tinto Limited shareholders' election notice for the Dividend Reinvestment Plans must be received by 29 March 2022. Purchases under the Dividend Reinvestment Plan are made on or as soon as practicable after the dividend payment date and at prevailing market prices. There is no discount available.

Portfolio management

Capital projects

Projects (Rio Tinto 100% owned unless otherwise stated)	Total approved capital cost (100% unless otherwise stated)	Status/Milestones
Completed in 2021		
Investment in the Greater Tom Price operations (Western Turner Syncline phase 2) to sustain iron ore production capacity in the Pilbara region of Western Australia. The investment includes construction of a new crusher and a 13-kilometre conveyor.	$0.8bn	Approved in November 2019, the investment will enable us to sustain production of our Pilbara Blend™ and facilitate mining of existing and new deposits around Tom Price. The project achieved first ore in October, in line with previous guidance.
Investment in the south wall pushback, to extend mine life at Kennecott, Utah, US, from 2019 to 2026.	$0.9bn	Funding for the continuation of open pit mining via the push back of the south wall: the transition to the south wall is complete, with copper head grade exceeding 0.5% in the second half of 2021.
Ongoing and approved		
Iron Ore		
Investment in the Robe River Joint Venture (West Angelas C and D and Mesa B, C and H at Robe Valley) in the Pilbara to sustain production capacity.	$0.9bn (Rio Tinto share)	Approved in October 2018, the investments will enable us to sustain production of our Pilbara Blend™ and Robe Valley products. First ore at West Angelas (C and D) was achieved in June 2021. At Robe Valley, the autonomous mining truck fleet has been commissioned: since achieving first ore in August, ongoing wet plant construction and commissioning challenges have impacted production ramp-up[1].
Investment in Gudai-Darri, a new production hub in the Pilbara region of Western Australia. The investment incorporates a processing plant and infrastructure including a 166-kilometre rail line connecting the mine to our existing network. Once complete, the mine will have an initial annual capacity of 43 million tonnes.	$2.6bn	Approved in November 2018. Labour shortages have impacted both steel fabrication and site construction activities in 2021. The railway is operational with the first train loaded from the mobile crushing and screening facilities in December. First production from the main plant is now expected in the second quarter of 2022, subject to the continuing impacts of COVID-19[1].
Aluminium		
Investment in a second tunnel at the 1000MW Kemano hydropower facility at Kitimat, British Columbia, Canada, which will ensure the long-term reliability of the power supply to the Kitimat smelter.	$0.8bn	The project was first approved in 2017, with $155 million of additional capital approved in 2020 and a further $132 million approved in July 2021. Works resumed at full capacity in 2021 first half and tunnel boring excavation is now complete. The project is scheduled to complete in the second half of 2022, subject to there being no further COVID-19 delays.
Ongoing and approved		
Copper		
Phase two of the south wall pushback to extend mine life at Kennecott by a further six years.	$1.5bn	Approved in December 2019, the investment will further extend strip waste rock mining and support additional infrastructure development. This will allow mining to continue into a new area of the orebody between 2026 and 2032.
Development of the Oyu Tolgoi underground copper/gold mine in Mongolia (Rio Tinto 34%), which is expected to produce (from the open pit and underground) an average of ~500,000 tonnes[2] of copper per year from 2028 to 2036 and an average of ~350,000 tonnes[2] of copper per year for a further five years, compared with 163,000 tonnes in 2021 (open pit).	$6.925bn[3]	The project was originally approved in May 2016 for $5.3 billion, with an additional $1.45 billion approved by the Rio Tinto Board in December 2020, following completion of the Definitive Estimate. It now includes $175 million of estimated COVID-19 impacts to the end of 2021[3]. First sustainable production is expected in the first half of 2023, following the comprehensive agreement between the Oyu Tolgoi partners announced in January 2022.
Minerals		
Development of the Zulti South project at Richards Bay Minerals (RBM) in South Africa (Rio Tinto 74%).	$0.5bn	Approved in April 2019 to underpin RBM's supply of zircon and ilmenite over the life of the mine. The project remains on full suspension.
Development of the greenfield Jadar lithium-borates project in Serbia. The development will include an underground mine with associated infrastructure and equipment, including electric haul trucks, as well as a beneficiation chemical processing plant.	$2.4bn	The Board committed the funding in July 2021, subject to receiving all relevant approvals, permits and licences. First saleable production was expected in 2027 with ramp-up to full production of 58,000 tonnes of battery-grade lithium carbonate, 160,000 tonnes of boric acid (B_2O_3 units) and 255,000 tonnes of sodium sulphate per year.[4] In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We are disappointed by this announcement and are committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.

Future growth options

Iron Ore: Pilbara brownfields

The capacity of our Pilbara system over the medium term is between 345 and 360 million tonnes per annum. To reach and sustain the upper end of the range will require the next tranche of replacement mines to be approved and brought onstream.

Key projects include Western Range, Bedded Hill Top and Hope Downs 2 as well as Brockman Syncline 1 to be delivered between 2025 and 2027. We continue to engage with and work closely with our communities, Traditional Owners, and governments to seek approval for the new mining projects.

Aluminium: ELYSIS

The ELYSIS™ inert anode technology eliminates all direct greenhouse gases from aluminium smelting, and instead produces oxygen.

With the current development pathway, ELYSIS aims to have its technology available for installation from 2024 and the production of larger volumes of carbon-free aluminium approximately two years later.

Copper: Resolution

The Resolution Copper project is a proposed underground copper mine in the Copper Triangle, in Arizona, United States. It has the potential to supply up to 25% of US copper demand.

We continue to work with the US Forest Service to secure approval of the Final Environmental Impact Statement. In parallel, mine studies and engagement with the Native American tribes and local communities continue to progress.

Copper: Winu

In late 2017, we discovered copper-gold mineralisation at the Winu project in the Paterson Province in Western Australia. In 2020, we declared a Maiden Inferred Mineral Resource.

There has been progress towards securing consent from the Traditional Owners to the Project Agreement in advance of submitting the necessary environmental and regulatory approvals. Drilling, fieldwork and study activities continue to progress to schedule.

Iron Ore: Simandou

The Simandou resource in Guinea contains one of the world's largest and richest high-grade iron ore deposits, demand for which is increasing as steelmakers look to reduce carbon emissions. It complements the long-term attractiveness of our Pilbara Blend™.

We continue to engage with key stakeholders in-country and remain committed to an inclusive partnership, seeking to develop the project in line with international social and environmental standards. A new drilling programme has commenced, and market engagement has been initiated for construction and early development works expected to be carried out in 2022.

Lithium: Rincon

In December, we entered into a binding agreement to acquire the Rincon lithium project in Argentina. The transaction is expected to be complete in the first half of 2022, subject to approval by Australia's Foreign Investment Review Board.

Located in the heart of the lithium triangle in Salta Province, Rincon is a long-life, scaleable resource capable of producing battery-grade lithium carbonate. It also has the potential to have one of the lowest carbon footprints in the industry.

1. Potential for capital cost to rise by around 15% due to ongoing COVID-19 restrictions on commissioning and ramp-up of Pilbara growth and brownfield mine replacement projects, including labour access and supply chain quality issues. The latter has been exacerbated by an inability to conduct pre-delivery quality assurance and control at international steel and equipment manufacturers due to limitations on travel.
2. The 500ktpa target (stated as recovered metal) for the Oyu Tolgoi underground and open pit mines is underpinned 17% by Proved Ore Reserves and 83% by Probable Ore Reserves for the years 2028-2036. The 350ktpa production target for the following five years is underpinned 18% by Proved Ore Reserves and 82% by Probable Ore Reserves. These production targets have been scheduled from current mine designs by Competent Persons in accordance with the requirements of the Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves, 2012 Edition (the JORC code).
3. These estimates exclude any impacts of delays to work schedules caused by restricted approved budgets since the start of 2021. This, together with any ongoing COVID-19 impacts, will be assessed following the commencement of underground operations with further updates provided to the market in due course. Panels 1 and 2 studies will be ongoing throughout 2022. Further study work is also underway to assess the extraction methodology and ultimate recovery of the Panel 0 recoverable pillars.
4. These production targets are reported in a release to the Australian Securities Exchange (ASX) dated 23 February 2022, "Rio Tinto updates Ore Reserves and Mineral Resources at Jadar". All material assumptions underpinning the production targets continue to apply and have not materially changed.

Iron Ore

We are one of the world's leading producers of iron ore, the primary raw material in steelmaking. In the Pilbara region of Western Australia (WA), we operate a network of 17 iron ore mines, four port terminals and a rail network spanning nearly 2,000 kilometres. Steel remains essential for ongoing urbanisation and will support the global shift to decarbonise.

We produce five mainstream iron ore products in WA, including the Pilbara Blend™, the world's most traded brand of iron ore. Our Iron Ore product group includes Dampier Salt – also in WA – the world's largest exporter of seaborne salt.

Our fully integrated portfolio of quality assets, highly valued product suite and committed people allow us to export our products to our customers safely, reliably and efficiently.

We continue to transform our safe operating performance by implementing the Rio Tinto Safe Production System (RTSPS). RTSPS will become the blueprint for how we continuously improve our business. In 2021, two of our iron ore operations started RTSPS pilot projects.

We are focused on building new mines for a better future. In 2021, we progressed the replacement of around 40% of our mine capacity with brownfield mines at Robe Valley, West Angelas and Western Turner Syncline Phase 2, and continued the construction of our most technologically advanced mine, Gudai-Darri. This is the largest mine replacement programme in our history, safely progressed during the pandemic, and it will enable us to continue to deliver the product blends the market needs.

We commissioned more autonomous haul trucks in 2021 than in any prior year, which means that around 80% of our fleet will be autonomous in 2022. In addition, AutoHaul™, our automated train network, has delivered benefits beyond expectations.

We are on a pathway to decarbonising our business with plans to electrify our Pilbara operations. The delivery of one gigawatt of renewables in the Pilbara will support abatement of about one million tonnes of our CO_2 emissions. Two-thirds will come from the displacement of power generation gas emissions, and one-third from providing electricity to enable the transition away from diesel.

With people at the heart of everything we do, nothing is more important than the physical and psychological safety of our people. We are committed to creating a workplace that is safe, respectful and inclusive for everyone, everywhere, and we are taking a number of actions to make this a lived reality for our people.

The destruction of the rock shelters at Juukan Gorge in May 2020 was a clear breach of our values. We have redesigned our planning and operational practices to protect heritage sites. This includes removing 100 million tonnes of reserves from our mine plans in the past two years and continuing a process to modernise and strengthen our agreements with Traditional Owners to ensure the destruction of a site of such exceptional cultural and archaeological significance never happens again. We have placed the accountability for Traditional Owner relationships with senior leaders of our Pilbara assets, to create direct partnerships. Read more about our communities and social performance commitments on pages 94 and 95.

We are committed to continuing to engage with our partners and build the business we need for the future.

Working together for a better future

17	4	13,000	5	3	3.0Mt
integrated mines in Western Australia	port terminals	employees	mainstream iron ore products	solar salt operations	CO_2e emissions (our share)

Snapshot of the year

0.67	76%	$27.6bn	$39.6bn	$19.2bn	$3.9bn
AIFR	Pilbara underlying FOB EBITDA margin	underlying EBITDA	gross product sales	net cash generated from operating activities	capital expenditure
(2020: 0.53)	(2020: 74%)	(2020: $18.8bn)	(2020: $27.5bn)	(2020: $13.2bn)	(2020: $2.9bn)

Pilbara iron ore operations, Western Australia.

Iron Ore

2021 year-end results	2021	2020	Change
Pilbara production (million tonnes – 100%)	**319.7**	333.4	(4)%
Pilbara shipments (million tonnes – 100%)	**321.6**	330.6	(3)%
Salt production (million tonnes – Rio Tinto share)[1]	**5.8**	4.9	20%
Gross product sales (US$ millions)	**39,582**	27,508	44%
Average realised price (US$ per dry metric tonne, FOB basis)	**143.8**	98.9	45%
Underlying EBITDA (US$ millions)	**27,592**	18,837	46%
Pilbara underlying FOB EBITDA margin[2]	**76%**	74%	
Underlying earnings (US$ millions)	**17,323**	11,398	52%
Net cash generated from operating activities (US$ millions)	**19,177**	13,218	45%
Capital expenditure (US$ millions)[3]	**(3,947)**	(2,941)	34%
Free cash flow (US$ millions)	**15,172**	10,233	48%
Underlying return on capital employed[4]	**100%**	74%	

1. Dampier Salt is reported within Iron Ore, reflecting management responsibility. Iron Ore Company of Canada continues to be reported within Minerals. The Simandou iron ore project in Guinea is reported within Copper.
2. The Pilbara underlying free on board (FOB) EBITDA margin is defined as Pilbara underlying EBITDA divided by Pilbara gross product sales, excluding freight revenue.
3. Capital expenditure is the net cash outflow on purchases less sales of property, plant and equipment, capitalised evaluation costs and purchases less sales of other intangible assets.
4. Underlying return on capital employed (ROCE) is defined as underlying earnings excluding net interest divided by average capital employed.

Enabling the low-carbon transition

Iron ore is an essential ingredient of steel, one of the most efficient construction materials in the world. In many applications, there is no viable substitute for steel. The challenge is to remove carbon from the steel manufacturing process, enabling green steel to play a critical role in reducing global carbon emissions. We are committed to developing the technology needed to prepare Pilbara iron ore for a green-steel future.

The Pilbara, with its natural advantages in solar and wind, is at the forefront of our global plans to decarbonise. We are on a pathway to decarbonise our business through multiple initiatives:

- We are electrifying our Pilbara operations, including haul trucks, mobile equipment and rail operations, replacing existing emissions-heavy diesel fleets with battery or hydrogen technology, while continuing to produce iron ore for the world's energy transition.
- A key focus for the Iron Ore product group will be deploying one gigawatt of renewable energy to power our mining operations and communities in the Pilbara.
- The Group's estimated $7.5 billion in capital expenditure to decarbonise our business has a focus on renewable power for iron ore, and we have applications for new tenure to support potential wind power initiatives.
- The construction of our first 34MW solar plant at the Gudai-Darri mine is an important step in reducing our carbon footprint in the Pilbara. The average annual emissions savings (battery and solar combined) are equivalent to powering about 6,000 homes.
- We are partnering with Komatsu and Caterpillar to fast-track the development and implementation of zero-emission haulage solutions, including haul trucks. To support these partnerships, we are also collaborating with the industry more broadly on the Charge On Innovation Challenge, an innovative problem-solving partnership to develop mobile fleet charging solutions.

Immediate reductions across our iron ore operations will not occur overnight, as research and development, and the deployment of these technologies will take some years.

In 2021, Iron Ore's absolute greenhouse gas emissions were 3.0Mt CO_2e (on an equity basis), an increase of 0.34Mt CO_2e compared to the 2018 emissions baseline, driven largely by an increase in diesel emissions due to increased haul distances, pre-strip ratios and material movement.

Safety and wellbeing

In 2021, the number of potentially fatal incidents (PFIs) increased by 25% compared to 2020. We are focusing on impactful actions stemming from incident investigations, to ensure learnings are embedded across the business, and we have allocated dedicated resources to address specific critical risks such as falling objects.

The rate of injuries also increased with our all-injury frequency rate (AIFR) at 0.67 for 2021 compared to 0.53 for 2020. The rate of injuries was higher in our contractor workforce than our employees. A tight labour market and onboarding challenges (particularly for our contract partners) contributed to this increase.

Specific focus areas for 2022 include the safety of our onsite contractors, improving our first line assurance, reducing fatigue risks, and fostering a healthy workplace. We continue to implement the safety maturity model and our mental wellbeing framework to achieve our objective of creating a physically and mentally healthy workplace for our employees and contractor partners.

In 2021, we conducted planned health and hygiene monitoring for known workplace exposures such as noise and dust. We also continued to assess the individual health status of exposed workers for the purpose of early detection and intervention including hearing and lung function screening. A new periodic medical programme was trialled across two locations, to proactively identify and manage non-work related health conditions with potential safety impacts.

In October, the WA Government announced COVID-19 vaccinations would be mandatory for workers in the resources industry. As such, all employees, contractors and visitors accessing a Rio Tinto workplace in Western Australia are required to have up-to-date COVID-19 vaccinations.

In 2021, we worked with the WA Government to boost vaccination rates across Western Australia. In partnership with the State Government, we set up vaccination clinics at Perth Airport and regional locations, including Tom Price, Paraburdoo and Pannawonica, helping to vaccinate more than 10,000 of our workforce and community members.

Leveraging our success to create value for others

In 2021, we spent almost A$8 billion on goods and services with more than 2,000 Western Australian businesses, including nearly A$300 million with local Indigenous businesses.

Learn more about how we are working with local businesses at riotinto.com/stories.

Financial performance

Our Pilbara iron ore shipments decreased by 3% compared with 2020. Shipments were impacted by lower mined production due to above-average rainfall in the first half of 2021, cultural heritage management and delays in growth and brownfield mine replacement tie-in projects.

Underlying EBITDA of $27.6 billion was 46% higher than 2020, driven by higher prices ($10.3 billion), with a 45% rise in the monthly average Platts index for 62% iron fines adjusted to an FOB basis compared with 2020. This more than compensated for the impact from reduced shipments and rising unit costs.

2021 Pilbara unit cash costs, which were $18.6 per tonne (excluding COVID-19 costs of $0.5 per tonne), marginally exceeded guidance of $18.0 to 18.5 per tonne and compared with $14.8 per tonne in 2020 (excluding COVID-19 costs of $0.6 per tonne). Unit cost performance was driven by higher input prices including labour, explosives and energy, a 9% stronger Australian dollar, an increase in the mine work index, operational readiness costs for our growth and brownfield mine replacement tie-in projects and fixed cost inefficiencies from lower volumes.

We have continued investing in productivity and automation: around 80% of the haul truck fleet is now autonomous.

Our Pilbara operations delivered an underlying FOB EBITDA margin of 76%, compared with 74% in 2020.

We price the majority of our iron ore sales (77%) by reference to the average index price for the month of shipment. In 2021, we priced approximately 11% of sales with reference to the prior quarter's average index lagged by one month with the remainder sold either on current quarter average, current month average or on the spot market. We made approximately 72% of sales including freight and 28% on an FOB basis.

We achieved an average iron ore price of $132.3 per wet metric tonne on an FOB basis (2020: $91.0 per wet metric tonne) across our product suite. This equates to $143.8 per dry metric tonne, assuming 8% moisture (2020: $98.9 per dry metric tonne), which compares with the monthly average Platts index for 62% iron fines converted to an FOB basis of $146.9 per dry metric tonne (2020: $101.3 per dry metric tonne). The slightly lower realised price compared to the Platts index was due to the higher proportion of SP10 volumes and the increased discounts for lower grade products, particularly in the second half of 2021.

Gross product sales for our Pilbara operations included freight revenue of $2.7 billion (2020: $1.5 billion).

Net cash generated from operating activities of $19.2 billion was 45% higher than 2020, in line with the movement in underlying EBITDA. Free cash flow of $15.2 billion was 48% higher than 2020, due to a 34% increase in capital expenditure to $3.9 billion, relating to construction of growth and brownfield mine replacement tie-in projects.

Review of operations

Pilbara operations produced 319.7 million tonnes (Rio Tinto share 266.8 million tonnes) in 2021, 4% lower than 2020, for the reasons mentioned above. Ongoing COVID-19 restrictions and a tight labour market have further impacted our ability to access experienced contractors and particular skill sets.

Production from the new greenfield mine at Gudai-Darri and brownfield mine replacement project at Robe Valley was delayed due to the COVID-19 impact on labour availability and other factors, including an inability to conduct pre-delivery quality assurance and control at international steel manufactures due to limitations on travel. First ore from Gudai-Darri was railed in December from the modular crushing and screening plant installed to supplement production and mitigate commissioning delays. Robe Valley production was significantly impacted by the Mesa A wet plant commissioning delays.

2021 shipments of 321.6 million tonnes (Rio Tinto share 267.9 million tonnes) included 36.6 million tonnes of lower grade SP10 products, 11% of shipments, on a 100% basis (2020: 3%). As growth and replacement mines ramp up through the first half of 2022, we expect to see a gradual decrease in SP10 over the medium term.

We continue to increase our iron ore portside sales in China, with a total of 14.0 million tonnes in 2021 (2020: 5.5 million tonnes). We experienced increased inventory levels of Pilbara product at the port at December (2021: 8.8 million tonnes, 2020: 1.7 million tonnes), due to higher volumes of SP10 and constrained availability of high grade blending stocks in the fourth quarter. Our portside operation handles product from the Pilbara and Canada as well as third-party product, and provides blending and screening capabilities. Approximately 81% of portside sales in 2021 were either blended or screened in Chinese ports.

Our principal projects and growth options

Commissioning and ramp-up of Pilbara growth and brownfield mine replacement projects have been impacted by ongoing COVID-19 restrictions, including labour access and supply chain quality issues. The latter have been exacerbated by an inability to conduct pre-delivery quality assurance and control at international steel and equipment manufacturers due to limitations on travel.

Mining and operational readiness activities are progressing at the $2.6 billion[1] Gudai-Darri mine and the railway is operational. The first train was loaded from the mobile crushing and screening facilities in December and first production from the main plant is now expected in the second quarter of 2022, subject to the continuing impacts of COVID-19. This new production hub will be our most technologically advanced, incorporating a processing plant and infrastructure including an airport, camp and a 166-kilometre rail line connecting the mine to our existing network. Once fully commissioned, this first phase will have an annual capacity of 43 million tonnes, replacing depleting orebodies and providing some incremental capacity.

Our $0.8 billion[1] investment in the Western Turner Syncline phase 2 mine, part of Greater Tom Price operations, will facilitate mining of new deposits and includes construction of a new crusher and a 13-kilometre conveyor. The project achieved first ore in October, following commissioning of the autonomous mining truck fleet. Some residual brownfield plant works are due to be complete during mid-year shutdowns.

We are also investing $1.7 billion[1] with our joint venture partners, Mitsui and Nippon Steel Corporation (our 53% share is $0.9 billion), at the Robe Valley and West Angelas operations. First ore at West Angelas C and D was achieved in June, and the mines are now commissioned. At Robe Valley (Mesa B, C, H), the autonomous mining truck fleet has been commissioned. Since achieving first ore in August, ongoing Mesa A wet plant construction and commissioning challenges have impacted production ramp-up. New wet plant components are on order and production will operate at a reduced capacity until repairs are completed.

Our people

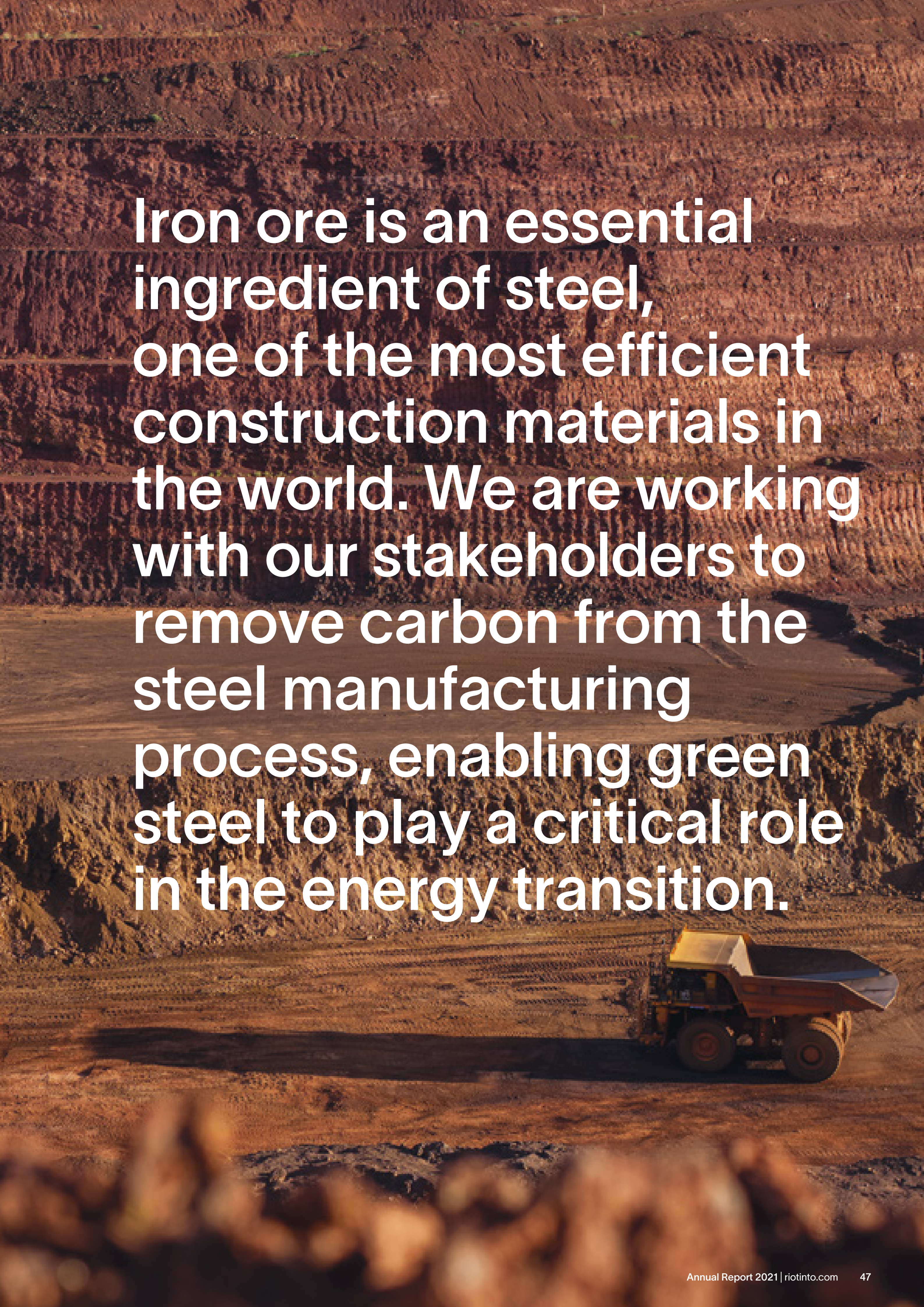
In 2021, building on the work of the Everyday Respect task force, we took steps towards fostering a psychologically safer work environment.

In addition to the task force's listening sessions and survey, we further opened up discussions with our teams through the Stop for Respect initiative, where we took the unprecedented step to stop all of our WA operations and projects for at least 30 minutes, allowing people time to reflect on what a respectful workplace is, share stories, and commit to actions to become more respectful and inclusive.

We also announced our plans to partner across industry, education, government and subject matter experts to design education awareness packages to increase awareness of bullying, sexual harassment, and racism – collectively referred to as Psychosocial Awareness. In time, these packages will be made available across broader industries and shared in other parts of Australia.

We still have much more to do in this space and we are committed to taking further action on the findings and recommendations outlined in the Everyday Respect report and Inquiry recommendations.

1. Potential for capital cost to rise by around 15% due to ongoing COVID-19 restrictions on commissioning and ramp-up of Pilbara growth and brownfield mine replacement projects, including labour access and supply chain quality issues. The latter has been exacerbated by an inability to conduct pre-delivery quality assurance and control at international steel and equipment manufacturers due to limitations on travel.



Iron ore is an essential ingredient of steel, one of the most efficient construction materials in the world. We are working with our stakeholders to remove carbon from the steel manufacturing process, enabling green steel to play a critical role in the energy transition.

Aluminium

As a global leader in low-carbon aluminium, we are uniquely positioned to further decarbonise our business and support the world's transition towards a lower-carbon footprint. A critical material – lightweight and infinitely recyclable – aluminium is found in diverse products ranging from solar panels to electric vehicles and smartphones.

The aluminium industry is highly energy-intensive and contributes significantly to the world's carbon emissions. Around 60% of the world's smelters currently use coal-based electricity. Decarbonising the industry, therefore, represents significant challenges and opportunities.

We produce some of the highest-quality, lowest-carbon footprint aluminium in the world. The greenhouse gas emissions intensity of our Canadian smelters is more than 80% lower than the industry average. This is possible in part to our hydro facilities, which we have operated for almost 100 years.

Our ELYSIS partnership with Alcoa, supported by Apple and the Governments of Canada and Quebec, is scaling up a technology with the potential to transform the aluminium industry through a significant reduction in its carbon footprint. In 2021, ELYSIS achieved a key milestone by successfully producing carbon-free aluminium at the Industrial Research and Development Centre in Saguenay.

Work is now focused on accelerating the scale-up of the zero carbon ELYSIS™ technology towards the demonstration of even larger commercial-size cells in 2023. Construction of the first commercial-scale prototype cells using ELYSIS™ inert anode technology has now begun at our Alma smelter in Saguenay–Lac-Saint-Jean, Quebec, Canada.

In November, we announced an $87 million investment to increase our low-carbon aluminium production in Canada with 16 new smelting cells at our AP60 smelter, in the Saguenay–Lac-Saint-Jean region. The project is expected to be completed by the end of 2023.

We continue to partner with governments, organisations and communities to further decarbonise the aluminium supply chain. In 2021, we developed partnerships in Australia to find ways to repower our smelters and to study the use of green hydrogen to replace natural gas in our alumina refineries.

Our structurally advantaged integrated business includes bauxite mines, alumina refineries and smelters producing aluminium certified as responsible. Managing the process from mine to metal allows us to independently deliver fully traceable products to our customers, reliably and efficiently. In 2021, we launched START, the first sustainability label for aluminium, which is being delivered to customers using blockchain technology.

Working together for a better future

4
bauxite mines in Australia, Brazil and Guinea[1]

14
aluminium smelters in Canada, Australia, New Zealand, Iceland and Oman[1]

7
hydropower plants generating most of the electricity we use in Canada

4
alumina refineries in Australia, Brazil[1] and Canada

14,000
employees

2.17t
CO_2e/ t Al emissions intensity of our managed Atlantic smelters

Snapshot of the year

0.33
AIFR
(2020: 0.34)[2]

38%
underlying EBITDA margin (integrated operations)
(2020: 26%)

$4.4bn
underlying EBITDA
(2020: $2.2bn)

$12.7bn
gross product sales
(2020: $9.3bn)

$3.6bn
net cash generated from operating activities
(2020: $1.9bn)

$1.3bn
capital expenditure
(2020: $1.0bn)

Boyne Smelters Limited. Queensland, Australia.

1. Non-managed joint ventures.
2. Our Gove operations' closure unit was transferred from Aluminium to Closure, causing change in historical AIFR, previously noted as 0.36 in our 2020 Annual Report.

Aluminium

2021 year-end results	2021	2020	Change
Bauxite production (000 tonnes – Rio Tinto share)	**54.3**	56.1	(3)%
Alumina production (000 tonnes – Rio Tinto share)	**7.9**	8.0	(2)%
Aluminium production (000 tonnes – Rio Tinto share)	**3.2**	3.2	(1)%
Gross product sales (US$ millions)	**12,695**	9,314	36%
Average realised aluminium price (US$ per tonne)	**2,899**	1,946	49%
Underlying EBITDA (US$ millions)	**4,382**	2,152	104%
Underlying EBITDA margin (integrated operations)	**38%**	26%	
Underlying earnings (US$ millions)[1]	**2,468**	471	424%
Net cash generated from operating activities (US$ millions)	**3,606**	1,930	87%
Capital expenditure – excluding EAUs (US$ millions)[2]	**(1,300)**	(1,009)	29%
Free cash flow (US$ millions)	**2,272**	892	155%
Underlying return on capital employed[3]	**16%**	3%	

1. Underlying earnings includes a $0.2 billion benefit for the recognition of previously written down deferred tax assets in Australia (2020: $0.2 billion charge for the partial de-recognition of deferred tax assets in Australia).
2. Capital expenditure is the net cash outflow on purchases less sales of property, plant and equipment, capitalised evaluation costs and purchases less sales of other intangible assets. It excludes equity accounted units (EAUs).
3. Underlying return on capital employed (ROCE) is defined as underlying earnings excluding net interest divided by average capital employed.

Enabling the low-carbon transition

Aluminium is one of the world's fastest-growing major metals. We produce some of the highest-quality, lowest-carbon footprint aluminium in the world. The Scope 1 and 2 greenhouse gas emissions intensity of our Canadian smelters is less than one-fifth of the industry average.

Our Aluminium business supports our pathway to zero emissions through several initiatives:

- Construction of the first commercial-scale prototype cells of ELYSIS™ inert anode technology has now begun at our Alma smelter in Saguenay–Lac-Saint-Jean.
- We signed a Statement of Cooperation with the Queensland Government, agreeing to work together to help the Central Queensland region decarbonise. This includes finding the best pathway to repower our Australian smelters to make them more competitive and sustainable.
- We are partnering with Carbfix to capture carbon and permanently store it underground at our ISAL aluminium smelter in Iceland.
- We began construction of a new 4MW solar farm and battery storage at Weipa. This will triple the local electricity network's solar generation capacity and help provide cleaner power to our operations.
- We partnered with the Australian Renewable Energy Agency (ARENA) to research the potential for using green hydrogen to replace natural gas in the calcination process of alumina refining at Yarwun. We partnered with Sumitomo Corporation on a study into building a hydrogen pilot plant at Yarwun.

More information on Carbfix, ELYSIS and our Yarwun hydrogen partnerships can be found in our Innovation pages 70-71.

In 2021, our Aluminium business's absolute greenhouse gas emissions (21.9Mt CO_2e) were 1% lower than the 2018 equity baseline (22.1Mt CO_2e). This reduction includes improvements in processing efficiency, an increased use of hydroelectric boilers in refining, instead of natural gas boilers, and a reduction of production at the Kitimat smelter due to a strike. The 2021 emissions intensity of our managed Atlantic smelters, powered by hydroelectricity, was 2.17t CO_2e per tonne of aluminium. Our Vaudreuil alumina refinery has the lowest carbon footprint of any alumina refinery in the world today.

Safety and wellbeing

In 2021, the number of potentially fatal incidents (PFIs) more than doubled compared with 2020. Increased incident identification and proactive learning from each has been a positive improvement in the safety culture. Given that falling objects accounted for 60% of the PFIs, a work programme was undertaken at our sites to address overhead asset maintenance. A robust monthly PFI-sharing meeting was also introduced to encourage our people to share learnings across our sites and leverage technical support to the sites as needed.

We ended 2021 with an all-injury frequency rate (AIFR) of 0.26 among our employees and 0.44 among our contractors. While our overall AIFR decreased to its lowest ever at 0.33, we saw a slight regression for employees when compared to 2020 (0.20) and an improvement for contractors when compared to 2020 (0.57).

While 2021 marked the seventh consecutive fatality-free year for our managed operations, sadly a non-managed operation, Compagnie des Bauxites de Guinée, experienced three fatalities. We are working closely with the teams on-site to ensure process safety and incident prevention.

We continued to improve the safety maturity of our sites by emphasising leadership coaching and critical risk management. In 2021, we completed over 215,000 verifications on critical controls, including more than 39,000 verifications specific to COVID-19.

Aluminium has the largest number of water and tailings dams in the company. In 2021, we implemented a telemetry programme across our tailings and water storage facilities to collect measurements and data from remote points and automatically transmit them for monitoring. This work, to be completed by the first quarter of 2022, will ensure that all our major water and tailings facilities have real-time monitoring. We have also begun implementing the new Global Industry Standard in Tailings Management (GISTM), with a particular focus on the community engagement and dam design safety elements.

In partnership with local governments, we administered more than 18,000 vaccines against COVID-19 to employees, contractors, families and the community at Aluminium-supported vaccination centres in Kitimat and Saguenay, Canada; Queensland, Northern Territory and Tasmania, Australia; and New Zealand.

Meeting growing demand for transparency and traceability

START Responsible Aluminium sets the standard for sustainable aluminium production through transparency, traceability and technology. Key information is provided for ten Rio Tinto Aluminium sustainability criteria, from mine to metal.

Learn more about START at riotinto.com/stories.

In 2022, we will continue to improve our safety culture and performance by emphasising a psychologically safe environment that encourages employees to raise safety issues and concerns. This will improve the rigour in our incident investigations to drive to systemic root causes, ensuring that our critical risk controls are regularly and thoroughly verified. Our daily visible leadership in the field will also continue to build trusting, transparent relationships and reinforces safe work behaviours.

Financial performance

In 2021, aluminium prices rallied to multi-year highs, following a firm recovery in global demand and extensive power-related supply disruptions in China, which led to a global market deficit. This rebound in sales prices, together with increased demand for value-added product (VAP), were the key drivers for our aluminium business to more than double underlying EBITDA and deliver a substantial increase in cash flow.

Underlying EBITDA of $4.4 billion, which was 104% higher than 2020, benefited from the stronger pricing environment, in particular for primary metal and alumina, and higher product premiums for primary metal. This was only partly offset by the impact of stronger local currencies, lower bauxite and alumina shipments and cyclical cost inflation for coke, pitch and alloys. This increased our industry-leading underlying EBITDA margin to 38%.

We achieved an average realised aluminium price of $2,899 per tonne, 49% higher than 2020 ($1,946 per tonne). This comprised the LME price, a market premium and a product (VAP) premium. The cash LME price averaged $2,480 per tonne, 46% higher than 2020, while in our key US market, the midwest premium duty paid increased by 119% to $584 per tonne (2020: $267 per tonne). Our VAP sales represented 50% of the primary metal we sold (2020: 43%) and generated product premiums averaging $230 per tonne of VAP sold (2020: $213 per tonne).

We generated $3.6 billion in net cash from operating activities, reflective of the higher underlying EBITDA achieved, net of a $0.5 billion build in working capital, driven by the higher pricing environment and supply chain constraints. Free cash flow increased by 155% to $2.3 billion.

Review of operations

Bauxite production of 54.3 million tonnes was 3% lower than 2020 due to severe wet weather in the first quarter impacting system stability throughout the year, equipment reliability issues and overruns on planned shutdowns at our Pacific operations.

We shipped 37.6 million tonnes of bauxite to third parties in 2021, 4% lower than the same period of 2020 due to the major weather events in the first quarter causing shipment delays. In 2021, gross product sales for bauxite declined 4% to $2.2 billion: this includes freight revenue of $462 million (2020: $423 million).

Alumina production of 7.9 million tonnes was 2% lower than 2020, as a result of outages during the year at the Yarwun refinery in Queensland, Australia and at Vaudreuil refinery in Quebec, Canada. Production at the Queensland refinery remained stable year on year.

Aluminium production of 3.2 million tonnes was 1% lower than 2020 due to reduced capacity at our Kitimat smelter in British Columbia following a strike which commenced in July. Agreement was reached with the labour union and employees in October, with a gradual restart in 2022 and full capacity expected to be reached by December 2022. The reduced capacity was partly offset by a robust performance across the remaining smelting portfolio.

Our principal projects and growth options

At the Kemano project in Kitimat, British Columbia, where we are constructing a second tunnel to de-risk our 100% owned hydropower facility, the tunnel boring machine is being dismantled and removed following breakthrough in October. Although COVID-19 continues to affect the workforce, completion remains on schedule for the second half of 2022. Total approved capital stands at $0.8 billion.

In December 2021, we opened a newly extended wharf that will increase the capacity of our port facilities in Kitimat and support economic diversification in Northern British Columbia. The new wharf will be used for imports of alumina, anodes and other supplies, and for exports of low-carbon aluminium made at our BC Works smelter in Kitimat. As the wharf was built and paid for by LNG Canada, when we gained control over it in December we recognised a $336 million gain, which has been excluded from underlying earnings on the grounds of materiality and linkage to the impairment recognised in 2021.

ELYSIS, our joint venture with Alcoa, supported by Apple and the Governments of Canada and Quebec, is developing a breakthrough technology that eliminates all direct greenhouse gases from the aluminium smelting process. In 2021, ELYSIS successfully produced aluminium at its Industrial Research and Development Center in the Saguenay, Quebec. Construction of the first commercial-scale prototype cells of ELYSIS™ inert anode technology has now begun at our Alma smelter. These prototype cells are expected to become operational in 2023. ELYSIS aims to have its technology available for installation from 2024 and production of larger volumes of carbon-free aluminium approximately two years later.

We announced an $87 million investment to increase aluminium production with 16 new smelting cells at our AP60 smelter, in the Saguenay. Production will rise by around 45%, or 26,500 tonnes of primary aluminium per year, to a capacity of 86,500 metric tonnes.

We announced a number of investments to sustain our assets in the Saguenay, including C$92 million to refurbish the Isle-Maligne hydroelectric power station, the oldest in our network, commissioned 95 years ago, and C$105 million to modernise the Port-Alfred port facilities.

At our Weipa bauxite mine in northern Queensland, construction of a new 4MW solar farm and 4MW/4MWh battery storage commenced, which will triple the local electricity network's solar generation capacity. The new facility will be built, owned and operated by EDL and will complement the existing 1.6MW solar farm at Weipa, which was completed in 2015.

We partnered with the Australian Renewable Energy Agency to research the potential for using clean hydrogen to replace natural gas in the calcination process of alumina refining at Yarwun. We are also partnering with Sumitomo Corporation to study the construction of a pilot plant at Yarwun, which could produce hydrogen for the Gladstone Hydrogen Ecosystem.

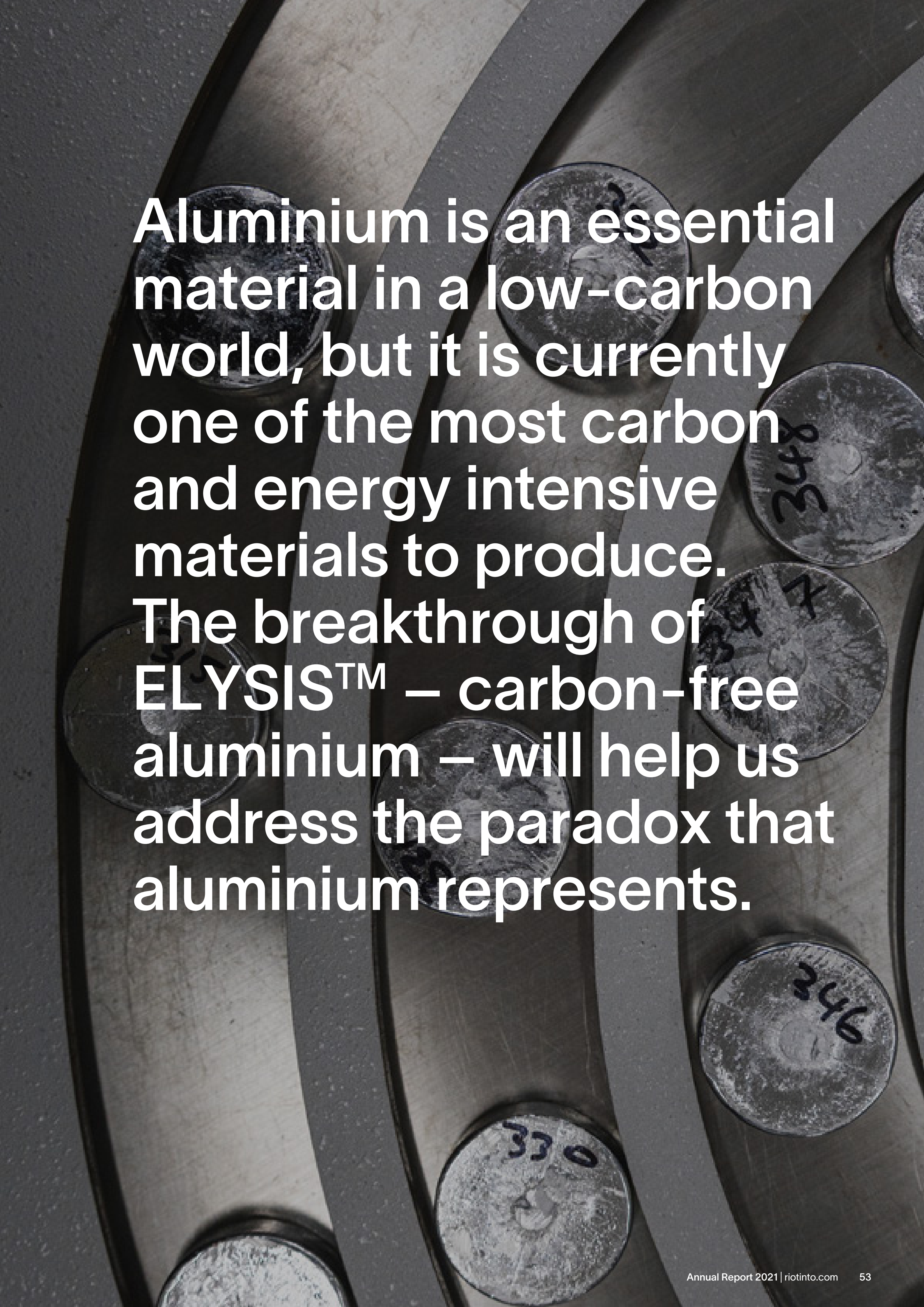
Our people

Our priority is to be a people-centric organisation where all employees have a sense of purpose, responsibility and empowerment to make decisions regarding our business. We continue to invest in enhancing the skills and leadership capabilities that influence safety and business performance. In parallel, we are embedding our new core values — care, courage and curiosity — to assist in creating an environment where everyone feels comfortable to speak up and challenge.

The strike and situation in Kitimat is a case where we have a large gap to close. We are committed to implementing a new way of working based on trust where the entire workforce feels listened to and cared for. The cultural reset is under way and has included a reorganisation of the BC Works leadership team. Beyond this, the team is focusing on training, redesigning some operational processes and more structured engagement with the workforce and union leaders.

We also continued our focus on inclusion and diversity. In 2021, we increased our workforce gender balance by 1.6%, to 16.4%. Over 40% of our senior leadership positions are held by women. Specific actions occurred on all sites across our Atlantic and Pacific operations to increase attraction, development and retention of a diverse workforce at all levels. Our sites in Gladstone introduced a female leadership development pilot to build career pathways and develop the capability of our female talent in frontline leader roles. Our Alma smelter, in partnership with the USW Alma union in Quebec, conducted a pilot to increase female representation by understanding women's experiences, addressing issues and incorporating mechanisms to better integrate and retain them in operations.

In 2021, our leadership across the organisation committed to improving the psychological safety and wellbeing of our employees through collegiality, feedback and everyday respect. This will remain a focus for the coming years.



Aluminium is an essential material in a low-carbon world, but it is currently one of the most carbon and energy intensive materials to produce. The breakthrough of ELYSIS™ – carbon-free aluminium – will help us address the paradox that aluminium represents.

Copper

Copper is essential to modern life and plays a fundamental role in creating a sustainable, low-carbon world. Rapid electrification and an increasing adoption of renewable energy sources, like wind and solar, are set to drive greater demand for copper. With assets spanning the globe, we are well-positioned to deliver on this potential.

We are building on over 100 years of history and experience, with world-class deposits and operations as the bedrock for future growth. Kennecott, our US operation based in Salt Lake City, Utah, has been mining and processing minerals since 1903, with the largest open pit mine in operation in the world and one of only two copper smelters in the US. Kennecott's long history of innovation is set to continue as we explore growth projects for this valuable asset. Building on this experience, we are developing the equally transformational Oyu Tolgoi copper and gold mine in the South Gobi Desert of Mongolia, a project that is almost unrivalled in the industry in its complexity and scale - where we are building one of the largest block cave mines in the world to access an orebody nearly the size of Manhattan island.

At every site and asset, we maintain a strong focus on innovation and responsible production. We delivered strong safety and financial performance despite significant challenges in 2021, from managing the varying and complex impacts of the COVID-19 pandemic across our global footprint, to major geotechnical issues at Oyu Tolgoi and Kennecott. Our team demonstrated resilience and technical capability in keeping our assets running and our people safe.

We also continued our focus on safety and wellbeing outside of our operations, strengthening our partnerships with communities, stakeholders and Indigenous peoples with ancestral connections neighbouring our assets – by providing critical support in areas ranging from food security to wildfire response.

As the world's demand for copper grows, we are ready to grow with it, with a pipeline of growth projects at various stages of development. In Arizona, US, the Resolution Copper project continues to progress through comprehensive and independent social and environmental regulatory reviews. In parallel, we advanced our consultation and partnerships with neighbouring communities and Native American tribes throughout 2021. Of particular note is our partnership with Western Apache tribes and the US Forest Service to implement the Emory Oak Collaborative Tribal Restoration Initiative, centred on advancing Indigenous Traditional Ecological Knowledge.

Management of Winu, our copper-gold discovery in Western Australia, transitioned from the Exploration group to Copper. Over the year, we have focused on engaging Traditional Owners on project plans, agreements and regulatory approvals while continuing drilling activities. Importantly, we successfully piloted our approach for Net Zero Pathway studies, and developed an assessment methodology for physical resilience to climate change risks, which will be replicated across other assets.

In addition to copper, our product group also includes the Simandou project in Guinea, the largest known undeveloped high-grade iron ore deposit in the world. High-grade iron ore is a key pillar for the decarbonisation of the steelmaking process, and a critical priority as the world progresses on the road to a low-carbon future.

Working together for a better future

3 copper operations in the US, Mongolia and Chile	**3** copper growth projects in the US, Australia and Mongolia	**2** Copper Mark certifications, verifying responsibly produced copper from Kennecott and Oyu Tolgoi
1 high-grade iron ore growth project in Guinea	**7,000** employees	**2.2Mt** CO_2e emissions (our share)

Snapshot of the year

0.21 AIFR (2020: 0.25)	**59%** underlying EBITDA margin (product group operations) (2020: 50%)	**$4.0bn** underlying EBITDA (2020: $2.1bn)
$7.8bn gross product sales (2020: $5bn)	**$2.6bn** net cash generated from operating activities (2020: $1bn)	**$1.3bn** capital expenditure (2020: $1.7bn)

Kennecott copper mine. Utah, US.

Copper

2021 year-end results	2021	Adjusted[5] 2020	Change
Mined copper production (000 tonnes – Rio Tinto share)	**494**	528	(7)%
Refined copper production (000 tonnes – Rio Tinto share)	**202**	155	30%
Gross product sales (US$ millions)	**7,827**	4,969	58%
Average realised copper price (US cents per pound)[1]	**424**	283	50%
Underlying EBITDA (US$ millions)	**3,969**	2,084	90%
Underlying EBITDA margin (product group operations)	**59%**	50%	
Underlying earnings (US$ millions)	**1,579**	754	109%
Net cash generated from operating activities (US$ millions)[2]	**2,634**	982	168%
Capital expenditure – excluding EAUs[3] (US$ millions)	**(1,328)**	(1,659)	(20)%
Free cash flow (US$ millions)	**1,295**	(687)	289%
Underlying return on capital employed (product group operations)[4]	**14%**	8%	

1. Average realised price for all units sold. Realised price does not include the impact of the provisional pricing adjustments, which positively impacted revenues by $246 million (2020: $182 million).
2. Net cash generated from operating activities excludes the operating cash flows of equity accounted units (EAUs) but includes dividends from EAUs (Escondida).
3. Capital expenditure is the net cash outflow on purchases less sales of property, plant and equipment, capitalised evaluation costs and purchases less sales of other intangible assets. It excludes EAUs.
4. Underlying return on capital employed (ROCE) is defined as underlying earnings (product group operations) excluding net interest divided by average capital employed.
5. Following a reorganisation of the management team in 2021, the Diamonds business is reported within Minerals and the Simandou iron ore project in Guinea is reported within Copper. 2020 comparatives have been adjusted accordingly.

Enabling the low-carbon transition

Copper plays a key role in electrification and power generation, including renewable energy and electric vehicles. A single 1MW offshore wind turbine uses more than six tonnes of copper, and electric vehicles have a copper intensity three to four times higher than traditional combustion engine vehicles. Across our own operational footprint, we are developing pathways to zero emissions through multiple initiatives, supported by a cross-functional team responsible for identifying a pipeline of emissions reduction projects.

- In partnership with ENGIE, we completed an emissions reduction pilot study at Winu in early 2021 to better understand existing and emerging technologies for improving renewable power to our operations. Having evaluated the emissions profile and current demands at one of our projects, plans are under way to apply this approach across all Copper assets, expected to be completed in 2022.
- At Kennecott, we are updating eight haul trucks with lower emission engines, as well as conducting a trial to understand the potential for using renewable diesel, for completion in 2022. We also received approval for a 30MW solar power plant to be constructed in two phases: 5MW to be completed by 2023, expanding to 30MW by 2025.
- Following the closure of Kennecott's coal-fired power plant in 2019, the annual 1.5MWh Renewable Energy Certificates (RECs) acquired far exceeded Kennecott's requirements. In 2021, we transferred excess RECs from Kennecott to Resolution Copper, resulting in zero carbon emissions from electricity for both assets.
- At Oyu Tolgoi, we are working on several initiatives to reduce energy consumption and introduce renewable solutions. Studies on the use of solar power to provide energy to camp areas and other ancillary buildings will be initiated in 2022. In addition, the opportunity for wind-based renewable energy is being explored via a wind feasibility assessment.
- At Winu, we piloted a new risk assessment methodology delivered by EY to assess business resilience to potential physical impacts of climate change. The assessment included key climatic variables relevant to the mine site, transportation routes and key infrastructure. The methodology and lessons learned from the Winu pilot will be replicated across our sites and operations on a priority basis beginning in 2022.

In 2021, our Copper product group's greenhouse gas emissions were 2.2Mt CO_2e, a reduction of 1.2Mt CO_2e or approximately 35% compared to our 2018 emissions baseline*.

Safety and wellbeing

Our operations recorded a third fatality-free year, but there was a slight deterioration in other key safety metrics, including a doubling of reported potentially fatal incidents (PFIs) to 18, due in part to improving the culture around reporting and transparency. We ended 2021 with all-injury frequency rates (AIFRs) of 0.25 among employees and 0.17 among our contractors, compared to 0.21 and 0.28 respectively in 2020.

In addition, we achieved a significant improvement in the effectiveness of our controls through critical risk elimination and engineering actions. Despite COVID-19 challenges, we completed over 200,000 critical risk management verifications, including over 41,000 COVID-19 verifications.

Our people continued to sustain our operations through the pandemic and we recognise the personal and professional challenges that many have experienced. In line with the Group health and wellbeing frameworks, we built on existing resources to deliver tailored and integrated approaches to improving safety and wellbeing dialogue among our workforce at each of our assets.

COVID-19 continues to present challenges and our workforce has become fatigued – this was made clear by our People Survey. We are adapting and introducing new workplace procedures to address these challenges, as well as supporting vaccination rollouts across our assets to try to ensure that our workforce remains protected, healthy and safe.

* The Copper group's carbon emissions are reported on an equity basis and therefore include Rio Tinto's 30% share in Escondida. The new power contract at Escondida, which replaces fossil-fuel based electricity with renewable energy, came into effect in 2021, and is a major contributor to emissions reduction of the Copper group.

A decade of innovation, a lifetime of opportunity

Award-winning copper, enriched communities, an underground oasis, and sustainable cashmere are among the many standout moments during Oyu Tolgoi's first ten years of operation.

Learn more about Oyu Tolgoi at riotinto.com/stories.

Financial performance

The improvement in our financial performance was primarily attributable to strong market conditions, with the copper price driven higher by renewed speculative interest, declining LME stocks, a weaker US dollar and COVID-19 related supply constraints. We also benefited from higher sales volumes of refined metal at Kennecott in the US and temporarily higher gold grades at Oyu Tolgoi in Mongolia. These compensated for lower volumes at Escondida in Chile, where ongoing preventive measures in response to COVID-19 continued to impact workforce availability. As a result, underlying EBITDA was up 90% to $4.0 billion, with margins rising to 59%.

Price movements for all products benefited underlying EBITDA by $2.2 billion for the full year. Our average realised copper price increased by 50% to 424 US cents per pound, even before taking into account the provisional pricing benefit to revenues of $246 million in 2021, while the benchmark gold price rose just 2% to $1,799 per ounce. We incurred additional costs related to our response to COVID-19, higher energy costs, notably in the US driven by higher diesel costs, and higher unit costs at Escondida due to lower concentrator throughput. These were offset by an improvement in volumes at Oyu Tolgoi and higher refined copper volumes at Kennecott, despite a furnace failure in September 2021, which was followed by safe restart in October. Downtime in 2020 was more significant, due to an earthquake and a major smelter maintenance shutdown.

Our copper unit costs, at 82 cents per pound in 2021, were 26% lower than in 2020, but marginally above guidance of 75 to 80 cents per pound. Lower throughput and grades at Escondida and higher royalties, in line with stronger prices, at Kennecott and Oyu Tolgoi were offset by higher production of copper and, in particular, gold at Oyu Tolgoi, driven by higher grades.

We continue to advance our future evaluation projects, in particular at Resolution Copper in Arizona, at Winu in Western Australia and at the Simandou iron ore project in Guinea.

We generated $2.6 billion in net cash from our operating activities, a 168% increase on 2020, from the same drivers as underlying EBITDA and a $0.8 billion increase in dividends from our 30% equity holding in Escondida to $1.4 billion, partly offset by a $0.4 billion tax payment in Mongolia. Free cash flow of $1.3 billion reflected the higher operating cash flow and high level of capital investment ($1.3 billion), mainly relating to the ongoing development of the Oyu Tolgoi underground project, where we have a 34% effective interest but fully consolidate on the basis of management control.

Review of operations

Mined copper, at 494 thousand tonnes, was 7% lower than 2020, due to lower recoveries and throughput at Escondida as a result of the prolonged impact of COVID-19, partly offset by higher recoveries and grades at Oyu Tolgoi and Kennecott.

Kennecott's mined copper production was 14% higher than 2020, with higher grades and recovery but less than expected production due to a slope failure in May. The transition to the south wall is complete, with copper head grade exceeding 0.5% in the second half. Refined copper production was 69% higher than 2020 as a result of improved performance through most of the year relative to 2020, despite the furnace failure in September 2021. The smelter was safely restarted in late October and has been stable since. In 2020, there was significant downtime following an earthquake and major maintenance.

Escondida's mined copper production was 17% lower than 2020, mainly due to 10% lower grade in ore feed to the concentrators, 4% lower throughput and 31% lower recoverable copper in ore stacked for leaching, mostly caused by continuous COVID-19 restrictions in 2021 which impacted mine development due to lower workforce availability.

Oyu Tolgoi's mined copper production from the open pit was 9% higher than 2020 with improved performance, a temporary increase in grades and increased mill feed following geotechnical issues in the first half, partly offset by lower staffing levels due to COVID-19.

Our principal projects and growth options – Oyu Tolgoi underground project

The Oyu Tolgoi underground project in Mongolia is expected to produce 500,000 tonnes of copper per year on average, from 2028 to 2036, from the open pit and underground and an average of around 350,000 tonnes for a further five years (from 2037 to 2041)[1], compared to 163,000 tonnes from the open pit in 2021. The underground Ore Reserve has an average copper grade of 1.52%, which is more than three times higher than the open pit Ore Reserve, and contains 0.31 grammes of gold per tonne.[2]

By 2030, Oyu Tolgoi is expected to be the fourth-largest copper mine in the world. It is a complex greenfield project comprising an underground block cave mine and copper concentrator as well as an open pit mine which has been successfully operating for ten years. It is also one of the most modern, safe, sustainable and water-efficient operations globally, with a workforce which is more than 96% Mongolian. Since 2010, Oyu Tolgoi has spent a total of $13.4 billion in-country, including $3.6 billion of taxes, fees and other payments to Mongolian national and local governments. The size and quality of this Tier 1 asset provides additional options, which could see production sustained for many decades.

In December 2021, the updated Resources and Reserves were registered in Mongolia in accordance with Mongolian regulations, and approval from the Mongolian authorities of the 2022 Annual Mine Plan was received.

A comprehensive agreement was reached with all partners on 25 January 2022, resetting the relationship between the partners, increasing the value the project delivers for Mongolia, and allowing underground operations to commence.

As part of a comprehensive package, Turquoise Hill Resources (TRQ) agreed to waive in full, funding balances arising from a carry account loan with Erdenes Oyu Tolgoi (EOT) of $2.4 billion, comprising the amount of common share investments in Oyu Tolgoi LLC funded by TRQ on behalf of EOT to build the project to date, plus accrued interest.

The Parliament of Mongolia has approved a resolution (Resolution 103) that substantially resolves the outstanding issues that have been subject to negotiations with the Government of Mongolia over the last two years in relation to addressing Parliament Resolution 92 (December 2019).

An updated funding plan has been agreed to address the current estimated funding requirement for the project. Until sustainable underground production is achieved, Oyu Tolgoi will be funded by cash on hand and rescheduling of existing debt repayments, together with a pre-paid copper concentrate sales agreement with TRQ. This is in line with restrictions on debt financing contained in Resolution 103, passed by the Parliament of Mongolia on 30 December 2021.

Rio Tinto and TRQ have amended the Heads of Agreement signed in April 2021 to ensure they appropriately fund Oyu Tolgoi, including seeking to reschedule existing project finance repayments and raising additional supplemental debt on terms acceptable to all the parties, as well as a loan facility from Rio Tinto and up to $1.5 billion of equity offerings by TRQ, with an initial offering of at least $650 million in 2022. The capital forecast stands at $6.925 billion, including $175 million of estimated COVID-19 impacts to the end of 2021[3], with sustainable production expected in the first half of 2023. A reforecast will be undertaken in the first half of 2022 to determine a revised cost and schedule estimate that will reflect any further COVID-19 impacts; any additional time-based impacts and market price escalation arising from resequencing due to 2021 budget constraints (as a result of the Oyu Tolgoi Board not approving the capital budget uplift at the time the Definitive Estimate was finalised); and updated risk ranging reflecting the latest project execution risks.

The Oyu Tolgoi Board has also approved the signing of an electricity supply agreement to provide Oyu Tolgoi with a long-term source of power from the Mongolian grid, under terms already agreed with the Government of Mongolia. In meeting Oyu Tolgoi's commitment to sourcing power domestically, we will work with the Government to support long-term renewable energy generation in support of the Mongolian grid. The Government of Mongolia and Oyu Tolgoi are in constructive discussions with the Inner Mongolia Power International Cooperation Company (IMPIC) for an extension of current power import arrangements beyond the current agreement of July 2023. IMPIC has indicated its support for an extension and commercial terms are being finalised.

Other principal projects and growth options

The $0.9 billion investment in phase one of the south wall pushback project at Kennecott, extending mine life to 2026, is complete and we are gradually accessing higher grades. The $1.5 billion phase two investment will further extend pre-stripping and support additional infrastructure development, allowing mining to continue into a new area of the ore body between 2026 and 2032, generating attractive returns. Pre-feasibility studies are also being progressed to extend open-pit mining beyond 2032, with a further pushback of the north wall. In July, we announced the approval of a $108 million investment to support an underground mine below the existing open pit, with studies due to be complete by 2024. Potential underground mining would occur concurrently with open pit operations and result in increased copper output.

At the Resolution Copper project in Arizona, the US Forest Service (USFS) published the Final Environmental Impact Statement (FEIS) in January 2021, six months behind the target date in its original project schedule set in 2015 by the Obama Administration. In March 2021, the US Department of Agriculture directed the USFS to rescind the FEIS to allow the agency to undertake further review and consultation. Resolution Copper has used this time to deepen dialogue and partnerships with local communities and Native American tribes, building on the significant consultation undertaken over the past decade.

1. The 500ktpa target (stated as recovered metal) for the Oyu Tolgoi underground and open pit mines is underpinned 17% by Proved Ore Reserves and 83% by Probable Ore Reserves for the years 2028-2036. The 350ktpa production target for the following five years is underpinned 18% by Proved Ore Reserves and 82% by Probable Ore Reserves. These production targets have been scheduled from current mine designs by Competent Persons in accordance with the requirements of the Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves, 2012 Edition (the JORC code).
2. This information in relation to the underground Ore Reserves was previously reported in the release to the ASX dated 16 December 2020. The Competent Persons responsible for reporting the Ore Reserves were Ferrin Prince and Mark Bixley, Competent Persons, who are a Member and Fellow respectively of The Australasian Institute of Mining and Metallurgy. Rio Tinto is not aware of any new information or data that materially affect these Ore Reserve estimates and confirms that all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed. The form and context in which the Competent Persons' findings are presented have not been materially modified from the release dated 16 December 2020.
3. These estimates exclude any impacts of delays to work schedules caused by restricted approved budgets since the start of 2021. This, together with any ongoing COVID-19 impacts, will be assessed following the commencement of underground operations with further updates provided to the market in due course. Panels 1 and 2 studies will be ongoing throughout 2022. Further study work is also under way to assess the extraction methodology and ultimate recovery of the Panel 0 recoverable pillars.

There are five different Native American groups, the O'odham, Hopi, Pueblo of Zuni, Western Apache, and Yavapai, who traditionally used and occupied this land, each with unique histories and interactions, cultural traditions, and perspectives on the way of life. The O'odham, Hopi and Zuni have ties to this land dating back thousands of years. From these five groups, there are 11 federally recognised tribes which establishes them as domestic dependent nations within the US with inherent sovereign authority who are part of the formal consultation process, all of whom have different views around this project. We are already progressing partnerships with over half of these tribes and our aim is to have a mutual dialogue with all tribes. For example, in the second quarter of 2021 the USFS, in partnership with Resolution Copper and Western Apache Tribal elders began a restoration effort for Emory Oak trees, guided by Indigenous Traditional and Ecological Knowledge. The project has advanced restoration activities at a dozen priority Emory Oak Groves identified by Western Apache elders on Arizona National Forests, White Mountain Apache Tribal lands and Resolution Copper private property.

In 2021, we also hosted tribal leaders and elders in our business and local community to share the importance of their culture and acknowledge their ancestral ties to Arizona's landscape. Throughout the year, we continued to support fieldwork by Native American tribal monitors who use traditional knowledge to identify ancestral sites, seeps, springs and medicinal plants on Resolution Copper private lands and partner with us on preservation and co-management approaches.

At the Winu copper-gold project in the Paterson Province of Western Australia, we continue to actively engage with the Traditional Owners and have begun discussions on the initial scope and mine design with Western Australia's Environmental Protection Authority. We have taken particular care to build transparent, credible and trusting relationships with the Traditional Owners and continue to prioritise building these partnerships moving forward. Drilling, fieldwork and development activities continue to progress to schedule. Timelines to sanction and first production will be disclosed on completion of relevant agreements and permitting processes.

At the Simandou iron ore project[4] in Guinea, technical optimisation work continued in 2021 with the support of China-based institutions and partners. Progress continued on updating and implementing our 2012 Social and Environmental Impact Assessment, alongside a new drilling programme that commenced in the fourth quarter. We established a new office in Conakry to accommodate our expanding in-country team and have issued expressions of interest for construction and early development works and in-country activities to be carried out in 2022.

We continued to engage with the Guinean authorities on potential mechanisms for collaboration on infrastructure development, while seeking mutual and sustainable benefits by developing our projects in line with international social and environmental standards and practices. We have continued to work closely with local communities, supporting them through the COVID-19 pandemic.

We remain committed to the development of Simandou, one of the world's largest and richest iron ore deposits, demand for which is increasing as steelmakers look to reduce carbon emissions, while delivering benefits to our partners, local communities and the people of Guinea.

Our people

Our people are a critical differentiator as we future-proof our business and continue the decarbonisation journey. One example this year of our people's role in our future success could be seen at Kennecott, where we are building on a foundation of more than 100 years of pioneering history.

Our Kennecott Concentrator was chosen as the first site across Rio Tinto to test, improve and embed the Rio Tinto Safe Production System (RTSPS). The system is different to what we have tried in the past. This time we are designing and building it from the ground up, with our people's voices being heard right across the business. Critical to our success will be how we lead. Our leaders are becoming coaches so our people have the autonomy they need to make decisions at the right level, to innovate, and to problem solve. Our people are building a production system that simplifies what we do, upskills our workforce in problem solving and brings consistency to our operations by sharing best practices and continuously improving them.

As we continue to roll out RTSPS, we are building the foundation of a new way of working that is future-ready and brings us together to become the best operator.

4. Operating under the Simfer joint venture where the government of Guinea holds 15% and Simfer Jersey holds 85%. Simfer Jersey is owned by Chalco Iron Ore Holdings (CIOH) (47%) and Rio Tinto (53%). CIOH is owned by Chinalco (75%), Baosteel Resources (20%), China Civil Engineering Construction Corporation (CCECC) (2.5%) and China Harbour Engineering Company (CHEC) (2.5%). This structure has been in place since 2017.

Minerals

Our Minerals portfolio encompasses a global suite of businesses producing materials essential for sustainable development in a decarbonising world. Our products are crucial to a wide variety of industries, ranging from agriculture to renewable energy and electric vehicles.

Our Minerals product group produces high-grade, low-impurity iron ore pellets and concentrate, titanium dioxide, diamonds, and borates from operations in Canada, Madagascar, South Africa and the US. We contribute to Rio Tinto's sustainable growth by unlocking value from our high-grade orebodies and developing new materials. By reprocessing mining waste to extract valuable by-products, we are expanding our frontiers and meeting the increasing demand for critical minerals. We apply innovative technology and processes to deliver products that contribute to a decarbonising and sustainable world.

Our borates business, U.S. Borax, supplies almost 30% of the global demand for borates. It is used in everything from agriculture to fibreglass insulation and in materials for renewable energy – for both wind and solar projects.

Our iron and titanium business is a major global producer of high-grade titanium dioxide, with operations in Canada, Madagascar and South Africa. We also operate a metal powder annealing facility in Suzhou, China. Titanium dioxide is used to whiten a wide range of products, from paint and textiles to paper. When it is smelted and processed into metallic form, titanium is light, resilient and corrosion-resistant. The nature of the orebodies allows us to produce by-products such as monazite and scandium.

Located in northeast Canada, the Iron Ore Company of Canada (IOC) is a fully integrated business with mine, processing, railway, and port facilities. IOC is the leading North American producer and exporter of premium iron ore pellets and high-grade concentrate with some of the lowest levels of impurities in the market.

The Diavik Diamond Mine is known for its beautiful and sought-after white diamonds. Situated 200km south of the Arctic Circle, Diavik is committed to protecting the biodiversity of this delicate ecosystem. The site is home to an award-winning wind farm that has offset over 28 million litres of diesel since its inception – prioritising environmental sustainability in the way that we mine.

Rio Tinto's 2021 Argyle Pink Diamonds™ Tender of 70 rare pink and red diamonds delivered the most significant record breaking results in its 38 year history. We will retain and manage the Argyle Pink Diamonds brand and associated intellectual property through a proprietary Argyle pink diamond trading platform, certification processes and ongoing collaborations with trusted partners.

We have made significant progress across critical minerals that are essential for a low-carbon future through our lithium and scandium projects. This year, we entered into a binding agreement to acquire the Rincon lithium project in Argentina from Rincon Mining, for $825 million. We also committed $2.4 billion to the Jadar lithium-borates project in Serbia. The project remains subject to receiving all relevant approvals, permits and licences. In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We remain committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.

We also successfully produced battery-grade lithium from waste rock at a demonstration plant at the Boron mine in California, US.

We are extracting scandium sustainably from the waste streams of titanium dioxide production, without the need for any additional mining at our new commercial-scale demonstration plant at the Rio Tinto Fer et Titane (RTFT) metallurgical complex in Sorel-Tracy, Quebec. Scandium oxide is used to improve the performance of solid oxide fuel cells and to produce high-performance aluminium-scandium alloys for the aerospace, defence, and 3D printing industries.

Looking ahead, the Minerals product group strives to be a leader in the green economy, a growth contributor, and an employer and partner of choice. Collaboration with our stakeholders, including governments and the communities surrounding our operations, is central to our strategy.

Working together for a better future

6	3	7	9,000	3.4Mt	18,000
mine sites	by-products recovered from waste	smelters, refineries, and processing plants	employees	CO_2e emissions (our share)	solar panels to power our QIT Madagascar Minerals operations by end of 2022

Snapshot of the year

0.38	43%	$2.6bn	$6.5bn	$1.4bn	$0.6bn
AIFR	underlying EBITDA margin (product group operations)	underlying EBITDA	gross product sales	net cash generated from operating activities	capital expenditure
(2020: 0.43)	(2020: 35%)	(2020: $1.7bn)	(2020: $5.2bn)	(2020: $1.1bn)	(2020: $0.5bn)

QIT Madagascar Minerals (QMM).

Minerals

2021 year-end results	2021	Adjusted[5] 2020	Change
Iron ore pellets and concentrates production[1] (million tonnes – Rio Tinto share)	9.7	10.4	(6)%
Titanium dioxide slag production (000 tonnes – Rio Tinto share)	1,014	1,120	(9)%
Borates production (000 tonnes – Rio Tinto share)	488	480	2%
Diamonds production (000 carats – Rio Tinto share)[2]	3,847	14,676	(74)%
Gross product sales (US$ millions)	6,481	5,170	25%
Underlying EBITDA (US$ millions)	2,603	1,710	52%
Underlying EBITDA margin (product group operations)	43%	35%	
Underlying earnings (US$ millions)	888	580	53%
Net cash generated from operating activities (US$ millions)	1,433	1,122	28%
Capital expenditure (US$ millions)[3]	(644)	(455)	42%
Free cash flow (US$ millions)	762	642	19%
Underlying return on capital employed (product group operations)[4]	21%	14%	

1. Iron Ore Company of Canada continues to be reported within Minerals.
2. Diamonds production for 2021 solely relates to Diavik Diamond Mine, following the closure of Argyle in 2020. On 17 November 2021, Rio Tinto's interest in Diavik increased from 60% to 100%. Production and financials reflect this from 1 November 2021.
3. Capital expenditure is the net cash outflow on purchases less sales of property, plant and equipment, capitalised evaluation costs and purchases less sales of other intangible assets.
4. Underlying return on capital employed (ROCE) is defined as underlying earnings (product group operations) excluding net interest divided by average capital employed.
5. Following a reorganisation of the management team in 2021, the Diamonds business is reported within Minerals and the Simandou iron ore project in Guinea is reported within Copper. 2020 comparatives have been adjusted accordingly.

Enabling the low-carbon transition

The minerals we produce are essential to a low-carbon future. Our premium iron ore pellets and high-grade concentrate from the Iron Ore Company of Canada (IOC) enable our customers to operate more productively, reduce emissions and produce higher-quality steel for the modern world. With lithium, we will support the growing demand for electric vehicles and renewable energy storage. We also recover valuable minerals from waste, making the most of what we extract from the ground.

The Minerals product group supports our pathway to zero emissions through several initiatives:

- We are investing in battery manufacturer InoBat Auto to support the development of a battery ecosystem in Europe, one of the world's largest and rapidly growing electric vehicle (EV) markets. InoBat is a European-based battery technology and manufacturing company with a battery research and development centre and pilot battery line under development in Voderady, Slovakia. Our investment follows a memorandum of understanding (MoU) signed with InoBat in May 2021 to help fund and complete this facility. In our MoU, we have agreed to work together to progress the establishment of a "cradle-to-cradle" EV battery value chain in Europe – covering the full commodity lifecycle from mining through to recycling of lithium.
- We have partnered with the US Department of Energy's Critical Materials Institute (CMI) to develop processes to extract lithium from waste material.
- In December, we announced the launch of the construction of the renewable energy plant that will power our QIT Madagascar Minerals (QMM) operations, with our partner CrossBoundary Energy. The plant will consist of over 18,000 solar panels and four wind turbines. The solar plant is expected to be operational in 2022, and the wind power facility will be completed in 2023.
- At the IOC operations in Canada, we are working on developing low-emissions process heat technology, including the trialling of plasma torches.
- Our Diavik Diamond Mine reduced diesel consumption by approximately 4.5 million litres in 2021 alone through their award-winning wind farm. This amount accounts for about 10% of Diavik's annual diesel consumption.
- Boron in California, US, started to trial the first renewable diesel-powered haul truck in Rio Tinto. Manufactured using organic biomass, the renewable diesel fuel is set to produce up to 80% fewer greenhouse gas emissions than regular diesel on a lifecycle basis.
- We are pursuing a project to produce hot briquetted iron (HBI) with high-grade iron ore and hydro-based green hydrogen in Canada.
- We are also working on initiatives that will help decarbonise our energy supply in Africa and implement alternative industrial heat sources and reductants for our industrial processes across our operations.

In 2021, our Minerals product group's absolute greenhouse emissions were 3.4Mt CO_2e, a reduction of approximately 8% from 2018 levels. The decrease in emissions was mainly driven by reductions in production and associated energy use at Richards Bay Minerals (RBM) due to halted operations.

Safety and wellbeing

Our Minerals operations recorded notable progress across key safety metrics this year. For a third year in a row, we recorded zero fatalities. The rate of injuries decreased, with our all-injury frequency rate (AIFR) at 0.38 compared to 0.43 in 2020. The number of potentially fatal incidents (PFI) was 47% lower than in 2020. For 2021, we had six process safety incidents, up from five last year. Our focus on reducing injuries at the sites results from our continued implementation of best practice standards in health and safety, and completing significant projects to remove our people from hazard exposure. We have thoroughly reviewed our risks across the product group and improved controls to mitigate and manage them. We strongly believe our leaders have a key role in our health and safety performance, and we were able to continue our coaching approach across all our sites despite COVID-19 restrictions. We have also made significant progress with our contractors' safety performance, resulting in an AIFR of 0.22, compared to 0.38 in 2020.

The QMM team marked a significant safety milestone by reaching, at the end of 2021, 14 million hours worked without lost-time incidents. The RBM team recorded exceptional safety performance with an AIFR of 0.06 in 2021. The Jadar project recorded three years without recordable injuries, and the Borates packaging and distribution facility in Nules, Spain, reached an impressive 25 years without a lost-time incident.

A critical mineral hiding in the desert

At our Boron operations in the US, we are testing a process to extract high grades of lithium from waste rock created from over 90 years of mining boron.

Learn more at riotinto.com/stories.

This year, we felt immense sadness when one of our colleagues was tragically killed on his way to work at RBM in South Africa. Sadly, another colleague was killed in a public bus accident near RBM. Our sympathies are with their families and loved ones, and we are offering ongoing support to their families and colleagues.

In 2022, we will continue to grow our safety culture in line with our safety maturity model (SMM) by learning from the best sites within the business. We will also continue to integrate SMM with our contractors, building on the success of our teams at RBM who reduced the contractors' rolling AIFR from 0.85 in January 2020 to 0.00 in May 2021 and recorded one injury for the contractor workforce in 2021, down from three in 2020. To support our ambition of becoming the best operator, we will also roll out the Rio Tinto Safe Production System (RTSPS), which was launched this year at the Iron Ore Company of Canada.

As COVID-19 continues to be prevalent in our everyday lives, our teams across all Minerals sites are taking proactive steps to ensure the health and safety of our employees and host communities. We maintain a range of COVID-19 specific measures to align with directives from governments and health authorities in the respective jurisdictions. Our strict COVID-19 protocols allow us to continue to operate while simultaneously reducing the risk of transmission for our employees, contractors and communities.

In 2021, we supported government vaccination campaigns. For example, in Canada, we partnered with governments, communities and other local businesses to deploy vaccination clinics at our facilities and trained staff to administer doses to employees and members of the communities.

Financial performance

In 2021, we benefited from strong market conditions in particular for iron ore pellets and concentrate, but also for titanium dioxide pigment and borates, driven by global economic growth and underpinned by a robust construction market. We also saw a recovery in diamond prices following a pandemic-related build-up of demand and low inventory levels.

The business continued to comply with government-imposed COVID-19 restrictions, notably in Canada, the US and South Africa. At our titanium dioxide business we experienced 9% lower production, as a result of community disruptions and subsequent curtailment of operations at Richards Bay Minerals (RBM) in South Africa for around three months coupled with an extended ramp-up period, as well as unplanned maintenance and equipment reliability issues at Rio Tinto Fer et Titane (RTFT) in Canada.

Underlying EBITDA of $2.6 billion was 52% higher than 2020, primarily due to the strong pricing environment which more than offset the impact of lower volumes, which in turn drove up cash unit costs due to fixed cost inefficiencies.

We generated net cash of $1.4 billion from our operating activities, and $0.8 billion of free cash flow, 28% and 19% higher than 2020, respectively, reflecting the strong pricing environment and higher dividends paid to holders of non-controlling interests at Iron Ore Company of Canada.

Review of operations

Iron Ore Company of Canada (IOC)

Iron ore production was 6% lower than 2020 due to prolonged labour and equipment availability issues impacting product feed and various other operational challenges throughout the year.

Iron & Titanium

Titanium dioxide production of 1.0 million tonnes was 9% lower than 2020 as a result of community disruptions and subsequent curtailment of operations at RBM and unplanned maintenance and equipment reliability issues at RTFT. On 24 August, RBM resumed operations following stabilisation of the security situation, supported by the national and provincial government, as well as engagement with host communities and their traditional authorities.

Borates

Borates production was in line with 2020 and benefited from improved refinery operating rates following the successful implementation of productivity initiatives supporting system stability.

Diamonds

On 18 November, we announced we had become the sole owner of Diavik Diamond Mine in the Northwest Territories of Canada, continuing its leading role in the Canadian diamond industry. Carats recovered at Diavik were 3% higher than in 2020, due to the increased share of production from November, which offset lower ore grade. The 74% decline in diamond production reflects the closure of the Argyle mine on 3 November 2020.

Our principal projects and growth options

The $463 million Zulti South project at RBM remains on full suspension.

On 27 July, the Board committed $2.4 billion of funding for the Jadar lithium-borates project in Serbia, subject to receiving all relevant approvals, permits and licences. In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We are disappointed by this announcement and are committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.

In December, we entered into a binding agreement to acquire the Rincon lithium project in Argentina, demonstrating our commitment to build our battery materials business and strengthen our portfolio for the global energy transition. Located in the heart of the lithium triangle in Salta Province, Rincon is a long-life, scaleable resource capable of producing battery-grade lithium carbonate. It also has the potential to have one of the lowest carbon footprints in the industry that can help deliver on our commitment to decarbonise our portfolio. The transaction is expected to be complete in the first half of 2022, subject to approval by Australia’s Foreign Investment Review Board.

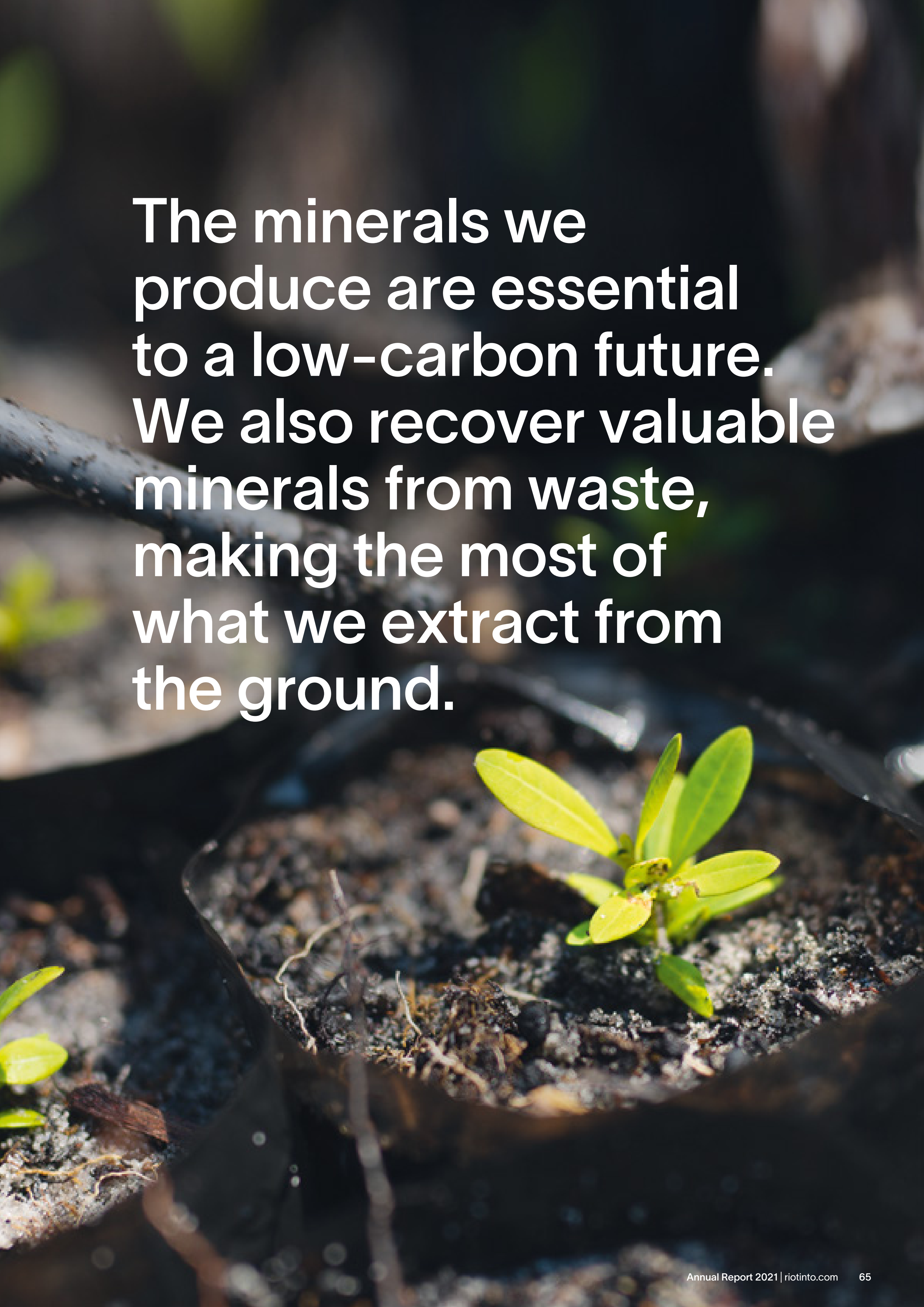
At our Boron operations in California, US, we have successfully produced battery-grade lithium from waste rock at our lithium demonstration plant as part of continued research, development, testing and experimentation of our proprietary technology in this space. The demonstration plant has a design capacity of ten tonnes per year. We are progressing with a feasibility study to evaluate options to expand to a 5,000 tonne per annum capacity.

Our people

Caring for our people is a top priority. Across Minerals operations and offices, initiatives have been put in place to ensure that our employees feel safe, heard, included and motivated.

One example is the Women in Mining Forum at our RBM operations in South Africa, sponsored by the site leadership team. Discussion forums between senior management and female employees at the site were held to foster dialogue and identify areas for improvement to break down gender bias and inequality. The forum also spearheaded community initiatives to support young girls attending high school, with care packages and career guidance.

As a result of these joint efforts, this year’s graduate cohort is 70% female. The Imbokodo programme – implemented in 2005 – is a second initiative led by RBM to improve gender diversity in the workplace by providing training and career opportunities to women in our surrounding communities.



The minerals we produce are essential to a low-carbon future. We also recover valuable minerals from waste, making the most of what we extract from the ground.

Commercial

Our Commercial group includes our global sales and marketing, procurement, and marine and logistics operations. We are the primary interface with markets, customers and suppliers – local, regional and global – through a network of 37,000 suppliers and almost 2,000 customers.

Our Commercial group is focused on building industry-leading customer and supplier partnerships to deliver innovation, ESG leadership, and create future value for the company.

In 2021, we refocused the Commercial group to prioritise the delivery of marketing and procurement excellence, provide sustainability leadership, drive optimisation across the Group, and establish integrated trading activities.

This year also saw an increased focus on the Asia region for the Commercial group as our Chief Commercial Officer also became the Group Executive responsible for China, Japan and South Korea.

The expansion of our marketing activity is helping position us to meet demand for Rio Tinto products driven by customer expectations and consumer behaviour, government stimulus initiatives in response to COVID-19 impacts, and the longer-term opportunities generated by climate change policies.

We are already seeing enduring market changes – whether it be mechanisms such as premium pricing for green products or demand advantage for low-carbon products.

There is a growing number of customers who require products to be responsibly produced, and who seek access to favourable green financing or opportunities that mandate green credentials.

Safety and wellbeing

In 2021, we continued to focus on the safety and health of our employees, contractors and stakeholders, recording zero fatalities and a 0.07 all-injury frequency rate (AIFR) for the year.

COVID-19 continues to be a global risk, managed across our workforce and supply chains with appropriate physical mitigations in place; regular facilitated discussions on mental health, resilience and wellbeing; and the collaborative sourcing and delivery of critical health equipment to colleagues and communities in medically underserved regions.

As our business continues to navigate COVID-19 impacts, we have maintained our strong focus on critical risk management and prevention programmes across areas of greatest exposure. For example, we continue to undertake risk analysis for each of our dangerous goods supply chains, and develop appropriate critical control plans.

In 2021, the Commercial group successfully managed a maritime fleet of more than 230 contracted and owned vessels. Our Marine team focuses on managing fatal risks by ensuring Critical Control Verifications are performed for all tasks. Over 300,000 operator verifications were performed and recorded during 2021, the highest number within the company during the past 12 months. This has helped our Marine team deliver an outstanding safety performance on our fleet of 17 owned vessels with a zero AIFR for 2021 and 12 months rolling, with the last recordable injury in July 2020. We are working hard with our partners to achieve the same results at our non-managed marine operations where we tragically witnessed three fatalities in 2021 and one in early 2022 on chartered vessels. We started collecting data on these fatalities in 2019, with three fatalities on non-managed vessels in 2019 and 2020.

To manage risks to seafarers from COVID-19 restrictions on crew changeovers, we continued to work with the industry, our shipowner partners, and regulators to support crew changes and protect crew welfare. This commitment was confirmed when we became a founding signatory to the Neptune Declaration on Seafarer Wellbeing and Crew Change.

Customer focus

We continue to lead the industry in the availability of our products, use of secure technology and application of streamlined financial platforms. For example, the increasing use of bonded warehousing and portside sales for our iron ore and aluminium products in China is supporting customer diversity with more than 20 million tonnes of portside iron ore sales achieved.

Our pioneering first paperless iron ore transaction in Chinese renminbi between Rio Tinto and Baosteel last year was recognised for industry excellence at the 2021 Asset Awards, and as one of the best deals from the market by Global Trade Review.

In 2021, we continued to simplify the customer experience by incorporating secure digital platforms, such as WeChat into our Boron marketing and Ouyeel and EFFITRADE into our iron ore sales.

During the year, we celebrated major destination milestones with the delivery of our three billionth tonne of iron ore to China and two billionth tonne of iron ore to Japan.

Supplier focus

We had more than 2,100 contracts under management in 2021, creating commercial advantage for us through key partnerships, lower costs, release of working capital and better productivity.

We worked to embed greenhouse gas emissions into our sourcing criteria, and we are expanding that to include other ESG factors.

During the year, our Procurement team managed $17.9 billion in contestable spend globally, while working to realise our local spend commitments and secure and diversify our supply chains through a continuing period of significant disruption due to COVID-19.

Our Procurement team's focus on local spend resulted in A$400 million spent with Indigenous suppliers in Australia in 2021, an increase of almost 40% on the previous year.

To further support our supplier partners, we introduced new shorter payment terms to pay Indigenous, small and regional suppliers faster.

Our China Sourcing strategy worked to provide competitive, quality options, and our spend with Chinese suppliers increased 44% compared to 2020.

Marine and logistics

We have already delivered a reduction in shipping emissions on our owned and time-chartered fleet with the use of more efficient vessels, weather routing and schedule optimisation, which will help us exceed the International Maritime Organization's 2030 targets of a 40% reduction by 2025.

From 2023, we will also begin to include the first dual-fuelled liquified natural gas (LNG)-powered ships in our fleet and continue to support the development of technologies and industry partnerships to accelerate the delivery of our climate commitments on shipping.

This includes the potential use of alternative fuels, supporting the viability of zero-emissions fuels, such as ammonia, through our memorandum of understanding (MoU) with ITOCHU Corporation, and our alignment with the Global Maritime Forum's Call to Action for Shipping Decarbonisation.

Circular economy, sustainable value chain initiatives and new markets

In 2021, we created and progressed innovative partnerships with key customers, suppliers, industry groups, technology providers and others on climate change, value chain decarbonisation and market growth.

Our commitment to sustainability was underscored by the launch of START – a new standard in transparency and traceability for the aluminium industry – where customer and consumer demand for a sustainable product is supported through reporting on key ESG criteria regarding our production process via secure blockchain technology.

In Iceland, our ISAL smelter was certified by the Aluminium Stewardship Initiative (ASI) for meeting the highest internationally recognised standards for responsible aluminium production. We now offer ASI Aluminium from eight smelters.

The transition to a lower-carbon world also offers us opportunities to grow our business. For example, to meet the growing demand for boron and zinc in fertilisation programmes, U.S. Borax launched two new products – Anhybor™ and Zincubor™ – to help farmers and fertiliser manufacturers unlock crop potential.

We partnered with Comptech to bring a new generation of aluminium alloys to the market for use in advanced technologies such as electric vehicles and 5G antennas.

We signed an MoU with InoBat to establish a "cradle-to-cradle" battery manufacturing and recycling value chain, and we marked the first sale of aluminium-scandium alloys to Amaero for use in 3D printing of industrial products.

We are also progressing innovative ways to reduce waste from our operations and strengthen our position in the supply of critical minerals by converting it into valuable products and services. Some new potential revenue streams include the extraction of tellurium at Kennecott in Utah, pathways to extract lithium from tailings at Boron in California, and the extraction of high-purity scandium from titanium dioxide production in Sorel-Tracy, Quebec and monazite at QMM in Madagascar.

Our commitment to a sustainable circular economy also included a first-of-its-kind, multi-product collaboration with Schneider Electric.

We announced the development of zero-emissions technologies and applications for mine-haulage systems with key supplier partners Komatsu and Caterpillar. By 2025, we will be piloting both zero-emissions haul trucks and locomotives with the goal to stop buying new diesel haul trucks and locomotives before 2030.

Partnerships aimed at delivering low-carbon and sustainable value chains have also continued with China Baowu, Tsinghua University and Nippon Steel Corporation, and new ones were created with Sumitomo Corporation, POSCO, the Australian Renewable Energy Agency, BlueScope and others.

More information on our low-carbon initiatives can be found in the Innovation pages 70-71.

Market insight and outlook

2021 presented a number of challenges along the path of economic revival, but perhaps most surprising was the breadth of the recovery itself.

Following China's remarkable, commodity-intensive recovery from the COVID-19 pandemic in 2020, other major economies also largely navigated out of the restrictions that impacted economic activity in 2021.

The vaccine rollout, while geographically uneven, defied most expectations and, coupled with ongoing accommodative monetary policy, allowed business across much of the world to begin the process of rejuvenation.

Unfortunately, the force of the global recovery caused numerous supply and demand imbalances that tested the world's production, commerce and trade.

Although we remain cautious of ongoing supply chain and COVID-19 challenges, we are encouraged by growth prospects in the coming year.

Iron ore

Iron ore demand and prices rose to record highs during 2021 as China's imports remained well above one billion tonnes while consumption in the rest of the world largely recovered to pre-COVID levels.

Global scrap generation and consumption also regained their pre-pandemic volumes, but significant incremental high-cost iron ore supply was required to balance the market.

The monthly average Platts Index for 62% iron fines converted to a free on board (FOB) basis rose by 45% (from $101/dmt in 2020 to $147/dmt in 2021 in nominal terms) year on year in order to incentivise the seaborne supply response.

With the exception of products sold at ports in China, all of our Pilbara products are priced with reference to the 62% index.

The steel intensity of the global economic recovery also lifted steel prices and steelmaking profitability across regions to record levels, and global crude steel production grew by almost 100 million tonnes year on year – one of its largest absolute annual increments in history – to an unprecedented total of almost two billion tonnes.

Steel output in Europe and North America rebounded by 16% and 19% year on year, respectively, and exceeded pre-pandemic levels in India, ASEAN and the Middle East.

On the seaborne iron ore supply side, the major producers maintained their 2020 aggregate shipments, but volumes remained below those delivered in the 2018 calendar year (pre-Brumadinho tragedy) for the third consecutive year.

The demand and price premiums for iron ore concentrate and pellets were supported by the recovery in ex-China steel production as steelmakers in developed regions responded to record margins by seeking to ramp up capacity and boost productivity using high-quality raw materials.

Aluminium

Aluminium prices rallied in 2021 to multi-year highs, on firm recovery in global demand, and extensive power-related supply disruptions in China. This led to a global market deficit. Coupled with logistical disruptions, raw materials and energy cost inflation, physical markets remained tight and supportive of higher prices.

Aluminium semi-fabricated demand rose by approximately 7% in 2021, following a decline of approximately 4% in 2020. A robust recovery in global demand across end-use sectors, including packaging, transport, building and construction, led the recovery. This was despite the impact of the semiconductor shortage on automotive production.

Demand recovery was notable in Europe and the US, leading to strong value-added products demand for extrusions billet and rolled sheet.

We expect overall global demand to improve in 2022, but geopolitical risks remain, as well as lower growth in China.

The global alumina market remains in overcapacity, which led to subdued prices earlier in 2021. However, severe disruptions to refineries in the Atlantic and China led to a spike in prices later in the year, but prices retreated by the fourth quarter on ample supply in China.

China continues to drive demand in the global seaborne bauxite market as a result of stricter environmental measures and the depletion of domestic bauxite.

Copper

Copper prices peaked in May at all-time highs (486c/lb LME copper cash, official daily price) driven by renewed speculative interest, declining LME stocks, a weaker dollar and lower production that suggested COVID-related supply problems would persist.

Prices eased over the remainder of 2021, barring a brief spike above 480c/lb in October due to speculation by financial investors and low exchange inventories on the major commodities exchanges of LME, COMEX and SHFE.

Despite headwinds of renewed lockdowns and logistical issues, softening demand and subsequent deterioration in global macroeconomic sentiment, full-year demand surpassed its pre-pandemic highs.

Supply struggled to keep up with rising demand as the lingering effects of COVID-19, workforce constraints and adverse weather conditions limited operating rates.

Supply growth is expected to pick up in 2022 as projects approved in 2017-2018 enter the market.

Copper inventories are at low levels. Throughout 2021, total visible inventory continued to decline, and Chinese inventories reached the lowest level on record. Stocks in LME warehouses rose with inflows to European warehouses in the first half of the year.

Minerals

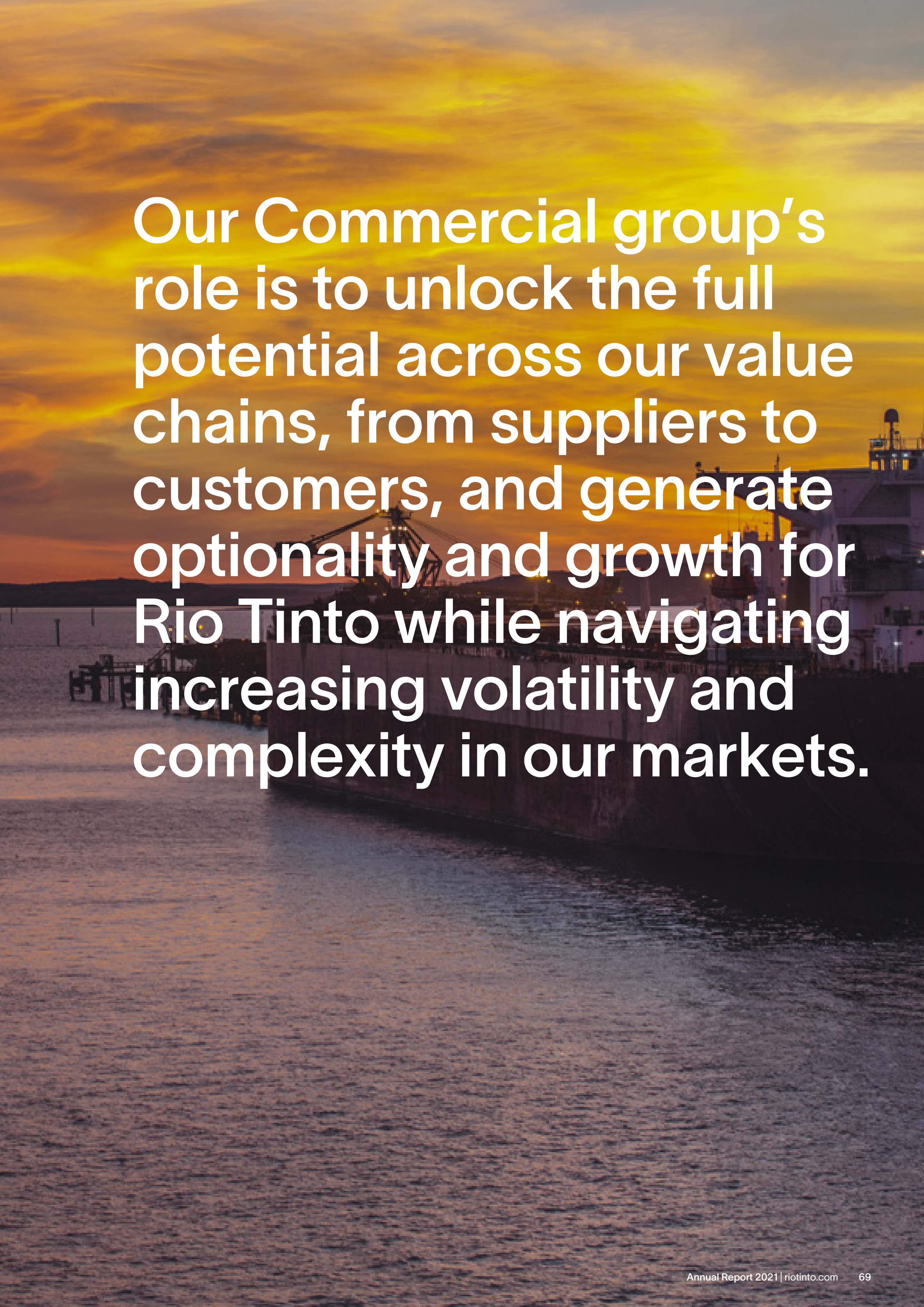
Underlying demand for titanium dioxide pigment has been strong throughout 2021, underpinned by robust construction. Leading indicators, such as housing starts in the US, suggest continued growth in 2022.

Structural factors relating to orebody depletion remain favourable for high-grade TiO_2 feedstock and zircon markets.

Lithium prices have risen sharply through 2021 amid accelerated demand and growth projections for electric vehicles. Increased model variety and the adoption of targets to transition to electric vehicles by major economies underpin this growth.

A strong demand uptick for borates in 2021 was driven by economic growth, with specific applications to construction and elevated crop prices. Supply bottlenecks further contributed to market tightness. Underlying fundamentals remain intact for 2022.

In diamonds, pandemic-related build-up of demand resulted in robust rough sales. Inventory levels dropped to an all-time low, resulting in a recovery in prices.



Our Commercial group's role is to unlock the full potential across our value chains, from suppliers to customers, and generate optionality and growth for Rio Tinto while navigating increasing volatility and complexity in our markets.

Innovation

Innovation has always been a significant differentiator for Rio Tinto, and it plays a critical role in enabling us to lead change for our future success. Empowering our people to innovate is especially important as we tackle climate change and support our customers on their own journeys to decarbonisation.

In 2021, we cemented our focus on research and development (R&D) and technology with the appointment of our Chief Scientist and the development of detailed R&D roadmaps to support the delivery of our business priorities. These include technology and inventions that deliver improved health and safety outcomes, productivity benefits and contribute to our climate goals. This year, we progressed both small initiatives and game-changing innovations across each area.

Improving health and safety through technology

Health and safety are at the centre of everything we do, and technology solutions remained key in keeping our operations running safely during the year. Some health and safety initiatives included:

- Investment in personal monitoring technology to help manage the risk of fatigue and heat stress in our workforce, particularly important where our people are exposed to extreme temperatures and humidity. The technology was tested at our Resolution Copper project in Arizona this year, and the trial identified key learnings and positive outcomes. Further options will be reviewed in future phases.
- At Oyu Tolgoi, a pilot for a Vehicle Interaction Management Situational Awareness System. This new system will improve and support underground mine safety by enhancing environmental visibility and awareness for underground mobile equipment operators. The pilot included 26 vehicles and went live as a fully operational safety system in January 2022.
- Automation of high-risk tasks to reduce our people’s exposure to live-energy sources and confined spaces – two critical fatality risks in our business. For example, our Aluminium business has used robots to complete non-destructive testing as a proof of concept, and drones to inspect confined spaces.

Working smarter

A strategic priority in 2021 has been to continue our investment in next-generation technologies to deliver greater efficiency and lower production costs. Some initiatives include:

- Deployment of a decision support and alerting software application across our Pilbara mine operations. This technology puts rich, real-time information into the hands of our frontline mine operations workforce, so they can make more informed and productive operational decisions.
- Deployment of the world’s first fully autonomous water trucks at Gudai-Darri in the Pilbara, in collaboration with Caterpillar. These joined our autonomous heavy mobile equipment fleet, including haul trucks and autonomous drills.
- Application of computer vision, a type of artificial intelligence, on our Kemano T2 hydropower project in British Columbia, Canada. This intelligence delivered productivity improvements in our tunnel boring machine as it journeyed through more than seven kilometres of mountainside to ensure the long-term reliability of the power supply for our BC Works smelter in Kitimat.
- Construction of a tellurium recovery plant at our Kennecott operations. This is part of our commitment to minimise waste streams by optimising extraction from the material we mine and process. An increasingly valuable by-product of copper smelting, tellurium is a critical mineral and an essential component of cadmium telluride, a semiconductor used to manufacture thin film photovoltaic solar panels. The $2.9 million investment has moved tellurium production forward with a commissioning phase that began in 2021. The plant is set to produce approximately ten tonnes of tellurium annually, developing a new US supply stream for the renewable energy industry.
- Development of a world-first Jadarite extraction process for our project in Jadar, Serbia. As Jadarite is a new mineral, there was previously no known process to extract it. At our Bundoora Technical Development Centre in Melbourne, Australia we created a pilot plant to develop and test extraction processes and validated a viable process.
- We began the design and rollout of the Rio Tinto Safe Production System (RTSPS), which simplifies what we do, frees our people up to innovate, and brings consistency of performance to our operations. Through RTSPS, we make sure our people can contribute to their full potential by upskilling them in problem solving. We are also drawing on data more efficiently to understand asset health, maintenance scheduling and bottleneck solutions, to optimise the end-to-end value chain. We have selected a number of pilot sites across our product groups to progressively test and refine the system as we look to deploy it globally over the next five years.

Accelerating the net zero transition

Tackling our operational emissions

We all have a role to play in addressing the climate challenge, and we know we cannot realise a decarbonised world without significant progress in technology solutions. Partnering with suppliers, industry and other organisations to reduce emissions, as well as growing and developing new markets, remain key components in our decarbonisation journey. Some of our activities this year include:

Decarbonising power:

- Long duration energy storage (between eight to 150 hours) will be required as we decarbonise our businesses through the adoption of renewable power from wind and solar sources as they become the dominant source of energy. In 2021, we became an Anchor member of the newly created Long Duration Energy Storage Council, which was launched at COP26. Through the Council, we aim to partner

Nurturing an innovative culture

At Rio Tinto, innovation is core to what we do. We are driving change internally, encouraging our people to show care, courage and curiosity through our Pioneering Pitch programme. It is an inclusive, global programme designed to capture our employees' creative ideas and accelerate innovative solutions by providing seed funding to develop those ideas further.

In 2021, we held our sixth Pioneering Pitch session and funded eight projects for further development. In total, we have funded 47 projects and invested over $8 million in our employees' ideas and projects.

Learn more about Pioneering Pitch at riotinto.com/stories.

with technology providers, industry and services customers, equipment manufacturers, capital providers and low-energy system integrators and developers to discover how these technologies and their materials' requirements can support us and society to decarbonise our energy systems.

Decarbonising process heat:

- At our Iron Ore Company of Canada (IOC) operations, we continued to work on the development of low-emissions process heat technology, including plasma torches.
- We formed two partnerships to research using hydrogen to reduce emissions in alumina refining: a study with the Australian Renewable Energy Agency to assess hydrogen use in industry and support a coordinated approach to developing a local supply chain; and a study with Sumitomo Corporation on building a hydrogen pilot plant at our Yarwun alumina refinery in Gladstone, Queensland, Australia.

Decarbonising mobile diesel (vehicles and rail):

- We launched the Charge On Innovation Challenge as Founding Patrons, alongside Vale and BHP and facilitated by Austmine. This global initiative challenges technology innovators to develop concepts for large-scale haul truck electrification systems to help the mining sector to reduce its consumption of diesel fuel and significantly cut emissions from surface mine operations.
- We are also fast-tracking the development of zero-emission mining haulage solutions, including autonomous haul trucks, through partnerships with key suppliers Komatsu and Caterpillar.

Decarbonising anodes and reductants:

- ELYSIS marked a significant milestone, successfully producing aluminium without any direct greenhouse emissions at its Industrial Research and Development Centre in Saguenay, Quebec, Canada. ELYSIS is our joint venture with Alcoa, supported by Apple and the Governments of Canada and Quebec.

Carbon-neutral solutions:

- We began collaborating with Carbfix, an academic-industrial partnership that has developed a novel approach to capturing and storing CO_2. Carbfix will use our land surrounding the ISAL smelter in Iceland for onshore CO_2 injection in the world's first carbon mineral storage hub, the Coda Terminal. Liquified CO_2 will be captured from European industrial plants' emissions and transported to Iceland by specifically designed ships operating on sustainable fuel.

Partnering to address emissions across our value chains

We operate in energy- and carbon-intensive value chains – particularly steel and aluminium production – and recognise that we have an important role to play in addressing the resulting emissions.

Our approach to Scope 3 emissions is to work in partnership with our customers to support the decarbonisation of their processes. In the steel value chain, our goal is to invest in technologies that could deliver reductions in steelmaking carbon intensity of at least 30% from 2030.

We are also working in partnerships to develop breakthrough technologies with potential to deliver carbon-neutral steelmaking pathways by 2050. These are subject to deployment by our customers.

Examples of some initiatives include:

- Supporting our customers' blast furnace optimisation to enable sizeable potential carbon emission reductions.
- Developing three decarbonisation pathways for our Pilbara iron ore:
  - Iron ore beneficiation and agglomeration with customers and research institutions.
  - Assessing a mid-grade direct reduced iron (DRI) produced with green hydrogen and processed in an electric melter.
  - A new low-carbon steel process that aims to replace coking coal with sustainable plant biomass when converting iron ore fines into steel. The patent-pending, laboratory-proven process has been developed over the past decade and is now being further tested in a small-scale pilot plant as the initial step in our scale-up process.
- Pursuing a project to produce hot briquetted iron (HBI) with high-grade iron ore and hydro-based green hydrogen in Canada.
- In China, we are working with China Baowu, the world's largest steel group, to support low-carbon steelmaking projects and research. The first $5 million committed in 2021 will initially prioritise the development of lower-carbon ore preparation processes. We committed a further A$4.5 million over five years to our partnership with China's Tsinghua University to support research projects at the Tsinghua-Rio Tinto Joint Research Centre for Resources, Energy and Sustainable Development.
- Through our memorandum of understanding (MoU) with Japan's Nippon Steel Corporation, we identified areas of mutual interest and are progressing projects in decarbonisation of iron and steelmaking, and shipping.

Further details on these initiatives can be found in our 2021 Climate Change Report. Our initiatives relating to our products can be found in our Commercial pages 66-68 in this report.

Sustainability

2021 was a year of learning from the past and looking to the future. We spent the year listening, learning and reflecting on who we are as a business, to better understand stakeholder expectations of us and how we can make a more meaningful contribution to addressing some of the world's most urgent challenges.

We have had some difficult conversations, both within our business and with stakeholders, about our actions, performance and culture. This feedback has helped shape a new direction for our leadership team and our business as a whole.

We are looking to the future and our role in tackling climate change, as well as the opportunities doing so might bring. The world is not doing enough to reduce carbon emissions and curtail the impact of climate change. Our business strategy, released in October 2021, has sustainability at its core. It sets a new direction for Rio Tinto, and an accelerated timeframe for us to deliver significant reductions in emissions from our operations and our value chain.

In 2021, we also set a goal to achieve impeccable environmental, social and governance (ESG) credentials, in line with societal expectations. We know that responsibly managing our business impacts is fundamental if we want to continue to grow and deliver on our strategy.

We can only achieve this in a culture of care, courage and curiosity – our new values.

We faced some confronting truths about our culture this year as we worked to better understand people's experiences of bullying, sexual harassment, racism and other forms of discrimination in the workplace through a comprehensive, independent review of our culture. Following the feedback from more than 10,000 of our people, we have set out a plan of action to improve how we prevent and respond to harmful behaviours in the workplace. This will, over time, contribute to a more safe, respectful and inclusive work environment.

We know we have lots of work to do, but we are optimistic about our future.

Our people demonstrated enormous resilience and commitment as we navigated the second year of the global pandemic, which for many presented even greater challenges than 2020. We continued to work closely with our employees and contractors, communities and governments to protect people's health and safety and facilitate access to vaccinations.

In 2021, we boosted our in-house expertise and capability across several disciplines, including communities, cultural heritage, social performance and environment, to support our operations. We also reviewed many of our organisational structures, standards and processes to ensure we have the right systems in place to effectively manage our impacts.

Rehabilitation at QIT Madagascar Minerals (QMM).

Our approach to sustainability

Sustainability is core to our business. Our strategy, objectives and values guide our approach to sustainability.

Decarbonisation is an urgent priority for us and the world. Our strategy sets a new direction for us to decarbonise our assets and our products, and grow by investing in those materials that are essential to a low-carbon future.

To deliver the strategy, we are focused on four key objectives, including our drive for impeccable ESG credentials and maintaining our social licence to operate.

We must ensure all our stakeholders benefit from the success of Rio Tinto. To do this, our business priorities and performance must align with society's expectations, which are constantly evolving. Robust and trusting relationships with our stakeholders are essential to secure a strong future for our business while ensuring we make meaningful contributions to our host communities and help address the world's most urgent challenges.

Our sustainability framework describes how we manage issues important to us and to our stakeholders and how we contribute to the United Nations Sustainable Development Goals (UN SDGs).

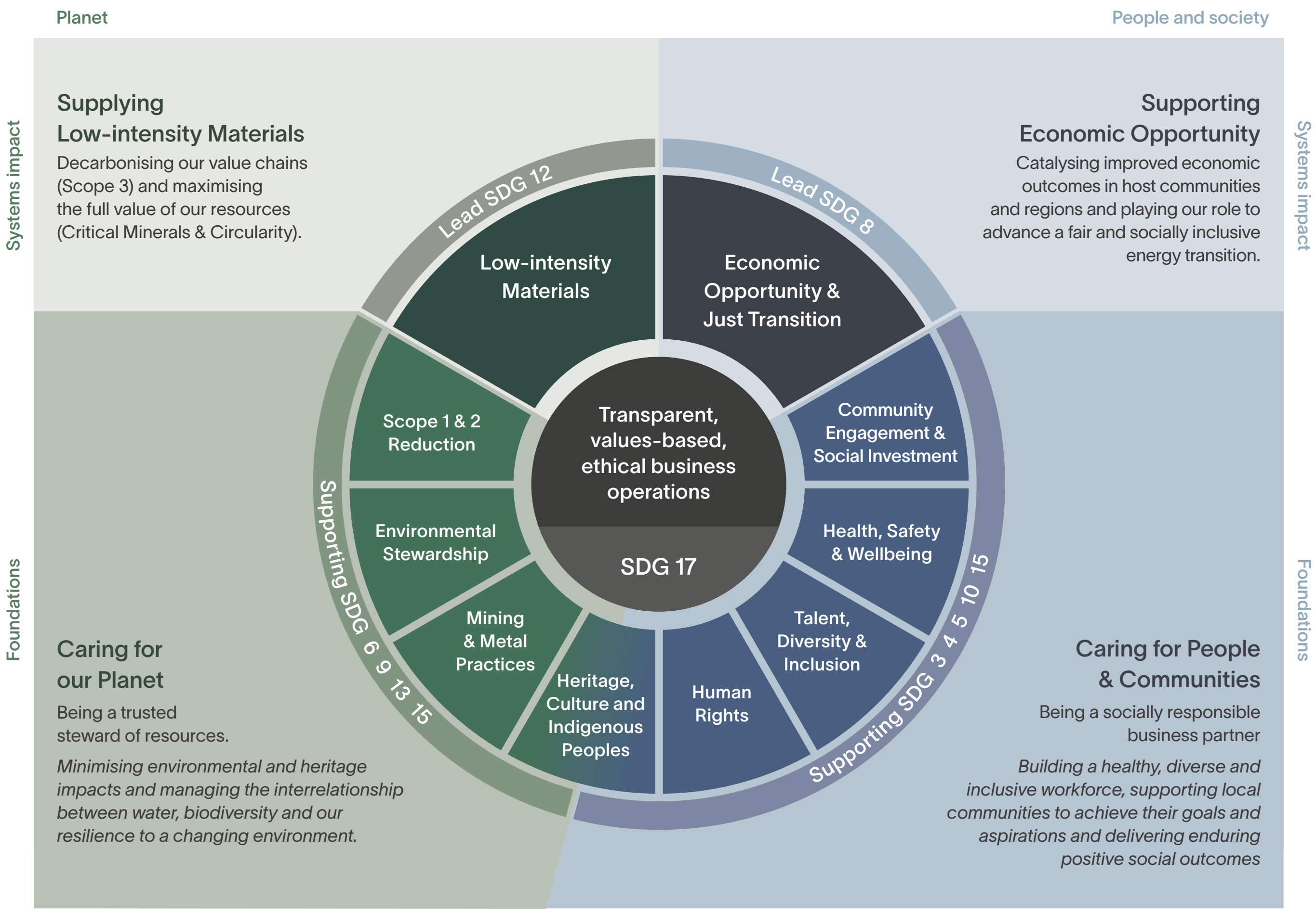
Our sustainability framework

We are entrusted with accessing the world's essential materials and making them available for society's use.

These resources are finite, and we recognise our responsibility to extract the full value from the minerals and materials we produce while avoiding harm and mitigating impacts to people and the planet. Excellence in managing the fundamentals of our business gives us the opportunity to make more substantial and meaningful contributions to society. We are working in partnership with others to support fairer, more sustainable and inclusive communities where we operate.

It has been a transitional year at Rio Tinto and in 2022, we will further define ambitions for each of our objectives, in line with our goal to achieve impeccable ESG credentials.

Sustainability framework



Our approach to the United Nations Sustainable Development Goals

In 2021, we refreshed the way we think about sustainability and more clearly articulated how we are supporting our priority United Nations Sustainable Development Goals (UN SDGs).

Our sustainability framework reflects our focus on the two lead goals – SDG 12 (responsible consumption and production) and SDG 8 (decent work and economic growth) – that we feel are most relevant to operating our business responsibly, and where we can have the most significant impact. Our business operations also contribute to eight supporting SDGs (3, 4, 5, 6, 9, 10, 13, 15) while SDG 17 (partnerships for goals) reflects our approach to achieving our sustainability objectives.

SDG 12 relates to how we mine, process and produce materials and contribute to ethical global supply chains, including trusted lifecycle assessments. This SDG builds on our existing health, safety, environment and community performance standards and our membership of responsible production and product stewardship programmes. It extends our thinking into how we can, in partnership, accelerate efforts to decarbonise our own operations, and those of our customers, and extract the most value from the materials we produce.

To further this goal in 2021, we:

- Announced new climate targets, including new commitments to reduce Scope 1 and 2 emissions by 50% by 2030. We also intend to invest an estimated $7.5 billion in climate abatement projects until 2030, including the installation of one gigawatt of solar and wind power in the Pilbara.
- Recovered critical mineral by-products from waste across several sites, including tellurium, a critical mineral used in solar panels, from Kennecott, lithium from our Borates business in the US, scandium oxide at Rio Tinto Fer et Titane and monazite at QIT Madagascar Minerals (QMM).
- Launched START, the first sustainability label for aluminium using blockchain technology, setting a new standard in transparency and traceability for the industry.
- Achieved industry and commodity accreditations and certifications, including the Aluminium Stewardship Initiative, the Copper Mark, the Responsible Jewellery Council, and the Mining Association of Canada's *Towards Sustainable Mining* standard to independently verify our ESG performance.
- Signed two memoranda of understanding (MoU) with POSCO and BlueScope to investigate options to decarbonise the steel value chain.
- Developed a business model and signed an MoU with our partner RESOLVE to form Regeneration Enterprises, a for-purpose and for-profit company that will combine the re-mining and processing of waste with site closure and rehabilitation, with the ambition to create full restoration outcomes.

SDG 8 speaks directly to our values and commitments to creating a safe and inclusive working environment, as well as promoting education and training partnerships that support social and economic development, and help develop skills for the future. We are committed to ensuring Traditional Owners and Indigenous peoples have a stronger voice in the decisions that affect their lands. Alignment with this goal also requires us to think carefully about how the decisions we make today will impact communities in the future.

To further this goal in 2021, we:

- Expanded our target of a 2% increase in the number of women in leadership roles, to a 2% increase in women in all roles across our business. We did not meet the target. On a broader level, we increased the representation of women in our workforce by 1.5%.
- Committed $50 million in Indigenous leadership development in Australia over five years. In 2021, the number of Australian Indigenous leaders in our business increased fivefold.
- Continued our commitment to source and hire locally, wherever possible, through asset-based employment and local procurement targets. For example, in Mongolia more than 96.5% of Oyu Tolgoi's workforce is Mongolian, of which 22% are from the neighbouring communities in our host Umnugovi province. In 2021, 71% of our total operational procurement was spent in-country.
- Developed partnerships and contributed $72 million to community programmes covering the health, education, environmental protection, housing, agricultural and business development sectors. Some initiatives included:
  - A partnership with the Mongolian University of Science and Technology to build the capability of geotechnical and mining professionals in Mongolia.
  - A partnership with Université du Québec à Chicoutimi (UQAC) for an institutional research structure dedicated to the indigenisation of higher education focused on training the next generation of Indigenous scientists.

Reporting what matters

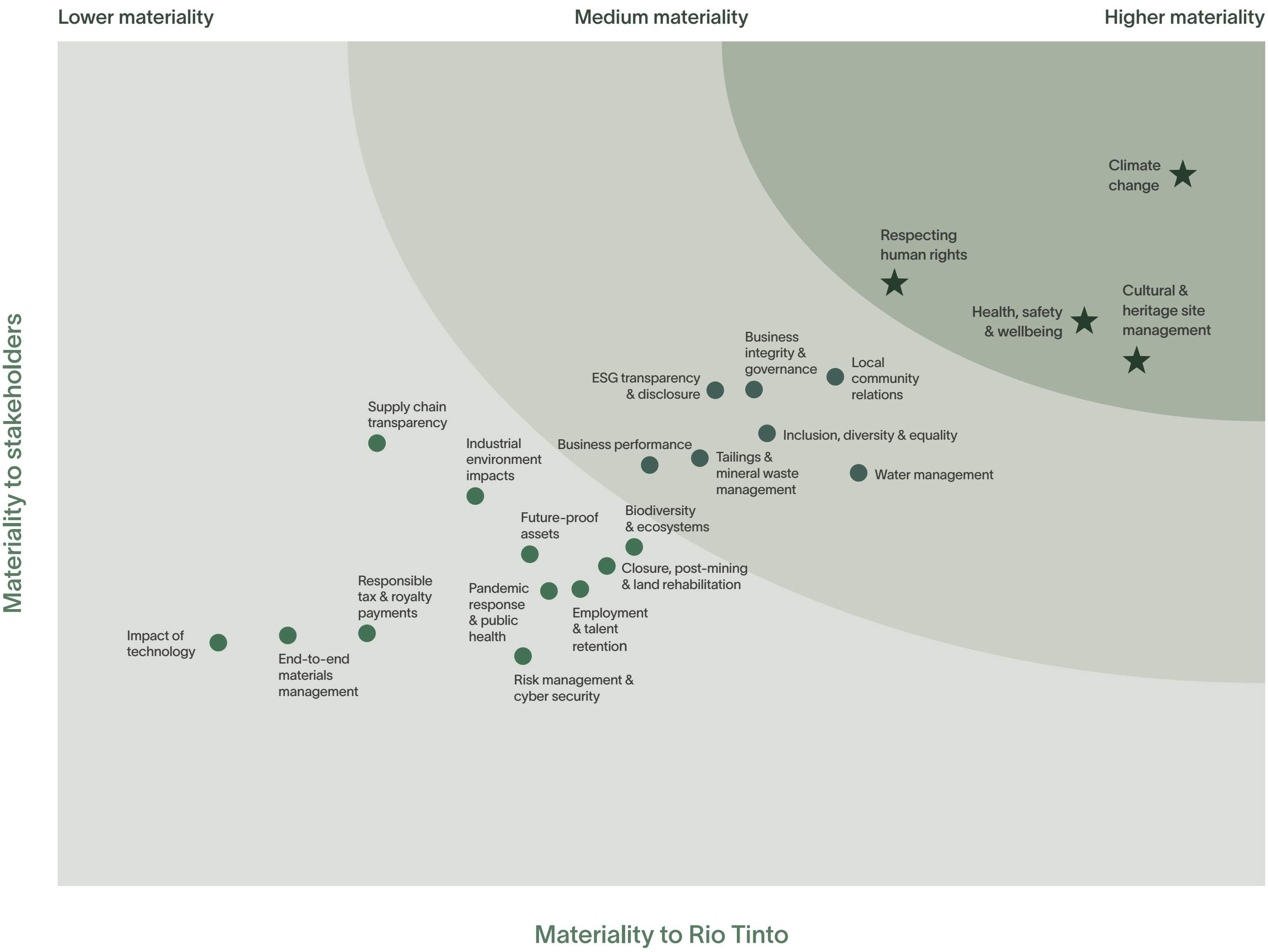
We complete a sustainability materiality assessment every year to ensure we understand what issues matter to our stakeholders and our business. We expanded our approach in 2021[1] to gather information from external stakeholders and a cross-section of employees via interviews, surveys, and reviews of publicly available materials. We asked participants what was important to them now, and what they think will be important in five to ten years.

What is important now

We found that our top four priority issues were clearly aligned with those of our external stakeholders. Climate change clearly stood out as the most important issue for all of us.

Concerns about climate change extended beyond emissions reduction to the need to consider our impact on nature more holistically, for example, on water and biodiversity, and how resilient the natural environment is to climate-induced change.

Respecting human rights, cultural and heritage site management, and health, safety and wellbeing, were the next most significant topics for both internal and external stakeholders. The safety and wellbeing of our people remains our highest priority and we have, over a number of years, made significant progress in ensuring our people return home safely. Business integrity and governance, and local community relations, remain important topics as we continue to rebuild trust with our stakeholders.



1. Note: Based on 60 internal and 68 external stakeholders (note: some interviewees chose not to answer one or more questions). The score represents an average of all respondents in each stakeholder group. Source: Primary interviews and surveys.

What will be important in the future

Our internal and external stakeholders feel that climate change will only continue to increase in importance over the next decade, as will geopolitical uncertainty, the impact of technology, and end-to-end materials management. Other emerging topics include water management due to the reliance of local communities and mining operations on an increasingly scarce resource, and biodiversity due to the increasing impacts of climate change. Human rights will also continue to be of high importance – it is a critical foundation of our social licence to operate.

It is also clear that supply chain accountability and ESG transparency are becoming increasingly important to customers, consumers, investors and financial markets, including our insurance providers. As we produce more critical minerals for batteries, electric vehicles and renewable energy technology, there will be a higher burden of proof in value chain provenance.

Reporting our performance

Our sustainability materiality assessment records the threshold at which an issue or topic becomes important enough to be reported on externally. Not all sustainability-related topics have the same risk profile. A sustainability materiality assessment differs from financial materiality, which may use financial metrics or other quantitative analyses to determine what would be considered a significant or material impact.

As a member of the International Council on Mining and Metals (ICMM), we commit to reporting on our sustainability performance against Global Reporting Initiative (GRI) standards (Core option).

The majority of our sustainability reporting is incorporated into our Annual Report and supplemented by our full Sustainability Fact Book containing current and historical data on topics, including health, safety, environment, climate, communities, human rights, responsible sourcing and transparency. Additional information is available at riotinto.com.

Governance and assurance

The Sustainability Committee oversees strategies to manage social and environmental risks, including management processes and standards. The Committee reviews the effectiveness of management policies and procedures relating to safety, health, employment practices (apart from remuneration, which is the responsibility of the Remuneration Committee), relationships with neighbouring communities, environment, security and human rights, land access, political involvement and sustainable development. Given its strategic significance, climate change is overseen directly by the Board. See the Governance section (pages 156-158) for more information about the Sustainability Committee.

This year, KPMG, the Group's auditor, was again engaged to provide the Directors of Rio Tinto with assurance on selected sustainability subject matters.

KPMG's limited assurance statement satisfies the requirements of subject matters 1 to 4 of the ICMM assurance procedure. See pages 153-154 in the Governance section for more information about our external auditors and internal assurance.

Non-financial information statement

This section provides information as required by regulation in relation to:

- Environmental matters - pages 72-89
- Our employees - pages 101-103
- Social matters - pages 90-95
- Human rights - page 104
- Corruption and bribery - pages 107-108

Other related information can be found as follows:

- Our business model – page 23
- Principal risks and how they are managed – pages 117-130
- Non-financial key performance indicators – pages 24-28

Notes on data

The data summarised in this sustainability section relates to calendar years. Unless stated otherwise, parameters are reported for all managed operations without adjustment for equity interests. Where possible, we include data for operations acquired before 1 October of the reporting period. Divested operations are included in data-collection processes up until the transfer of management control.

We report against the GRI standards and the requirements of other select reporting frameworks, and we reflect the ten principles of the ICMM and the mandatory requirements in the ICMM position statements within our policies, standards and procedures. Visit riotinto.com/policies for more information.

2021 performance against targets

Targets	Performance
To reach zero fatalities, and to eliminate workplace injuries and catastrophic events.	– Zero fatalities at managed operations. – All-injury frequency rate (AIFR) at 0.40 (target: 0.33). – 1.3 million critical risk management (CRM) verifications.
To have all of our businesses identify at least one critical health hazard material to their business, and demonstrate a year-on-year reduction of exposure to that hazard.	– In 2021, 13 of our assets across Rio Tinto achieved an exposure reduction to known health risks (airborne contaminants and noise); these exposure reduction projects positively impacted over 6,500 employees and contractors.
To reduce the rate of new occupational illnesses each year.	– 28% decrease in the rate of new occupational illnesses since 2020[1]
To reduce our absolute Scope 1 and 2 emissions by 15% and our emissions intensity by 30% by 2030 (relative to our 2018 equity baseline). These targets were updated on 20 October 2021. Our new targets are to reduce our absolute Scope 1 and 2 emissions by 15% by 2025 and by 50% by 2030.	– The 2021 Scope 1 and 2 emissions were 31.1Mt CO_2e – a reduction of 1.4Mt CO_2e (4.3%) relative to our 2018 baseline.
To disclose for all managed operations by 2023, their permitted surface water allocation volumes, annual allocation usage and the estimated surface water allocation catchment runoff from average annual rainfall. To achieve local water stewardship targets for selected sites by 2023.	The water stewardship targets have progressed well with the Group target, with 4 of the 6 asset level targets remaining on track. Kennecott and Ranger site-based targets are at risk, but both are considered recoverable with additional focus. For further details on our water performance, see pages 83-86.
To demonstrate local economic benefits from employment and procurement of goods and services by reporting yearly against a locally defined target. To capture and manage community complaints effectively and reduce repeat and significant complaints each year. These targets will be updated for 2022-2026.	– 95% (20 out of 21 asset groupings[2]) have met their 2021 repeat complaints target. – 90% (19 out of 21 asset groupings[2]) have met their 2021 significant complaints target. – 81% (17 out of 21 asset groupings[2]) have met their locally set procurement target. – 53% (10 out of 19 asset groupings[2]) have met their locally set employment target[3].
To improve diversity in our business by: – Increasing women in the business (including in senior leadership) by 2% each year. – Aiming for 50% women in our graduate intake, and 30% from places where we are developing new businesses.	– 25% of our Executive Committee were women, up 2% from 2020. – 27.4% of senior leadership[4] were women, up 1.3% from 2020. – 21.6% of our workforce were women, up 1.5% from 2020[5]. – 58% of our graduate intake were women, down 2% from 2020. – 36.4% of Board roles were held by women, up 3.1% from 2020. – 35% of our graduate intake was from places where we are developing new businesses[6], up 9% from 2020.
Improving our employee engagement and satisfaction.	– 2-point decrease in our employee satisfaction score (eSAT[7]) from 2020.

1. Fewer health assessments were completed in 2021 due to COVID-19 restrictions, which may have impacted the frequency of new cases of occupational illnesses.
2. Refer to the Sustainability Fact Book on riotinto.com/sustainabilityreport for details on the asset groupings.
3. COVID-19 restrictions, workforce supply constraints and organisational restructures are the primary drivers which have impacted asset achievement of locally set employment targets. Two asset groupings are not reporting against the employment target in 2021. Further explanatory notes for each asset are provided in the Sustainability Fact Book.
4. We define senior leadership as General Managers, Group Advisers and Chief Advisers as well as employees in leadership roles who report directly to Executive Committee members.
5. From 2021, the definition used to calculate diversity was changed to include people not available for work, and contractors (those engaged on temporary contracts to provide services under the direction of Rio Tinto leaders), excluding project contractors.
6. Identifying with a nationality is not mandatory. More than 48% of our graduates have not formally reported a nationality.
7. eSAT (employee satisfaction) is a measure of how happy an employee is to work at Rio Tinto. It is calculated by averaging the responses on a 1-7 scale and expressing this out of 100.

Caring for the planet

Producing the materials the world needs means we have an impact on the environment. We work in remote locations and sensitive environments, our activities have the potential to cause harm through pollution, and we have a significant carbon footprint.

We recognise the responsibility we are entrusted with and see ourselves as long-term stewards of natural resources, including land and water, and the ecosystems they support. Our commitment to understanding and mitigating the risks and impacts of our operations extends from the very beginning of an operation's life to beyond closure. More immediately, we are accelerating action to reduce our carbon emissions and investing to help reduce emissions generated by the use of our products. We have an important role to play.

Solar power plant, Weipa. Queensland, Australia.

Climate change

The transition to a net zero carbon emissions world will create additional demand for our commodities. Copper, lithium, aluminium and other minerals are essential to increase renewables capacity and for electric vehicles. Steel is an irreplaceable material in many applications, and iron ore is an essential ingredient for the new technologies required to produce green steel.

We have an important role to play in supporting and enabling the transition to net zero emissions. We will do this by producing materials that are essential to the energy transition, decarbonising our own assets, and partnering to develop the technologies and products that will enable our customers to decarbonise their own processes.

Most of our assets sit in the low end of their commodity carbon intensity curves and 75% of the electricity used at our managed operations is from renewable sources. Our absolute Scope 1 and 2 emissions in 2021 were 31.1Mt CO_2e (2020: 31.5Mt CO_2e), 4.3% below our 2018 equity emissions baseline. The reductions achieved since 2018 are primarily the result of switching to renewable electricity contracts at Kennecott in the US and the Escondida mine in Chile (managed by BHP; Rio Tinto owns 30%), and also relate to unplanned operational disruptions in 2021 at Richards Bay Minerals in South Africa and the Kitimat aluminium smelter in Canada.

Decarbonising our operations

In the lead up to the UN Climate Change Summit in Glasgow, we announced that we will accelerate actions to decarbonise our assets in the short term and aim for a 15% reduction in emissions by 2025 – five years earlier than originally planned. We increased our 2030 target to a 50% reduction in our Scope 1 and 2 emissions and remain committed to reaching net zero by 2050.

To achieve this, we aim to:

- Develop renewable power in the Pilbara. The 34MW solar plant at Gudai-Darri and the 45MW battery system at Tom Price that we approved in 2020 are expected to come online in 2022. We are now targeting the rapid deployment of one gigawatt of wind and solar power. This will replace gas power and meet demand from our fixed plants and infrastructure, as well as support the early electrification and decarbonisation of our mobile fleet.
- Work with state and federal governments, power companies and renewable developers to dramatically increase the availability of renewables in eastern Australia, and aim to develop green repowering solutions for the Boyne Island and Tomago smelters.
- Advance the projects in our Marginal Abatement Cost Curve such as the deployment of zero-emission trucks and the use of hydrogen at our alumina refineries.
- Use a $75/t CO_2e internal carbon price to incentivise energy-efficiency investments and identify new mitigation projects.
- Scale up the ELYSIS™ technology with the goal to have it available for installation from 2024. Construction of the first commercial-scale prototype cells of the inert anode technology has begun at our Alma smelter in Saguenay–Lac-Saint-Jean, Quebec.

We estimate that we will invest approximately $7.5 billion in capital between 2022 and 2030 to deliver our decarbonisation strategy (approximately $1.5 billion over the period 2022 to 2024). There will also be incremental operating expenditure on building new capabilities, energy efficiency initiatives, and research and development of approximately $200 million per year to 2030.

Alignment with 1.5°C

We conclude that our Scope 1 and 2 targets for 2030 and our commitment to reach net zero emissions by 2050 are aligned with efforts to limit warming to 1.5°C, which is aligned with the stretch goal of the Paris Agreement. While there is no universal standard for assessing the alignment of targets with the Paris Agreement goals, the basis for our conclusion is provided in the 2021 Climate Change Report.

KPMG has provided limited assurance over our Scope 1 and 2 target information presented in the 2021 Climate Change Report, including the process to set the target, the alignment with 1.5°C and the roadmap to achieving the target.

Partnerships across our value chains

We operate in energy- and carbon-intensive value chains – particularly steel and aluminium production – and recognise that we have a role to play in addressing the resulting emissions. We have updated our approach to calculating Scope 3 emissions to use regional factors rather than a global average. Our estimated Scope 3 emissions in 2021 were 553.5Mt CO_2e, and around 95% is from the processing of iron ore, bauxite and other products by our customers. Aside from the revision to the reporting methodology, the change from 2020 is primarily due to changes in production of iron ore and bauxite. 94% of these processing emissions take place at our customer facilities in China, South Korea, Japan and other countries that have pledged to be carbon neutral by around mid-century.

Our approach to addressing Scope 3 emissions is to engage with our customers on climate change, to share information on respective goals and targets, and work with them to develop the technologies to decarbonise steel and aluminium production. We will continue to report on progress each year.

Steel value chain

Steel is a vital material for low-carbon infrastructure and, with limits to recycling, our iron ore products have an important future role to play. The future trajectory of our Scope 3 emissions is dependent on our customers' decarbonisation roadmaps, which in turn will be guided by technology development and government policies, including carbon pricing. The Net-Zero Steel Initiative (NZSI) is an industry platform, part of the Mission Possible Partnership, that brings together stakeholders across the whole steel supply chain to help put the sector on a path to net zero emissions by mid-century. The NZSI considers 20 technology archetypes and the decision-making process to deploy these at individual steel plants based on lowest total cost of ownership. Should the industry follow the NZSI Tech Moratorium scenario, we estimate that Rio Tinto's iron ore-related Scope 3 emissions would fall by 23% by 2035 and 42% by 2040, relative to our 2020 emissions.

About 28% of our iron ore sales are directly to steel producers that have already set public targets for their Scope 1 and 2 emissions (our Scope 3), and have ambitions to reach net zero by around mid-century. In 2022, we commit to engage with all our direct iron ore customers (representing approximately 75% of our iron ore sales and related Scope 3 emissions) to share information on our respective climate change goals and roadmaps, and actively seek areas of mutual collaboration on pathways to net zero, such as those highlighted in our iron and steel decarbonisation goals.

Our approach is to pursue and support a range of decarbonisation options aligned with the technology pathways highlighted by the NZSI analysis, through proactive partnerships with our customers, including China Baowu, Nippon Steel Corporation, POSCO and BlueScope, as well as technology providers, universities and research institutes. This is consolidated under the following focus areas:

- Support our customers' blast furnace optimisation, with potential carbon emission reductions of up to 30%;
- Explore future carbon-neutral pathways for our Pilbara iron ores through: existing and new technologies to beneficiate Pilbara ores; a proprietary low-carbon research project using microwave energy and sustainable biomass as a reductant; and assessing a mid-grade direct reduced iron (DRI) produced with green hydrogen and processed in an electric melter;
- Pursue a project to produce hot briquetted iron (HBI) with high-grade iron ore and hydro-based green hydrogen in Canada;
- Find a pathway to develop Simandou to meet the future demand of high-quality iron ore for low-carbon steelmaking technologies.

Aluminium value chain

As a leading producer of low-carbon aluminium, we are actively involved in the decarbonisation of the value chain from bauxite to alumina and primary metal production, and we are committed to support the industry's transition. About 74% of our Scope 3 emissions related to the downstream processing of bauxite and alumina sold to our customers is from the use of electricity, predominantly in China. The remainder is from the energy used for process heat at the alumina refineries of our bauxite customers and from the use of carbon anodes in aluminium smelting. Our plan is to address these through:

- A commitment to engage with all our bauxite customers to seek areas of mutual collaboration in alumina decarbonisation projects, leveraging existing technical support relationships;
- The continued development of the ELYSIS™ inert anode technology, with the goal to have it available for installation at our smelters from 2024, following the construction of large-scale commercial prototype cells at our Alma smelter in the Saguenay by 2023;
- Leveraging START, a new standard we launched in 2021 for transparency and traceability across the aluminium value chain, to support customer and consumer demand for sustainable products.

Shipping

We have an ambition to reach net zero emissions from the shipping of our products by 2050 and expect to meet the International Maritime Organisation (IMO) decarbonisation goal of 40% reduction in shipping emissions intensity by 2025, five years ahead of the IMO deadline. We expect to introduce net-zero emission vessels into our portfolio by 2030.

Enhancing our resilience to physical climate risk

Our assets, infrastructure, communities and broader value chains are exposed to chronic and acute climate change risks, such as the impacts of extreme weather events. Managing physical climate change risk through risk-based adaptation practices is essential to enhance the resilience of assets and communities, and it is the fourth pillar of our approach to climate change. Following a Group-wide exposure assessment, the next stage has been to conduct asset-level risk assessments to confirm the effectiveness of our controls. This work was paused in 2020 due to the prioritisation of the COVID-19 response and restrictions on travel to our sites. In 2021, the Energy and Climate Change Centre of Excellence and Risk Area of Expertise have been preparing to engage the product groups for detailed physical risk assessments in 2022.

Revolutionising aluminium production

The ELYSIS™ technology will reduce the carbon footprint and operating costs of aluminium smelters while increasing production capacity. In Canada alone, the ELYSIS™ technology has the potential to reduce greenhouse gas emissions by 7 million tonnes.

Learn more about ELYSIS™ at riotinto.com/stories.

Disclosures consistent with the TCFD recommendations

Climate-related disclosures on governance, strategy, risk management, as well as metrics and targets, are integrated into this Annual Report in the following sections: Strategic Context, Key Performance Indicators, Innovation, Risk Management, Principal risks and Uncertainties, Governance, the Sustainability Committee report, the Remuneration Committee report and in the notes to the accounts.

Given space constraints in the Annual Report, other reports supplement the disclosures on climate-related governance, strategy, risk management and metrics and targets that are made in this report. These are available at riotinto.com/reports. Our 2021 Climate Change Report provides further detail on our approach including our Climate Action Plan, the way we evaluate and manage climate-related risks, progress towards our targets and our value chain partnerships. Our 2021 Sustainability Fact Book provides a full list of the 11 main TCFD recommendations alongside references to our disclosure against them. Our 2020 Climate Change Report includes further detail on our approach to scenario analysis, including our consideration of 1.5°C scenarios. These disclosures together meet all of the disclosures required under the TCFD Recommendations and Recommended Disclosures.

Greenhouse gas emissions

Scope 1 and 2 emissions – equity basis

Equity greenhouse gas emissions – million tonnes carbon dioxide equivalent (Mt CO_2e)	2021	2020	2019	2018
Total Scope 1 & 2 GHG emissions	31.1	31.5	31.5	34
Scope 1 emissions	22.7	22.8	23.1	24.7
Scope 2 emissions	8.4	8.7	8.3	9.3
2018 GHG emissions target baseline (adjusted for acquisitions & divestments)				32.5
Scope 3 emissions	553.5	570[1]	–	–
Operational greenhouse gas emissions intensity (t CO_2e / t Cu-eq) (equity)[2]	6.4	6.2	6.1	6.2

2021 equity greenhouse gas emissions by product group & source (Mt CO_2e)	Electricity[3]	Anodes & Reductants	Process Heat[3]	Mobile Diesel[3]	Other	2021 Total emissions (Mt CO_2e)
Aluminium	10.4	5.2	4.9	0.3	1.1	21.9
Aluminium (Pacific)	8.1	1.7	0.2	–	0.2	10.2
Aluminium (Atlantic)	0.6	3.5	0.5	–	0.6	5.2
Bauxite & Alumina	1.6	–	4.3	0.3	0.3	6.5
Minerals	1.4	1.2	0.5	0.3	0.1	3.4
Iron Ore	0.8	–	0.1	2.1	–	3.0
Copper	1.3	–	0.2	0.8	–	2.2
Other (includes Shipping and corporate functions)	0.1	–	–	0.5	–	0.6
Total	14.0	6.4	5.6	4.0	1.1	31.1

2021 equity greenhouse gas emissions by location (Mt CO_2e)	Scope 1 emissions (Mt CO_2e)	Scope 2 emissions (Mt CO_2e)	Total emissions (Mt CO_2e)
Australia	12.8	6.0	18.8
Canada	6.0	0.0	6.0
South Africa	0.3	1.1	1.4
US	1.0	0.0	1.0
Other: Rest of Africa	0.2	0.0	0.2
Other: Europe	0.4	0.0	0.4
Other: Asia, New Zealand, Central America, South America	2.0	1.3	3.3
Total	22.7	8.4	31.1

Scope 3 emissions – equity basis

Total equity Scope 3 greenhouse gas emissions (Mt CO_2e)	2021	2020
Upstream	27.5	23.7
Processing of goods sold		
Iron Ore	364.6	376.4
Bauxite & Alumina	144.5	152
Other goods sold	14.2	14.4
Other Downstream	2.7	3.0
Total – 2021 reporting method	553.5	570

1. 2020 Scope 3 emissions have been re-estimated using the 2021 methodology (using the 2020 methodology our total Scope 3 emissions were reported as 519.4Mt CO_2e). Please see our 2021 Scope 1, 2 and 3 Emissions Calculation Methodology report at riotinto.com/climatereport.
2. Historical information for copper equivalent intensity has been restated in line with the 2021 review of commodity pricing to allow comparability over time.
3. Electricity includes imported power and own generation; process heat includes diesel consumption from stationary sources such as pumps; mobile diesel sources are haul trucks, locomotives and other mining fleet.

Environment

In 2021, we improved our ability to manage environmental impacts consistently across the business. We increased our internal technical expertise and capability by recruiting subject matter experts in a number of disciplines to support practitioners at the asset level. We reviewed our control framework across all Environment disciplines and identified critical controls at a Group level to better manage risks across the portfolio. We also worked on our data collection and monitoring processes to improve data access and analysis to allow better data-driven decision-making and management practices, more transparency and improved environmental outcomes.

Water

Increasingly disrupted weather patterns and more extreme weather events due to climate change, and a growing world population, mean efficiently managing our water impacts is more important than ever. Water is a shared resource critical to sustaining biodiversity, people and their economic prosperity. The way we think about water, and manage the risks, reflects the diversity of our operations and geographic locations.

Water scarcity is an issue for some of our assets operating in desert locations, while others must remove excess water to allow safe mining operations. Some of our assets are powered by water via hydroelectricity and, in all locations, we carefully manage our use and reuse of water, and consider the potential long-term impacts on water sources. This complexity means we are developing a catchment-level approach to water management and manage our impacts, risks and potential solutions within our operations with the understanding that we share water with surrounding communities and nature. We understand this responsibility extends beyond the life of our operations.

We aim to avoid permanent impacts to water resources by carefully managing the quality and quantity of the water we use and return to the environment. We work to balance our operational needs with those of local communities and ecosystems, and factor in the impact of climate change, which is already affecting rainfall and water security at many of our sites. We use baseline water stress as determined by the World Resource Institute to identify operational catchments of most concern. Visit riotinto.com/water for more information.

Protecting a national treasure

Iron Ore's Water Resource Evaluation team is helping us meet the water target for our Pilbara operations.

Learn more about their work and the importance of water in the region at riotinto.com/stories.

To manage our water impacts well, we first need to understand the specific risks at more than 50 operating sites, as well as our overall Group impacts. To do this, we think about water issues in four ways:

1. Water resource
2. Quality and quantity
3. Dewatering
4. Long-term obligations

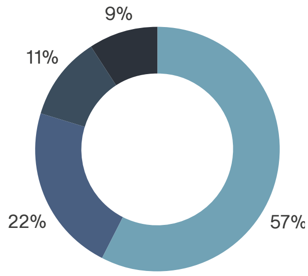
We use this framework to identify, assess and manage water risks. This comprehensive approach extends beyond our mandatory reporting obligations and allows us to have relevant conversations about water risks internally and with stakeholders in the communities where we operate.

Our Group water risk profile (below) shows the level of exposure against each of the four themes, or risks. Most of our water risks sit in the "low" to "moderate" range. There are some in "very high" and "high" categories for each. Regardless of the level of risk, we apply rigorous standards and processes to manage them.

Group water risk profile (% of managed operations)[1]

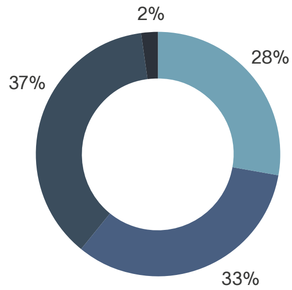
Water resource

Is there enough water available for both environment and community needs, and our operational use?



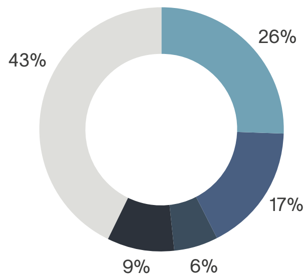
Water quality/quantity

Does the way we manage water on site, or discharge excess water, cause environmental impacts or operational constraints?



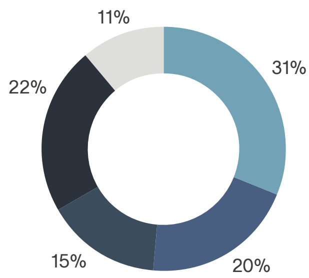
Dewatering

Does the removal of water from the operational areas of our sites impact regional aquifers or our mine plans?



Long-term obligations

Do our operational activities generate long-term or ongoing obligations related to water?



Low | Moderate | High | Very high | Not applicable

The water resource risk at Oyu Tolgoi in Mongolia is assessed as *moderate,* even though it is located in the Gobi Desert. Oyu Tolgoi sources its water requirements from a deep water supply, the Gunii Hooloi aquifer, a 150-metre deep resource holding around 6.8 billion cubic metres of non-drinkable saline water. Oyu Tolgoi uses this water source efficiently with water recycling and conservation practices implemented across the operation. For more information see riotinto.com/water.

Our QIT Madagascar Minerals (QMM) operation in Madagascar operates in a highly sensitive area from a water, broader environment and community perspective. The discharges from our operation have the potential to impact receiving water quality and, therefore, the water quality risk is assessed as *high*. We are working to improve management activities on site, including our ability to more accurately measure our water discharge quality, and the deployment of a dedicated water treatment plant to adjust the discharge pH. For more information see riotinto.com/water.

Impacts associated with dewatering and water supply activities in the Pilbara are recognised as a *very high* risk for our business. Returning water to the aquifers impacted by our mining activities in a controlled manner is the focus of a number of studies. More information on our current programme of managed aquifer recharge trials in the Pilbara is available on riotinto.com/water.

We may sometimes generate impacts that we are required to manage over the long term. Whether they are associated with the management of post-closure pit lakes formed in our mining pits in the Pilbara, or the ongoing management of potential seepage from our waste rock or tailings facilities in our aluminium and copper facilities, our systems and standards aim to ensure that the risk is identified early and managed appropriately and responsibly throughout the asset lifecycle.

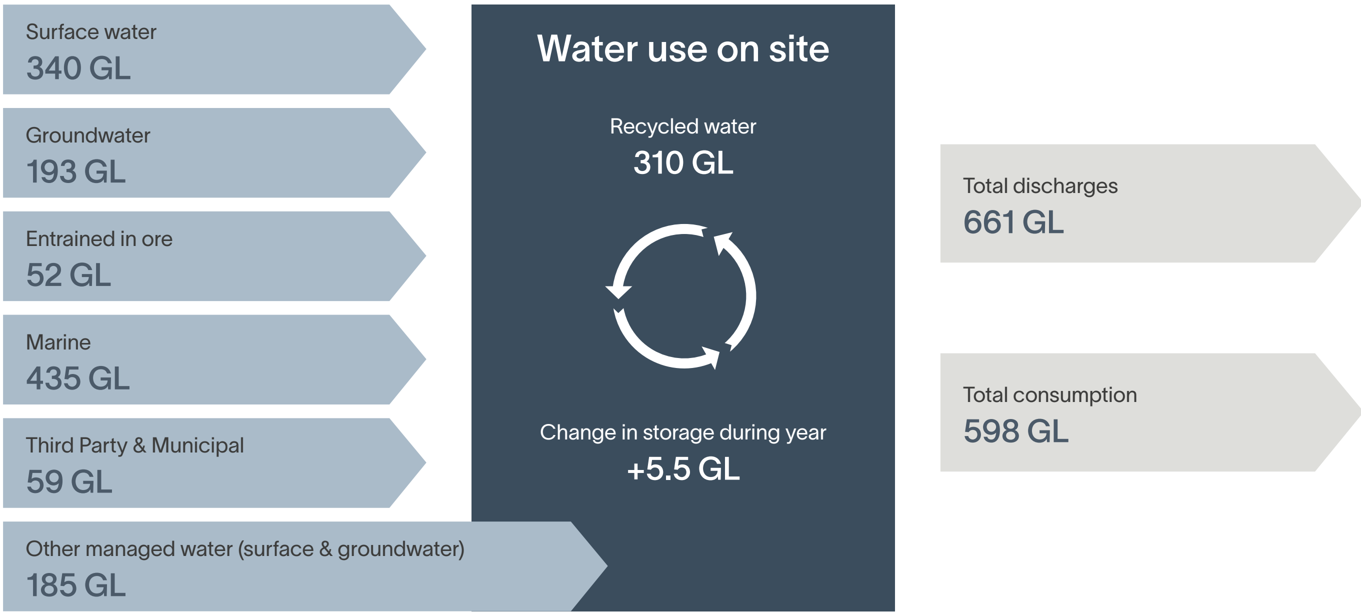
1. Queensland Alumina Limited is a non-managed operation, but is part of our water stewardship target programme.

Our water balance

The Group water balance for 2021 (below) provides a simplified visual summary of where water was withdrawn from, discharged to, recycled/reused and consumed at our operations.

With regard to operational withdrawal water quality, 439 GL[1] or 40% of overall 2021 withdrawals were of freshwater, or category 1, quality. This compares against our 2020 freshwater breakdown of 35%. Freshwater, or category 1 quality, is water that is generally suitable for consumption with minimal treatment required. Where possible, we aim to minimise our extractions from water sources of this quality.

The reported categories correlate with reporting requirements for the International Council on Mining and Metals (ICMM), Minerals Council of Australia (MCA) and Global Reporting Initiatives (GRI). See the Sustainability Fact Book for more detailed water balance information.



1. A gigalitre (GL) is 1,000 megalitres, or 1,000,000,000 litres.
439 GL is the category 1 quality water withdrawn, out of a total 1080 GL of operational water withdrawals. Please refer to the Sustainability Fact Book for additional detail.

Our 2019–2023 water targets

Our five-year water targets allow us to be more transparent about our water usage, risk profile, management and specific challenges. These targets, and the data required to measure progress against them, are helping us become better water stewards.

Our water targets were set in 2019 and consist of one Group target and six site-based targets, again reflecting our catchment-based approach and recognising that we manage vastly different water-related risks across our business. The site-based targets were chosen based on their water risk profile, our International Council on Mining and Metals (ICMM) commitments, and local community and environmental interdependencies.

We continued to make progress against our Group target in 2021 and remain on track to meet it by 2023. We collected water allocation volume data for all sites and estimated surface water catchment rainfall-runoff volumes for our managed operations. We also implemented the last component of the framework – the Group water control library – which describes all controls identified to manage our water risks. In 2022, we will continue embedding our water risk framework and associated controls across our product groups and focus on delivering our site-based targets.

Progress against our targets

Group target	Water risk theme	Status	Commentary
Rio Tinto Group (Tier 1)			
By 2023, we will disclose – for all managed operations – permitted surface water allocation volumes, annual allocation usage and the associated surface water allocation catchment rainfall-runoff volume estimate.	Water resource	On track	Progress remains on track against target schedule. Additional specialist water expertise added to central team during 2021.

Site-based target	Water risk theme	Status	Commentary
Pilbara operations, Iron Ore (Tier 1)			
Our Iron Ore product group will complete six managed aquifer recharge investigations by 2023.	Dewatering (aquifer reinjection)	On track	Successful completion of three of the proposed six managed aquifer recharge investigations.
Oyu Tolgoi, Copper (Tier 1)			
Oyu Tolgoi will maintain average annual water use efficiency at 550 L/tonne of ore to concentrator from 2019-23.	Water resource (intensity and efficiency)	Achieved for 2019-21	Average annual water use efficiency maintained below 550 L/tonne for 2019-21 period.
Kennecott Utah Copper, Copper (Tier 1)			
Kennecott will reduce average annual imported water per tonne of ore milled by 5% over the 2014-18 baseline of 393 gal/tonne (1,487L/tonne) at the Copperton Concentrator by 2023.	Water resource (import reduction)	At risk, recoverable	Kennecott has allocated additional budget in 2022 to prioritise the understanding of the conditions that influence water import demands at the concentrator and to determine solutions to mitigate and lower these demands.
Ranger Mine[1], Energy Resources of Australia Limited (ERA), Closure (Tier 1)			
ERA will achieve the planned total process water inventory treatment volume by 2023, as assumed in the Ranger water model.	Quantity/quality (inventory reduction)	At risk	Following the ASX announcement on 19 November 2021, work is continuing on the reforecast of both cost and schedule in relation to the calculation of the rehabilitation provision and timing for completion of the Ranger project area. Given this, the ERA target remains at risk subject to the reforecast of target treatment volumes as part of the Ranger water model update.
QIT Madagascar Minerals (QMM), Minerals (Tier 2)			
QMM will develop and implement an improved integrated site water management approach by 2023.	Quantity/quality (discharge quality)	On track	Progress remains on track against target schedule. Completed development of the integrated site water management approach and implementation of identified site improvements is under way.
Queensland Alumina Limited (QAL), Aluminium (non-managed joint venture) (Tier 2)			
QAL will complete the following four water-related improvement projects from the QAL five-year Environment Strategy by 2023: – Project L1 – integrity of bunds and drains – Project W3 – caustic pipe and wasteline 4 integrity – Project W6 – residue disposal area surface/ground water impacts – Project W7 – residue disposal area release to receiving environment	Quality/quantity (discharge quality) Joint venture performance improvement	On track	Progress of nominated water-related improvement projects is aligned with current project schedules.

Tier 1 water targets form part of the Rio Tinto external limited assurance programme.
Tier 2 water targets do not form part of the Rio Tinto external limited assurance programme.

More detailed information about our progress against our site-based water targets is available at riotinto.com/water.

1. Ranger Mine is owned and operated by ERA; Rio Tinto is a 86.3% shareholder in ERA.

Biodiversity

The associated impacts of climate change and biodiversity loss pose significant risks to people and the environment on which we all rely. We recognise our responsibility to effectively mitigate the impact of our operations on nature – and we are mindful of our own dependence on healthy ecosystems to run a successful business.

Healthy natural environments with relatively intact ecosystems are key to climate resilience. They also provide important services to the communities where we operate and our business. We are committed to protecting biodiversity with the ambition of achieving no net loss. This means striking a balance between negative impacts on biodiversity and positive outcomes achieved through mitigation.

In 2020, we reported on the biodiversity sensitivity of our assets using a database developed by the UN Environment Programme World Conservation Monitoring Centre (UNEP WCMC) methodology that combined global datasets of threatened species and conservation and protected areas. Building on this, in 2021 we worked with Birdlife International to understand how our biodiversity programmes might also contribute to carbon sequestration and began to understand how we might apply nature-based solutions within our landholdings. This work will continue to mature in 2022.

As a founding partner of UNEP WCMC's 19-year-old Proteus Partnership, we committed to the next five-year phase of this cross-sectoral association. Through this partnership, and as part of our drive to build our internal capability, we have delivered biodiversity training to more than 200 employees across the business in 2021.

We were unable to complete an independent review of the monitoring programmes of our high-priority biodiversity sites in 2021 due to pandemic-related restrictions. However, we had independent assessments completed for five of eight sites and completed an internal assessment of all plans. We aim to complete this work in 2022 to ensure that management plans and actions adequately address risks to nature.

Land stewardship

In 2021, our land footprint – total disturbed area – was 3,734 square kilometres, an increase of 105 square kilometres compared to 2020. This includes all disturbance of our operating assets and activities, such as exploration activities, smelters, mines and supporting infrastructure.

We are temporary custodians of the land on which we operate, and our aim is to rehabilitate the land as soon as it becomes available. In 2021, we rehabilitated 20 square kilometres of land, mostly at our bauxite mines in Australia, mineral sands mines in South Africa and Madagascar, and exploration areas in the Pilbara, Western Australia.

Our rehabilitation teams work in partnership with research centres and universities to refine rehabilitation approaches and improve outcomes. In 2021, as a member of the Cooperative Research Centre for Transformations in Mining Economies, we participated in foundational projects intended to identify gaps affecting rehabilitation, closure and post-closure outcomes to guide upcoming research that will assist our Australian operations. In another example, through a partnership with the company Virotec, we are reprocessing a by-product from bauxite refining (red mud) into a commercial product that can be used in the treatment and regeneration of soils. In addition, 22 of our operations completed rehabilitation trials to improve outcomes relating to seed germination, erosion and topsoil quality.

Contributing to a resilient environment

Our environment technical experts work with our process safety and operational engineers to ensure our operating systems and processes are managed to prevent harmful discharges or releases to the environment.

At a minimum, we comply with national and local environmental regulations related to waste management, water discharge and air emissions. We also apply our own standards, which set the minimum requirements to define, monitor and manage emissions at all our managed operations to prevent harm to people and the environment. These standards require us to set performance requirements for resource efficiency, particularly relating to mineral and non-mineral waste management.

We contribute to sustainability initiatives across the value chain through our work with peers, industry associations, and customers. And we continually improve our due-diligence mechanisms and assess the environmental performance of new suppliers and customers.

Managing waste

Waste and residues from our operational activities are a key area of environmental risk management for us. In 2021, we renewed our focus on managing potential contamination from these sources. We conducted a detailed analysis of hazardous materials and non-mineral waste to assess and prioritise our contamination risks. To reduce further contamination risks, we are banning the use of PFAS (perfluoroalkyl and polyfluoroalkyl substances) in fire-suppression systems at our sites by the end of 2022.

At some of our long-life assets, waste management practices of the past have led to a need for remediation in the present. For example, at New Zealand's Aluminium Smelter (NZAS), which has operated for more than 50 years, a detailed site investigation was completed in 2021 to guide remediation work. The study identified localised areas of contamination confined to the smelter footprint, informing a targeted rehabilitation strategy for the site. NZAS has committed to removing all Spent Cell Lining waste generated in the process of relining reduction cells with refractory materials, managing waste and remediating the site.

Protecting air quality

Clean air is critical for the health of our host communities and of the surrounding ecosystems. Across the business, we continue to pursue improvements to air quality management, focusing on emissions of greenhouse gases and particulate matter and gases emitted by our operational activities, including mining, materials handling, processing and transportation. The potentially hazardous emissions we monitor at operations are:

- Sulphur oxides (SOx), mainly at our aluminium and copper smelters
- Nitrogen oxides (NOx), mainly from burning fossil fuels
- Gaseous fluoride emissions from aluminium smelters
- Respirable particulate emissions (PM10 and PM2.5), very fine particles from mining and processing operations, and from burning fossil fuels

Our emphasis is on prevention, managing air quality through operational discipline and process improvement.

Many of our assets have multi-year air quality improvement projects in place. For example, at the Iron Ore Company of Canada (IOC), plans are under way to reduce emissions with additional dust collection and to reconfigure the stacks to improve dispersion in the atmosphere. At our Atlantic aluminium smelting operations in Canada, enhanced monitoring for key air pollutants that links emissions and operational data has reduced response times for upset conditions. Phase 1 of this project has reduced, by 90%, the amount of time stack emissions exceed recommended particulate concentrations.

In some instances, we did not comply with permissible emission limits. For example, our Kennecott smelter experienced temporary equipment failures that, for safety reasons, required us to vent gases containing sulphur oxides directly to the stack. This resulted in short-term non-compliance but we remained compliant with our daily and annual limits and our continuous monitoring system indicated there was no adverse impact on ambient air quality.

Topsoil-free rehabilitation

With topsoil in short supply at our Gove bauxite mine in the Northern Territory, Australia, we have been working on a new topsoil-free rehabilitation approach to reduce reliance on topsoil in the future while minimising environmental impacts and cost.

Learn more about our rehabilitation work at riotinto.com/stories.

Operational environment overview (2017-2021)

	2021	2020	2019	2018	2017
Significant environmental incidents	**3**	0	0	0	0
Fines and prosecutions – environment ($'000)[4]	**7.4**	27.4	19.0	284.7	89.5
Land footprint – disturbed (square kilometres)	**3,734**	3,629	3,626	3,595	3,616
Land footprint – rehabilitated (square kilometres)	**495**	491	490	485	497
Mineral waste disposed or stored (million tonnes)	**1,005**	987[3]	905	886	1,188
Non-mineral waste disposed or stored (million tonnes)	**0.65**	0.47[3]	0.28	0.27	0.33
SOx emissions (thousand tonnes)	**70.2**	75.7[3]	79.0	84.2	86.9
NOx emissions (thousand tonnes)[1]	**88.5**	85.6	64.3	62.0	65.8
Fluoride emissions (thousand tonnes)	**2.36**	2.27[3]	2.34	2.61	2.49
Particulate (PM10) emissions (thousand tonnes)[2]	**139.6**	143.2[3]	131.5[3]	136.2[3]	112.4[3]

1. The increase of NOx emissions from 2019 to 2020 is due to a change in the calculation method from emissions factors to direct measurement using stack sampling data.
2. PM10 emissions have increased due to a change in calculation methodology, figures for 2017 to 2020 have been restated.
3. Numbers restated from those originally published to ensure comparability over time.
4. In 2021, we paid environmental fines totalling $7,414 resulting from non-compliance for snow management at Alma, Canada; the death of a goitered gazelle in Mongolia; and the violation of Eastern Kern Air Pollution Control District Rules and Regulations at Boron Operations, US.

Please refer to the Sustainability Fact Book at riotinto.com/sustainabilityreport for more details.

Tailings

Responsibly managing waste from mining operations is essential, as is being transparent with our stakeholders about our tailings storage facilities and how we manage them. We engage with stakeholders throughout the lifecycle of our tailings storage facilities, from design to closure.

We manage 106 tailings storage facilities (TSFs) across our global assets. There are a further 41 non-managed TSFs. Altogether, there are 65 active TSFs, 36 are inactive and 46 are closed. There have been no external wall failures at any of our TSFs for more than 20 years.

We work through technical committees and joint venture relationships to support leading practice in tailings management. Our full tailings disclosure is available at riotinto.com/tailings and we periodically update the list of TSFs to reflect operational and ownership changes, including changes due to the transition of closure or remediation obligations for legacy assets and reclassification of facilities. Our list of TSFs also includes those managed by our joint venture partners.

In May 2021, we updated previously disclosed information on each of our global TSFs. All facilities were assigned a consequence classification in accordance with the regulatory or industry body that oversees tailings in each region or jurisdiction. Additional technical data from updated downstream impact assessments, required under the Global Industry Standard on Tailings Management (GISTM) and Rio Tinto's internal standard for tailings and water storage facilities, resulted in a modification to hazard classifications of some facilities. Consequence classifications are not ratings of the condition of a facility or the likelihood of failure; instead, they rate the potential consequence if they were to fail.

Our facilities are regulated, permitted and have been managed for many years to comply with local laws, regulations, permits, licences and other requirements. Tailings management has been included in the Group risk register since 2010, and our Group safety standard for tailings and water storage facilities has been in place since 2015. Our internal assurance processes verify that our managed TSFs operate in accordance with this standard, which we updated in 2020.

Our operational TSFs have emergency response plans – tested through training exercises in collaboration with stakeholders such as local emergency services – and follow strict business resilience and communications protocols.

Since the launch of GISTM in August 2020, we have continued work on our implementation plan. We completed a gap analysis against our internal tailings management, environment, and communities and social performance standards, and developed improvement plans to close identified gaps. While COVID-19 restrictions delayed a few items, we plan to complete all outstanding actions as quickly as possible, while adhering to restrictions in each jurisdiction. We are on track to have all TSFs with a potential consequence rated "extreme" or "very high" in conformance with GISTM by August 2023, with all remaining facilities in conformance by August 2025.

We played an active role in the International Council on Mining and Metals (ICMM) tailings working group in 2021, which focused on the development of the GISTM conformance protocol as well as a tailings good practice guide designed to help support industry-wide adoption.

This year, we also:

- Appointed Accountable Executives for tailings and established the Tailings Management Committee, which provides governance of tailings management practices across the Group to ensure we meet the GISTM and the relevant Rio Tinto standard requirements.
- Updated our tailings disclosure information and released our updated D5 Standard for the management of tailings and water storage facilities on our website in May 2021.
- Published our Tailings Policy on our website in August 2021.
- Consolidated our Group-wide controls for tailings management in our centralised risk management system so that, no matter where in the world our people are, controls relating to tailings can be consistently applied and verified.
- Continued to support the Future Tails partnership, a collaboration between Rio Tinto, BHP and the University of Western Australia (UWA), launched the first micro-credentials, and enrolled the first cohort of more than 90 students for the Graduate Certificate in Tailings Management at UWA.

Caring for society and people

We know our operations have a far-reaching impact on society. Our longevity and success depend on the enduring relationships and strong partnerships we develop with our people, our host communities, governments and broader society. The ability to work together to deliver positive outcomes is increasingly important as society comes together to address global challenges like climate change. We are engaging with our people and our stakeholders to learn how we can play our role.

Seeds collected by Traditional Owners as part of the Community Collection programme for Weipa Operations. These seeds will be used for rehabilitation in areas post-mining, providing the opportunity for Indigenous peoples to participate economically in the area. Weipa, Australia.

Communities

The communities where we live and work are fundamental to our business. They include Indigenous peoples, landowners, governments, business partners, neighbours and our colleagues – without their support, we cannot operate. We aim to contribute to a shared future and positive legacy by developing lasting relationships with people, learning about and supporting their goals and aspirations, avoiding or mitigating adverse impacts, and respecting connections to lands and waters.

The destruction of the rock shelters at Juukan Gorge in May 2020 was a clear breach of our values and the trust placed in us by the Indigenous peoples to respect the lands on which we operate. It was a tragedy that prompted us to review our mindset and practices and commit to improve. In May 2021, we recognised a year since the destruction of the Juukan Gorge rock shelters by reflecting on the loss and hurt that we caused and renewing our commitment to learn the lessons from Juukan Gorge.

How we work with communities

Mining and processing, by its very nature, disturbs the environment and can impact surrounding communities. It also delivers significant economic and social benefits, including the production of essential materials, employment, small business development, tax and royalty streams, training and skills development, and socioeconomic programmes. We recognise that while many of the benefits of our activities are widespread, many of the negative impacts are localised. Our teams work in partnership with communities to understand how our activities impact their lives, culture and heritage. Through meaningful engagement, we can respond to community concerns, optimise socioeconomic benefits and mitigate negative impacts.

Engaging with communities on a low-carbon future

We believe we have an important role to play in ensuring that the green energy transition is progressed in a fair and socially inclusive way. This will be a key focus for our Communities and Social Performance teams from 2022 and will include active community engagement, managing potential adverse social and human rights impacts, and exploring and enabling ways for host communities to share in economic opportunities. In 2021, QIT Madagascar Minerals (QMM) and its partners laid the foundation stone for a new solar and wind energy plant. This, in addition to allowing Rio Tinto's operations in Madagascar to reach carbon neutrality by 2023, will replace the majority of the electricity it currently supplies to the town of Fort Dauphin and its 80,000 community members with clean energy. QMM and its partners are working with local authorities to develop manufacturing capacity to produce equipment for the renewable industry locally.

Strengthening social performance

We have strengthened our social performance structure, governance approach and processes. In September 2021, we released our Communities and Social Performance Commitments Disclosure Interim Report, our first report dedicated to sharing the progress on the actions from the 2020 Board Review of cultural heritage management. Read more about progress on our commitments on pages 94-95.

Working with First Nations, Canada

In Canada, we continue to work with Indigenous peoples on the implementation of agreements signed with communities, and we are progressing discussions on four new agreements with Indigenous communities in Quebec, Saskatchewan and British Columbia.

To advance reconciliation efforts in 2021, we focused on strengthening our employees' cultural awareness. In June, our business celebrated National Indigenous History Month by supporting a series of events across the country, including a fireside chat between Former National Chief Phil Fontaine and our Aluminium Chief Executive, Ivan Vella. In September, we commemorated National Truth and Reconciliation Day by hosting an awareness session which provided employees with information on the residential schools in Canada, including a first-hand account from a survivor.

Resolution Copper project, Arizona, US

At our Resolution Copper project in Arizona, we continue to build relationships with impacted communities and Native American tribes. We recognise the enduring historical connection Native American tribes have with the land at, or near, the proposed mine. We are committed to ongoing consultation with Native American tribes and working together in a manner consistent with the International Council on Mining and Metals (ICMM) Statement on Indigenous Peoples and Mining. We are progressing partnerships with over half of these tribes and our aim is to have a mutual dialogue with all tribes. Since 2013, the US Forest Service (USFS) has led a rigorous review of the project, including consulting 11 Native American tribes with historic connections to the land around Resolution Copper. This dialogue has led to changes in the project design and the implementation of other measures to address stakeholder concerns. While the USFS published the Final Environmental Impact Statement in January 2021, the US Department of Agriculture directed the USFS to review and engage further with consulting Native American tribes. We support the National Environmental Policy Act process and continue to engage with local communities and Native American tribes to further shape the Resolution Copper project.

Richards Bay Minerals (RBM), South Africa

We are committed to fostering broad-based development of the four local communities that host our RBM mine in the province of KwaZulu-Natal. However, following a series of business disruptions that put the safety of our employees at risk, we declared force majeure at the operation in June 2021. Significant work has been done to improve the situation, including reaching milestone agreements with traditional leaders, local youth and business forums. In August 2021, RBM and representatives of all four communities reached an agreement to release 130 million rand from the community trusts. These funds will be channelled towards local economic development initiatives. The agreement also aims to secure improved community trust governance.

Simandou project, Guinea

At our Simandou iron ore project in Guinea, we continue to engage with stakeholders and local communities to deliver a range of economic development and community health initiatives, including COVID-19 and Ebola response programmes. We are working with communities to help them prepare for future operations, identify and manage our impacts, and design and deliver regional and local economic development programmes. We engaged with other mining projects in Guinea to discuss the potential for enhancing offset options, as well as supporting the Centre Forestier N'Zérékoré and Pic de Fon Classified Forest management committee.

Oyu Tolgoi, Mongolia

Oyu Tolgoi supports economic opportunities through livelihood and economic diversification initiatives for communities in Umnugovi aimag. We support herders' cooperatives and work with local subject matter experts to improve livestock health services, increase the productivity of livestock, encourage vegetable and dairy production, and foster new business development through capacity building, strengthening market linkages and nurturing entrepreneurial mindsets amongst local communities. Our Oyu Tolgoi South Gobi Development Strategy will expand on this work over the next five years to boost local procurement and employment above their current levels of 24.5% and 24.8%, respectively.

Jadar lithium-borates project, Serbia

In 2021, we committed $2.4 billion to the Jadar lithium-borates project in Serbia, one of the world's largest greenfield lithium projects.

In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We remain committed to exploring all options and are reviewing the implications for our activities and our people in Serbia.

We acknowledge the concerns from local communities and are committed to meaningful engagement to explore ways to address these concerns.

Panguna mine, Bougainville, Papua New Guinea

The Panguna mine was operated by Bougainville Copper Limited (BCL), majority-owned by Rio Tinto, for 17 years from 1972 until 1989, when operations were suspended due to an uprising against the mine and a civil war. Rio Tinto has not had access to the mine for over 30 years. In 2016, Rio Tinto transferred its 53.83% majority shareholding in BCL to the Autonomous Bougainville Government (ABG) and the Papua New Guinea (PNG) Government for no consideration, enabling the ABG and PNG to hold an equal share in BCL of 36.4% each.

In September 2020, the Human Rights Law Centre (HRLC) filed a complaint against Rio Tinto on behalf of 156 Bougainville residents with the Australian National Contact Point (AusNCP) regarding the Panguna site. The complaint alleges that we are accountable for significant breaches of the OECD Guidelines for Multinational Enterprises relating to past and ongoing environmental and human rights impacts arising from the Panguna mine.

In July 2021, following months of constructive discussions facilitated by the AusNCP, Rio Tinto and Bougainville community members, represented by the HRLC, announced an agreement to identify and assess the legacy impacts of the mine.

A joint committee of stakeholders, the Panguna Mine Legacy Impact Assessment Committee, has been formed to oversee a detailed independent assessment of the Panguna mine to identify and better understand the environmental and human rights impacts of the mine. The Committee was established by the ABG and the parties to the AusNCP process (Rio Tinto, the HRLC and the community members the HRLC represents). It is chaired by an independent facilitator with representatives from the Independent State of PNG and BCL, as well as other clan landowners and community representatives. The first meeting of the Committee was held on 30 November 2021. This was a constructive and important first step towards resolving the highly complex legacy of the Panguna mine.

Compagnie des Bauxites de Guinée SA (CBG), Guinea

CBG is a bauxite operation in Guinea owned by Halco Mining Inc. (51%) and the Guinean Government (49%). Halco is a consortium comprised of Rio Tinto (45%), Alcoa (45%) and Dadco Investments (10%). We participate on the boards of Halco and CBG, with representation on various shareholder oversight committees.

Through our board and committee roles, we have been proactively monitoring CBG's approach to environmental protection, community issues and human rights. We are aware of the concerns regarding access to land and water, the pace of livelihood restoration programmes as well as aspects of CBG's stakeholder engagement.

In 2021, sustainability advisory committees were created at Halco and CBG levels, strengthening our oversight and providing support to CBG for the improvement of its social and environmental practices, including their response to a complaint made to the International Finance Corporation's (IFC) Office of the Compliance Advisor Ombudsman (CAO).

The mediation process facilitated by the CAO reached an important milestone in 2021 with an agreement to adjust the mitigation measures related to blasting.

Halco continues to participate in the mediation process as an observer, alongside the IFC.

Socioeconomic contribution

In 2021, our direct economic contribution was $66.6 billion, including the total value of operating costs, employee wages and benefits, payments to providers of capital, payments to governments, development contributions, payments to landowners and community investments. Catalysing economic opportunities for our host communities and regions continues to be a priority. We strive to employ local people, buy local products and engage local services. For example, we awarded contracts valued at over A$500 million to local Western Australian and Pilbara Aboriginal businesses for the Greater Tom Price operations.

Through social investment, we seek to deliver positive, measurable social outcomes and support communities to achieve their goals and aspirations. Our total voluntary global social investments amounted to $72 million, covering health, education, environment, agricultural and business development programmes. This is an increase of approximately 53% on our 2020 voluntary social investment spend. This increase is associated with the completion of the $25 million COVID-19 pledge, a review of social investment strategies across product groups, and the launch of a number of significant multi-year partnerships, particularly through Rio Tinto Iron Ore.

Social investment highlights (in figures)

In 2021, some of our social investment activities included:

- Delivering life opportunities to young Indigenous peoples through a A$1.265 million Indigenous Advancement partnership with the Western Australia Football Commission.
- Investing A$12 million over three years to improve the health and wellbeing of children in Western Australia and supporting further research into mental health and juvenile diabetes with the Telethon Institute.
- Providing 1,800 community members with access to Computerised Tomography (CT) services in Weipa, North Queensland, through the provision of a CT scanner. The A$1.15 million partnership between Rio Tinto and Old Mapoon Aboriginal Corporation to leverage a A$1.35 million contribution from the Queensland Government.
- Supporting charities through the RioGivers programme, enabling our employees to make donations to selected charities and have these matched by Rio Tinto on a dollar-for-dollar basis. In 2021, A$222,000 was matched through the RioGivers Australia programme, and C$660,000 through the Canada Employee Giving programme.
- Investing in future Canadian leaders through C$1 million in *Let's Talk Science* experiential STEM-learning programmes over the next four years.
- Renewing our partnership with the Breakfast Club of Canada with C$750,000 over three years to provide nutritious meals to over 4,000 students in 18 Indigenous schools in British Columbia and Quebec.
- Establishing an institutional research structure dedicated to the indigenisation of higher education through a C$1.5 million partnership with Université du Québec à Chicoutimi (UQAC). The structure will be established in collaboration with several Indigenous communities and will focus, among other things, on training the next generation of Indigenous scientists.
- Supporting STEM and robotics programmes in local schools in Superior, Arizona, US through a $1.2 million partnership with the Superior Unified School District.
- Building the capability of geotechnical and mining professionals in Mongolia through a $2.75 million partnership with the Mongolian University of Science and Technology.
- Supporting increased COVID-19 testing capacity through a $1.66 million partnership with the Regional Public Health Directorate in Fort Dauphin, Madagascar.

Economic contributions ($ million) (2021)

	2021	2020	2019	2018	2017
Gross product sales	**66,568**	47,018	45,367	42,835	41,867
Net cash generated from operating activities[1]	**25,345**	15,875	14,912	11,821	13,884
Underlying earnings	**21,380**	12,448	10,373	8,808	8,627
Underlying earnings per share (US cents)	**1,321**	770	636	512	483
Profit/(loss) after tax for the year	**22,575**	10,400	6,972	13,925	8,851
Net cash/(debt)	**1,576**	(664)	(3,651)	255	(3,845)
Capital expenditure[2]	**(7,384)**	(6,189)	(5,488)	(5,430)	(4,482)
Employment costs	**(5,513)**	(4,770)	(4,522)	(4,728)	(4,765)
Payables to governments[3]	**(12,789)**	(8,224)	(7,175)	(7,217)	(6,637)
Amounts paid by Rio Tinto	**n/a[4]**	(8,404)	(7,635)	(6,575)	(5,138)
Amounts paid by Rio Tinto on behalf of its employees	**n/a[4]**	(1,353)	(1,284)	(1,342)	(1,402)

1. Data includes dividends from equity accounted units, and is after payments of interest, taxes and dividends to non-controlling interests in subsidiaries.
2. Capital expenditure is presented gross before taking into account any disposals of property, plant and equipment.
3. Total payables to governments includes corporate taxes, government royalties and employer payroll taxes.
4. Our Taxes Paid Report will be published later this year on riotinto.com.

	2021	2020	2019
Community investment (discretionary)[5]	**(72.1)[8]**	(47)	(36.4)
Development contributions (non-discretionary)[6]	**(19.1)**	(12.8)	(12)[9]
Payment to landowners (non-discretionary)[7]	**(222.9)**	(165.9)	(147)

5. Community investments are voluntary financial commitments, including in-kind donations of assets and employee time, made by Rio Tinto managed operations to third parties to address identified community needs or social risks.
6. Development contributions are defined as non-discretionary financial commitments, including in-kind donations of assets and employee time, made by Rio Tinto to a third party to deliver social, economic and/or environmental benefits for a community, which Rio Tinto is mandated to make under a legally binding agreement, by a regulatory authority or otherwise by law.
7. Payment to landowners are non-discretionary compensation payments made by Rio Tinto to third parties under land access, mine development, native title, impact benefit and other legally binding compensation agreements.
8. The notable increase in community investment is associated with the completion of the $25 million COVID-19 pledge, a review of social investment strategies across product groups and the launch of a number of significant multi-year partnerships, particularly through Rio Tinto Iron Ore and Rio Tinto corporate teams.
9. In 2019, $13 million was reported for development contributions. This has been revised down to $12 million due to an error noted in reporting.

Progress on our communities and social performance commitments

Following the destruction of the rock shelters at Juukan Gorge in May 2020, we have strengthened our approach to managing Indigenous cultural heritage. We are determined to build more meaningful and genuine relationships with Indigenous peoples and host communities around the globe.

As part of our efforts to improve transparency, we have committed to providing updates on the work we are undertaking to enhance our communities and social performance practices. In September 2021, we released our first Communities and Social Performance Commitments Disclosure Interim Report.

On 18 October 2021, the Joint Standing Committee for Northern Australia (JSCNA) released its final report. JSCNA restated the recommendations made in the December 2020 interim report and focused on the legislative frameworks governing the protection of cultural heritage. Recognising that there is still much work ahead, we are learning from the outcomes of the review and our ongoing dialogue with stakeholders as we continue to deliver on our commitments to ensure a tragic incident like Juukan Gorge never happens again.

An update on our commitments is provided below.

1. Remedying and rebuilding our relationship with the PKKP people

We are working under the direct guidance of the Puutu Kunti Kurrama and Pinikura (PKKP) people to remediate Country. Throughout our journey with the PKKP people, they have graciously shared their knowledge to ensure our remediation efforts deliver the best possible outcomes. During this time, we have been reminded of the importance of trusted relationships and valued partnerships through listening and continuously demonstrating mutual respect.

We continue to work in partnership with the PKKP people to finalise co-management principles under which we can work together to enhance protection of heritage and achieve better outcomes. The new model will involve earlier and more detailed consultation, increased sharing of information and greater involvement of PKKP representatives in Rio Tinto's decision making throughout the lifecycle of the mine.

2. Partnering with Pilbara Traditional Owners in modernising and improving agreements

During the year, we continued to actively engage with Traditional Owners in Western Australia to better understand existing and historic issues and define ways we can jointly deliver more effective outcomes. We have developed a set of principles to guide the agreement modernisation process which seeks to address areas where current agreements have not met the Traditional Owners' aspirations of partnership.

It is our intention that revised agreements will seek to agree on a clear pathway for resolution of any differences of views that may emerge. We will also continue to work with Traditional Owners and local communities to build sustainable business development and employment participation opportunities.

In Canada, we currently have 11 active long-term Life of Mine agreements and are engaging on four new agreements with Indigenous communities in Quebec, Saskatchewan and British Columbia.

3. Establishing the new Communities and Social Performance model

In 2021, we established our new Communities and Social Performance (CSP) model to increase our social performance capacity and capability across the business. We now have more than 400 technical CSP professionals working on 60 sites in 35 countries (compared with 250 professionals in 2020).

A central CSP Area of Expertise complements our asset-based teams by monitoring external societal trends, developing and reviewing standards, systems and risk and assurance processes, building capability, and providing strategic regional and technical advice to our businesses.

4. Building local capability and capacity to support the site General Manager

Operational leaders play a critical role alongside our CSP teams in our social performance. Product group Chief Executives have overall accountability for relationships with Indigenous peoples, supported by line managers who have direct responsibility for maintaining relationships with host communities, including Indigenous peoples.

5. Improving our governance, planning and systems where it relates to communities

In 2021, we designed a new social performance strategy and set CSP targets for 2022 to 2026 to support its achievement. We also strengthened our governance including a review of our global CSP Standard and Cultural Heritage Group Procedure for Australian businesses, and improved assurance and risk management processes.

As part of our global Risk Control Framework, we created a standardised library of cultural heritage controls across the Group. This will enhance control effectiveness across our business.

A substantive independent review of our cultural heritage performance is currently under way at all our businesses, to redefine best practice for cultural heritage management in our organisation. Phase one of the review focuses on Australian assets, in consultation with a number of Indigenous groups, and is being led by the sustainability consultancy Environmental Resources Management. Phase two is due to be awarded at the end of the first quarter, with completion planned for the end of 2022.

We have also established an internal global Indigenous Coordination Committee which meets monthly to ensure cross-functional alignment on Indigenous strategy and activities.

6. Reducing barriers to, and increasing, Indigenous employment

We know that a diverse workforce is an important factor in business performance, and we are committed to Indigenous peoples having a stronger voice. In Australia, we have committed $50 million over five years to attract, retain and grow Indigenous leaders, and we have increased the number of Australian Indigenous leaders in our business fivefold since November 2020.

We are partnering with Traditional Owners and local stakeholders to deliver initiatives that contribute to improving the pathways to employment for Indigenous peoples, increasing the number of employment opportunities and providing positive experiences for current and future employees. In 2021, 76 Indigenous employees paired with senior leaders participated in our two-way mentoring programme across our Australia business to deepen cross-cultural understanding and responsiveness. In Western Australia, we have launched an Indigenous participation strategy which seeks to improve the opportunities for Indigenous peoples to participate in employment.

7. Increasing Indigenous leadership and developing cultural competency within Rio Tinto

The Indigenous leadership commitment is designed to fast-track Indigenous Australians into professional and leadership roles. During the year, 126 Indigenous employees earned promotions across Australia.

In Australia, 80% of our senior leaders completed our Cultural Connection programme in 2021. We also launched a digital cultural onboarding platform to enhance and support cultural safety and understanding. In the second half of 2021, 65 employees and new starters completed the experience with their leaders.

A component of our 2021 ESG short-term incentive was linked to an increase in cultural awareness training. The target was risk-based, by identifying cohorts of employees and contractors whose roles interface with cultural heritage. Business units and product groups identified their training cohorts, and training programmes were designed to reflect the local context. The length of programmes varied according to context and risk profile.

In our Iron Ore group, our immersive virtual reality cultural awareness training was rolled out in 2021 and is now part of our onboarding process. We are also implementing regionally specific, Traditional Owner-led cultural awareness training.

In North America, two virtual cultural awareness sessions were facilitated by an Indigenous-owned business, and numerous site-based sessions were held in 2021, including at our IOC operations, which have introduced mandatory cultural awareness for employees and contractors and achieved full compliance in 2021. We have also launched online cultural awareness training on Canadian Indigenous peoples' history, culture and industry interaction.

8. Establishing a process to redefine and improve cultural heritage management standards

In Iron Ore, our Integrated Heritage Management Process (IHMP) ensures heritage considerations are embedded throughout the mine development process, from early resource planning and studies through to closure. By the end of 2021, we had reviewed over 2,200 heritage sites in the Pilbara, adding further protection controls. Through ongoing consultation with Traditional Owners, we have removed 100 million dry tonnes of iron ore from reserves in 2020 and 2021 through this process.

The core principles from IHMP have informed the Cultural Heritage Group Procedure update and our cultural heritage global control library, and we continue to explore opportunities to embed these across the business.

9. Establishing an Australian Advisory Group

We have established an Australian Advisory Group (AAG) to provide guidance on current and emerging issues, and better manage policies and positions that are important to both Australian communities and our broader business. We have confirmed the inaugural Chairperson as Professor Peter Yu, and other members include Michelle Deshong, Nyadol Nyuon, Yarlalu Thomas, Djawa Yunupingu, Cris Parker, and Shona Reid. The first AAG meeting will be held in the first quarter of 2022.

10. Elevating external consultation

In 2021, we established the Chief Executive Australia role to focus on rebuilding trust and strengthening external relationships across Australia, and a Chief Adviser Civil Society and Outreach role to expand our capacity to engage on key matters globally. We continue to increase our dialogue with government, civil society organisations, Indigenous leaders, Traditional Owners and other stakeholders at all levels of our organisation, and will explore further opportunities to engage in 2022.

11. Elevating employee engagement

We are focused on keeping our people informed of our commitments and achievements, through the implementation of new communications tools, channels and platforms. And through training, networking opportunities and cultural competency programmes, we are increasing cultural awareness at every level of our business.

Progress on best practice cultural heritage management

We remain committed to achieving best practice cultural heritage management. We will continue to work with Indigenous peoples and communities to ensure we better understand their priorities and concerns, minimise our impacts, and responsibly manage Indigenous cultural heritage within our operations.

We support the strengthening of cultural heritage legislation and advocate for more meaningful engagement, the protection of heritage values, strengthened agreement-making, and certainty for all stakeholders.

More information is available in our Communities and Social Performance Commitments Disclosure Interim Report. Our next dedicated report is due to be released in the third quarter of 2022.

Closure

We aspire to leave a positive legacy for future generations. We do this in partnership with our stakeholders, embedding closure considerations throughout the entire lifespan of our assets – in the way we design, build, run, close and transition them.

Although mining and processing activities extend over decades, we recognise they are temporary and that other activities and land use will follow. To mitigate the impacts of a shift to a new use, we engage our stakeholders early and transparently, to contribute to a shared vision for the future of the land and associated communities. We balance environmental and social considerations with costs and look for opportunities associated with progressive closure, remediation and repurposing, and where appropriate, long-term monitoring and maintenance.

Closure execution

In 2021, we progressed closure execution work at a number of assets, including the Gove refinery and the Argyle diamond mine, and our subsidiary Energy Resources of Australia Ltd (ERA) continues to progress the closure of the Ranger uranium mine.

Argyle diamond mine

Our Argyle diamond mine, in Western Australia, ceased production in 2020. We are in the first year of a four-year plan to dismantle the operational infrastructure, reshape the land and undertake revegetation activities to enable the re-establishment of a natural ecosystem. Once completed, as agreed with the Traditional Owners and the Western Australian Government, we will release our landholding and support the land being returned to the Traditional Owners for activities such as cattle grazing, Indigenous cultural tourism, cultural use and possibly small-scale agriculture and native food production alongside longer-term monitoring activities. We are committed to support the development of long-term sustainable local businesses and local employment. In 2021, we spent 14% of our annual closure budget with Traditional Owner business.

Gove refinery and residue disposal areas

While mining continues at our Gove bauxite operations in the Northern Territory, we are implementing progressive closure activities, including the decommissioning and demolition of the refinery and progressive capping of the red mud ponds. The refinery demolition is one of the largest in Australia. The Gove closure execution programme will take approximately ten years to complete followed by ongoing monitoring, with mining operations expected to cease no later than 2030. This year's work saw the commencement of the capping of pond 5 within the Residue Disposal Area; the completion of the feasibility study of the refinery complex; and optimisation of our waste liquor treatment plant performance. Our Closure team is working with the Gove operations team, Traditional Owners, local business, and the Northern Territory Government, to contribute to the Traditional Owners' future vision for the Gove Peninsula, with the intention to maximise commercial opportunities that Rio Tinto has available through to closure. As agreed with stakeholders, the refinery will be demolished and the underlying land will be remediated. It can then be used for industrial purposes with the intent that certain assets, such as the light fuel farm, cargo wharf, warehouses and administration buildings may be retained for future use by Traditional Owners.

Ranger uranium mine

The Ranger uranium mine in the Northern Territory is owned and operated by ERA. ERA's shares are publicly held and traded on the Australian Securities Exchange, with Rio Tinto holding 86.3% of ERA's shares. In accordance with the Ranger s41 Authority, production at the Ranger uranium mine ceased in January 2021.

On 2 February 2022, ERA released the preliminary findings from its reforecast of the cost and schedule for the Ranger rehabilitation project, which had been subject to an independent review. Rio Tinto is reviewing the preliminary findings of this reforecast and have advised ERA that we are committed to working with the company to ensure the rehabilitation of the Ranger Project Area is successfully achieved to a standard that will establish an environment similar to the adjacent Kakadu National Park.

Legacy sites

We also manage a number of historic sites – known as legacy sites – some we did not operate but acquired through corporate acquisitions after they were closed. Where required, we rehabilitate these sites and, where and when we can, transfer them to local authorities or third parties for future land use. In North America, we are progressing the remediation of a number of sites. We have settled our obligations at the Vernon, a former aluminium cast plate facility in California, and are undertaking seven studies at other sites to develop a path to divest our landholdings or optimise ongoing monitoring and maintenance.

In Europe, we are remediating the historic white and red mud deposits at Salindres, France, and have commissioned a soil treatment plant at Dammarie to enable the site to be repurposed in the future. In the UK, we continue to optimise our long-term treatment of water at Whinnyhall, a historic bauxite residue disposal site.

At the end of 2021, closure provisions on our balance sheet totalled $14.5 billion (compared with $13.3 billion in 2020). We continue to optimise closure costs through sharing good practice with product groups, finding more efficient closure execution methods, building synergies through sequential closures, and targeting research and development opportunities (including water and waste treatment, material movement, community engagement methodologies and partnering).

Strengthening our approach

Successful closure needs to meet our host communities and long-term stewards' expectations. To achieve this, we are working with host communities, including Indigenous partners, on rehabilitation, revegetation and long-term monitoring of the land at many sites. In 2021, the first Argyle Rangers completed their Conservation and Land Management traineeship and joined our team full-time. The programme was developed to upskill Traditional Owners on various land management, community and cultural activities that will be undertaken during the closure execution phase, and post-closure monitoring and maintenance phase. Our focus is to support Traditional Owners to ultimately lead the important environmental monitoring and maintenance work required on site until approximately 2035.

In some locations, our landholdings are a significant contributor to land, water and biodiversity value. We have earmarked land for transfer to national parks and support a number of protected forests and parks across our portfolio. We are exploring options to repurpose several legacy sites for renewable energy, such as our pilot photovoltaic cell facility at Marignac, France, a former ferroalloy plant.

We have expanded our partnerships with universities and other organisations to find opportunities to repurpose and reprocess waste, improve water and waste treatment, and explore the social aspects of mine closure.

For example:

- Together, with our partner RESOLVE, we developed a business model and signed a memorandum of understanding to form Regeneration Enterprises, a for-purpose and for-profit company that will combine the re-mining and processing of waste with site closure and rehabilitation, with the ambition to create full restoration outcomes.
- As part of RemovAL, a European Commission H2020-funded Innovation Action, we continue to work with ZaaK Technologies to demonstrate at pilot scale the upcycling of bauxite residue into Smart Spheres® – an engineered lightweight aggregate that can be used in a range of civil engineering applications.
- We are a partner in the ReActiv project, which looks at new uses for bauxite residue produced during alumina refining in cement production.
- We are a member of the Social Aspects of Mine Closure Research Consortium, an initiative of the University of Queensland's Centre for Social Responsibility in Mining. The consortium was established in 2019 and is a multi-party, industry-university research collaboration to conduct research that challenges industry norms and practices, and places people at the centre of mine closure activities.

To realise these opportunities, we must have the basics in place. All our operating assets have closure plans aligned with our closure framework. We regularly update these plans to ensure they reflect stakeholder expectations and build on experience from closure practices as we learn from them. We have an internal assurance programme, and closure plans are audited every five years against our internal requirements. At operations with joint ownership structures, we work in partnership with the asset owners to embed closure into asset design, planning and operations.

In 2021, we completed asset closure strategies covering another six of our operating assets. These strategies are now in place for 42 assets, contributing to host communities' vision for future land use after our operations cease and ensuring closure is considered throughout the asset lifecycle to identify opportunities while in operation.

This year, to enhance our internal governance processes, we updated our Closure Standard that outlines our minimum closure requirements to mitigate risks associated with the permanent cessation of exploration, mining, processing, and logistics operations. We also updated the internal procedure for how we estimate and report on closure costs. More information on closure provisions and financial statements can be found on pages 229-230 of this report.

Holden mine remediation leads to land conservation

In 2021, we contributed to the Chelan-Douglas Land Trust's establishment of the Chelan Coulees Reserve for permanent conservation as part of an environmental offset for work on the Holden remediation project. The long-term conservation will support native species and habitats unique to the Chelan area and provide benefits for generations to come.

Learn more about our remediation work at riotinto.com/stories.

Health, safety and wellbeing

Caring for one another is one of our values – it is part of who we are and the way we work, every shift, every day. Nothing is more important than the safety and wellbeing of our employees, contractors and communities.

We believe all incidents and injuries are preventable, so our focus is on identifying, managing and, where possible, eliminating risks. In 2021, for the third year in a row, we had zero fatalities. While we recognise the commitment made by all our employees and contractors to achieve this milestone, we know we can always do better.

Although we have had no fatalities on our managed sites in 2021, we are saddened by the loss of life at our suppliers and non-managed operations this year. Two people tragically drowned when a marine vessel delivering materials sank while en route to our Kemano operations in British Columbia, Canada. Three mariners also lost their lives in incidents on chartered vessels. At one of our non-managed joint-ventures, the Compagnie des Bauxites de Guinée SA (CBG), three workers lost their lives in three separate workplace incidents. We are working closely with our partners to understand what happened in each of these events. We will work with our contractor partners and joint venture owners to support the implementation of actions to make these facilities and operations safer and eliminate fatalities in our industry. We also felt immense sadness this year when one of our colleagues from Richards Bay Minerals (RBM) lost his life tragically to violence on his way to work.

We still see some serious incidents at our own operations. A significant risk at our sites is falling objects, accounting for 38% of our potentially fatal incidents (PFIs). Focused improvements are under way to manage this critical risk. In the second half of the year, three people fell from significant heights in three separate events causing serious injury that could have resulted in a fatality. These incidents are stark reminders that we must continue to share the learnings across our business, both among our employees and our contractor partners. Over the last year, we have included contractors more in our safety efforts and are taking action across our product groups to support greater consistency in the application of our safety systems.

We had another challenging year managing the pandemic and we saw a small increase in the number of people hurt on the job. Our all-injury frequency rate (AIFR) in 2021 was 0.40 compared to 0.37 in 2020. While we continue to build our safety maturity, we are seeing the impacts of COVID-19 restrictions on our operations, with fatigue across the organisation and, in some areas, tightness in the labour pool.

In 2021, we launched our Health, Safety, Environment and Security (HSES) Transformation programme, a three-year programme to transform the way we access and use our health, safety and environment data, improving our data collection processes and, ultimately, our strategic decision making.

Safety and health performance[1] 2017-2021

	2021	2020	2019	2018	2017
Fatalities at managed operations	**0**	0	0	3	1
All-injury frequency rate (per 200,000 hours worked)	**0.40**	0.37	0.42	0.44	0.42
Number of lost-time injuries	**218**	187[2]	229[2]	226	199
Lost-time injury frequency rate (per 200,000 hours worked)	**0.25**	0.22	0.27	0.27	0.25
Safety maturity model (SMM) score[3]	**5.7**	5.4	4.5	–	–
New cases of occupational illness (per 10,000 employees)	**12.1[5]**	16.9[2]	21.3[2]	29.6	24.6
Number of employees[4]	**49,000**	47,500	46,000	47,500	47,000
Fines and prosecutions – safety (US$'000)	**646.2[6]**	25.4	40.7[7]	59	29
Fines and prosecutions – health (US$'000)[8]	**5[8]**	0	1.4	0	7.1

1. Data relating to fatalities, all-injury frequency rate and lost-time injury frequency rate includes all employee and contractor exposure hours and incidents at managed operations. New cases of occupational illness are reported for employees only.
2. Numbers adjusted from previous years to ensure comparability over time.
3. Figures in the table represent the Rio Tinto Group average SMM score at the end of each year. Each year, assets are added or removed from the SMM programme based on Project and Closure cycles. New assets to the programme are baselined in the first quarter of each year and added to the Group average at the end of the year.
4. Includes our share of joint ventures and associates (rounded) and excludes contractors.
5. Fewer health assessments were completed in 2021 due to COVID-19 restrictions, which may have impacted the frequency of new cases of occupational illness.
6. In 2021, we have incurred safety violations fines whilst MSHA inspections at our Boron Operations, California, USA; Kennecott Copper and Bingham Canyon mines, Utah, USA. Our Kitimat smelter, Canada, received a fine from WorkSafe BC regarding implementation of exposure control plan for process dust.
7. Safety fines and prosecution amount for year 2019 is restated as WorkSafe BC has reversed the penalty at Kitimat in entirety in 2021.
8. In 2021, we have incurred a fine from the Department of Environmental Quality for misplacing a radioactive gauge at our Kennecott Copper mine, Utah, USA.

Contributing causes for newly reported illness cases (2021)

	2021
Noise-induced hearing loss	**14 (27%)**
Musculoskeletal disorders	**27 (53%)**
Mental stress	**1 (2%)**
Other	**9 (18%)**

Note: There can be one or more illnesses reported for each employee/contractor.

Mental health and wellbeing

Mental health is a core part of our safety culture. We have continued to support several initiatives, including flexible work schedules, greater access to health and medical resources, improved benefits for better access to mental health specialists and virtual care packs, to help our people manage the impacts of COVID-19 on their mental health and wellbeing.

In 2021, we progressed the implementation of our mental health framework to raise awareness of mental wellbeing, reduce stigma and increase the capacity of our leaders to recognise and support individuals experiencing mental illness. We have used this framework in our product groups to better understand the current state of our employees' mental health, and to put in place control measures for mental wellbeing based on ease of implementation and breadth of impact.

To support the proactive management of mental wellbeing and to give our employees the tools and skills they need to build resilience and positive mental health, we continue to provide and promote the Employee Assistance Programme (EAP), our mental health toolkit and our Peer Support Programme, which has expanded globally to now include 1,200 peer supporters worldwide.

In October 2021, we held our mental health week, with the aim of increasing mental wellbeing in the communities where we operate and encouraging our people to support and look out for one another. We also continue to support global mental health campaigns, including World Mental Health Day and R U OK? Day.

In 2021, we continued the rollout of our domestic violence support programmes, which now cover 100% of our employees.

Our mental health strategy has moved us from an individual wellbeing mindset to a psychological health and safety risk management focus. We plan to progress our efforts in 2022 by addressing psychosocial hazards in the workplace using a risk management approach to further support better workplace mental health.

Occupational health

In 2021, we recorded fewer occupational health illnesses compared to the previous year, with 51 (2020: 68). However, we conducted fewer health assessments due to COVID-19 restrictions. We completed more than 366,000 health control verifications, of which 221,000 were COVID-19 control verifications, to assess the efficiency of our health controls, such as physical distancing and hygiene controls.

This year, we were able to return most of our operations to their routine hygiene-sampling activities to gather data on exposures to noise, dust and other contaminants, to evaluate the risk to people and determine control effectiveness and compliance. We reinstated health surveillance activities for those with exposures in the workplace, including fitness assessments as well as hearing and blood tests. We have not yet universally returned to lung-function testing due to difficulties with COVID-19 controls, but we are looking at strategies to reinstate this activity as soon as it can be safely conducted.

Strengthening our safety performance

Eliminating fatalities requires a strong safety culture and systems designed to mitigate risk and continually improve the safety of our work. Much of the success of our safety culture is a result of the work accomplished through the implementation of our safety maturity model (SMM), now in its third year. The SMM provides a roadmap for leaders to advance the foundations of safety without being overly prescriptive. These foundations include leadership and engagement, learning and improvement, risk management, and work planning and execution. We assess our assets' progress annually against each of these elements.

In 2021, we undertook an extensive review of the model and committed to introducing some enhancements from 2022 onwards, addressing areas where we can improve, including bridging the disparity in safety performance between employees and contractors and assessing the maturity of core systems, symbols and behaviours that drive safe operations. We will also place a greater emphasis on our people and their mindsets to build psychologically safe operations and extend our leadership maturity approach to environment and health management.

Our critical risk management (CRM) system, a tool used to verify controls to prevent fatalities are in place before starting each task, is fundamental. In 2020, we expanded CRM to include COVID-19 critical controls and, in 2021, we further strengthened the system with improvements to the existing set of control verification checklists, in consultation with frontline leaders, and the addition of new checklists to address emerging risks such as the use of autonomous equipment.

We have also identified opportunities to improve safety in our Marine business and have embarked on a multi-year programme to improve all aspects of safety, health and the wellbeing of seafarers. A key focus will be the increased data collection of safety incidents and sharing learnings through training and coaching to avoid repeat incidents. Our goal is to drive visibility and accountability by engaging and partnering with other organisations to foster a safer future for the industry.

Transforming our HSES systems

The three-year HSES Transformation Programme was established in 2021 to simplify our health, safety, environment and security processes and technology systems into a handful of integrated tools. This will free up our leaders' time, and make our data more reliable and our business safer. This year's focus has been on the global design process, building and testing the processes and technology, and planning for rollout during 2022 and 2023.

Safety standards

Our standards (available at riotinto.com) and procedures provide a consistent approach to managing hazards across our managed operations. We audit managed operations against our standards and require our businesses to meet their health and safety performance requirements and targets.

In 2021, we reviewed our underground control framework, updating the underground safety standard and adding 13 new Group procedures to support our understanding of our critical controls. We trained our underground leaders and implemented improved assurance activities to ensure our underground operations and projects have the technical capability to manage major hazards. We are now applying new technology underground to support geotechnical monitoring at Oyu Tolgoi, and in 2022, we will trial Battery Electric Vehicles (BEV) at our underground project at Kennecott.

COVID-19

When COVID-19 emerged as a global pandemic, we put strict protocols in place in line with government directives, many of which still remain. In 2021, we focused our efforts on the pathway out of the pandemic. We helped governments boost vaccination rates by opening our own vaccination hubs and encouraged our communities to get vaccinated to protect their loved ones.

Building on measures introduced in 2020, all our operations and offices adopted screening measures, such as health questionnaires and temperature checks and, in most locations, virus screening. We track the situation in every region where we operate, and adapt control measures as needed, in line with government directives. Our specialist in-house team follows the latest health research and advice, and monitors new variants. Their expertise also helps to inform our policies and control measures.

The pandemic is ongoing and is continuing to present new challenges for our operations and supply chains. We are constantly evaluating the situation and addressing emerging issues as they arise.

Supporting our communities

With COVID-19, none of us will be safe until everyone is safe. While we saw hope in some parts of the world, in other parts, there was an alarming resurgence of the virus. As the pandemic continues to evolve with the appearance of variants such as Delta and Omicron, our Business Resilience teams throughout the world, together with Group Services, Global Procurement and our Global Health teams worked to safeguard the health and safety of our people by securing medical services and equipment. We also worked with our partners to extend our care to vulnerable people in the communities.

COVID-19 vaccination support

Now that vaccines are available, we have supported government vaccination campaigns and set up vaccination clinics near our operations in several locations across the US, Mongolia, South Africa, Madagascar, Canada and Australia – for our employees, contractors, their families, and community members.

Position statement on COVID-19 vaccination

In line with our commitment to the safety, health and wellbeing of our employees, contractors, their families, and the communities where we operate, we have updated our position statement regarding COVID-19 vaccinations. It reflects our commitment to ensuring our people are vaccinated against COVID-19, based on key principles, including regional risk assessments to determine whether certain roles, locations or tasks require individuals to be vaccinated. Our approach is guided by our commitment to respect human rights. Any vaccination requirements will be closely managed with care and will consider those who are unable to be fully vaccinated.

Iron Ore Company of Canada (IOC), operations.

People

Empowered and engaged colleagues are key to our success, but we recognise that the work culture in some parts of our business has not always supported this. As a result, we have launched a number of initiatives to evolve our culture, so our people feel safe, respected and included, and they are supported to use their knowledge and experience, drive improvements, and deliver transformation and growth.

2021 was a challenging year with COVID-19 continuing to impact our ways of working and our lives at home. Our new leadership team focused on building trust and listening to our people. With the safety and wellbeing of our 49,000 employees top of mind, we have taken steps to shift our mindsets and simplify our processes.

Evolving our culture

In 2021, we launched our new strategy as well as our new values of care, courage and curiosity, which will reinforce the culture change that we are driving and enable greater performance. We recognise that embedding our values and evolving our culture will take time, but we are making important progress.

Within the mining industry, and across society as a whole, we see unacceptable behaviours such as bullying, sexual harassment, racism. To address this proactively within our own company, we commissioned expert and former Australian Sex Discrimination Commissioner, Elizabeth Broderick*, to conduct an independent review of our workplace culture, as part of our Everyday Respect task force. More than 10,000 people shared their experiences and suggestions, through listening sessions, surveys and written submissions.

The Board and Executive Committee fully endorse the recommendations set out in the report, which focus on a framework for prevention and response via three key areas:

- Leadership and behavioural change: A commitment from the company's leadership to create safe, respectful and inclusive working environments to prevent harmful behaviours and better support people in vulnerable situations. This includes increasing diversity within the company.
- Safe and inclusive facilities: Ensuring the company's camp and village facilities are safe and inclusive. This includes applying the same safety and risk processes that Rio Tinto uses to prevent harm in operations to create a safe environment for all employees and contractors.
- Caring response: Making it as easy and safe as possible for all people to call out unacceptable behaviours, highlight issues when they happen and receive support. This includes introducing early intervention options and improving how the company responds to formal complaints in the workplace.

In 2021, we also took part in the Western Australian Parliamentary Inquiry into sexual harassment of women in the fly-in, fly-out (FIFO) mining industry. We made our submission to the Inquiry in August and are absolutely committed to eradicating all forms of sexual harassment, racism and bullying in our workplace, wherever we operate globally. Everyone deserves to feel physically and psychologically safe at work, without exception. This is core to our values and what we stand for as a company.

This year, we also updated our confidential reporting programme, myVoice, with a number of enhancements designed to make it easier for our people to voice concerns when something at work does not feel right. The myVoice programme will continue to evolve to reflect the feedback received through the independent review. More information is available on page 107.

We know that addressing these issues will, over time, contribute to a safer, more inclusive and respectful work environment. It will help improve wellbeing, increase collaboration, and help to attract and retain diverse people. Continuing to focus on our culture will remain a key priority for all leaders in 2022.

To help catalyse change, we rolled out a major leadership development programme to our top 115 leaders. Over the next two years, a further 400 of our senior leaders will go through the same programme. We are also investing in developing our frontline colleagues, and we are focusing on more delegation and empowerment, as well as simplifying our governance processes. In 2022, we will also review our incentives and rewards to ensure they support and align with our desired culture, values and strategy.

In 2021, we also undertook two Group-wide employee engagement surveys to help us understand how our people feel about the company and our direction. In our latest survey in October, close to 27,000 employees completed the survey and provided over 62,000 comments. Results show that the new strategy was well-received, and our new values resonated for many who felt they have a stronger human connection and reflect what we want to be as a company.

However, our employee satisfaction (eSAT) score, which measures how happy people are working at Rio Tinto, has gone down from 73 to 71. This is the first decline since 2017, and is seen across most levels, geographies and parts of the business. This is consistent with what Glint, our survey provider and expert in engagement, is seeing across organisations. After a broad increase in eSAT during the first year of the pandemic, there has been a general decline across many industries and organisations as fatigue increases. This is a combination of increasing workload to cover absenteeism, additional pandemic-related work and the isolation for those working from home leading to higher levels of employee burnout.

Building a workforce that reflects the diversity of our community

In 2021, our workforce grew by 3,001 and we hired 7,895 people, of which 3,098 were contractors who became permanent Rio Tinto employees.

We continue to focus on the representation of women across all levels. This year, we expanded our gender diversity targets beyond women in senior leadership to women at all levels and increased the representation of women in our workforce by 1.5%. Overall, we increased female representation from 20.1% to 21.6%, hiring 2,524 women, 32% of all new hires. Gender diversity also improved among our senior leadership, up 1.3% to 27.4%. Also, for the first time in five years, our frontline operator female representation grew by 0.9%, from 14.2% to 15.1%.

Initiatives to increase the representation of women include the Women in Mining Forum at our Richards Bay Minerals (RBM) operations in South Africa, sponsored by the site leadership team. Discussion forums were held between senior management and female employees at the site to foster dialogue and identify areas for improvement to break down gender bias and inequality. Our Gladstone leadership development pilot programme is another example from this year where we focused on building career pathways to develop the capability of our female talent in frontline leader roles. The programme was rolled out across the Boyne Smelters, Queensland Alumina and our Yarwun refinery, and our plan is to deploy this programme across our Pacific Operations.

* Elizabeth Broderick AO, Principal, Elizabeth Broderick & Co. Elizabeth was formerly Australia's longest-serving Sex Discrimination Commissioner, and is Founder and Convenor of the Champions of Change Coalition, Adjunct Professor at The University of Sydney, and an Independent Expert to the UN Working Group on Discrimination against Women and Girls.

Our graduate programme is one avenue where we can make sure our leaders of tomorrow reflect the diversity of our community. For our 2021 intake, 58% of the graduates are female and 35% from nationalities where we are building new businesses. In Australia, 10% of the graduate intake and 15% of our vacation student programme are Indigenous, both up from 8% in 2020. We are also investing in the development of our graduates through our new graduate development programme. Due to COVID-19, this programme is now a two-year virtual journey that ensures that all graduates, regardless of where they are located, have access to the same curriculum. It prepares graduates to be future leaders with experiences including the future of work and our role in society. In 2021, the programme received an innovation award through the Human Resources Canada Awards.

We know that having an inclusive and diverse workforce improves performance, and we are committed to Indigenous peoples having a stronger voice across our business. We are one of the largest employers of Indigenous Australians, with almost 1,500 Indigenous employees and contractors working across our Australian business, but we recognise that we have more work to do to increase representation in professional and leadership roles. We have committed $50 million over five years to attract, retain and grow Indigenous professionals and leaders in Australia, and we have increased the number of Australian Indigenous leaders in our business fivefold since November 2020. We have also developed a national cultural competence programme which was launched in 2021 and will continue to be delivered to our leaders across our business in 2022.

Ensuring equality through pay equity

Equity is intrinsically linked to our commitment to inclusion and diversity. Ensuring that employees with similar skills, knowledge, qualifications, experience and performance are paid equally for the same or comparable work remains a core focus. Our gender pay gap reporting consists of two metrics:

- Our equal pay gap, the primary lens we use when assessing gender pay, measures the extent to which women and men employed by our company in the same location and performing work of equal value receive the same pay. In 2021, we further reduced our gender pay gap compared to 2020, which is less than 1.5% in favour of men.
- Gender pay is a measure of the difference between the average earnings of women and men across the Group (excluding incentive pay), regardless of role, expressed as a percentage of men's earnings. In 2021, our gender pay gap is unchanged with just over 1% in favour of women.

Multiple factors impact this more high-level indicator, including our approach to promoting equity, reflecting higher increases in average earnings for women and an increase in the number of women in higher-paying roles. During the year, we increased our headcount by around 7%. This included a significant proportion of male hires in lower paying roles within the operational workforce, which contributed to the overall outcome. More information on our commitment to pay equity can be found at riotinto.com/payequity.

Other activities in 2021:

- Launched the development of the Rio Tinto Safe Production System (RTSPS) to support our ambition of becoming the best operator. RTSPS empowers our frontline employees, simplifies what we do, frees our people to innovate and brings consistency to our operations. We began testing the model at five sites in 2021: at our copper concentrator at Kennecott, Yandicoogina Fixed Plant, and drill and blast at West Angelas in the Pilbara, the casthouse system at Grande-Baie in the Saguenay, and the concentrator at the Iron Ore Company of Canada (IOC).
- Launched a programme to streamline processes and remove bureaucracy to further empower our people. As an example, we are ensuring authority is delegated to the appropriate level and have completed improvements to our workflows, representing approximately 16,750 approvals per year and returning almost 2,800 hours annually to our leaders.
- Expanded our technical expertise through the RioExcel programme with 36 people formally recognised as technical RioExperts, bringing our total number to 109. Of these, 18% are women and our total RioExpert population represents 14 technical disciplines across six countries.
- Partnered with Mindgym to conduct 15 virtual learning sessions for over 500 people globally (in English and French) about inclusion, being a better ally and creating a sense of belonging.
- Continued to encourage skills development through LinkedIn Learning. Since its launch in May 2020, more than 17,000 of our colleagues have registered for the platform and completed more than 16,200 courses and 24,500 hours of learning.
- Increased the employee contribution caps in our Global Employee Share Plan, myShare, further increasing the attractiveness of the programme. The number of employees who hold Rio Tinto shares through myShare increased by 14% this year – to more than 25,000 employees.
- Researched our global mobile talent to understand the impact of the pandemic on how people view international assignments and what support they need to thrive. Outcomes from this research will inform the shape of the mobility programme to ensure we provide the right support and growth opportunities.
- Established a partnership with the Australian Graduate School of Management (AGSM) at the University of New South Wales to deliver the Rio Tinto Emerging Indigenous Executive Leaders Programme (EIELP) to 20 Indigenous leaders. This programme focuses on developing executive-ready Indigenous future leaders who will have an influential role in shaping the future of our business.
- Completed the first round of the Indigenous two-way mentoring programme. We matched 31 of our Indigenous employees with senior leaders across our Australia businesses. We have now launched round two of this programme, with 45 Indigenous employees participating.

Supporting a career path for our technical experts

In many organisations, career progression means taking on responsibility for leading teams. But through our RioExcel programme, we offer our technical specialists an alternative career path – one where they can focus on building and sharing their expertise. Our RioExperts are selected by a panel of senior technical leaders and must prove they are at the forefront of their domain to share their knowledge.

Learn more about our RioExcel programme at riotinto.com/people.

Employee hiring and turnover rates[1, 2, 3] (2021)

		Gender[4]		Age group				Region				
	Total	Female	Male	Under 30	30-39	40-49	Over 50	Africa	Americas	Asia	Australia/ New Zealand	Europe
Employee hiring rate[5, 6]	**18.8%**	32.0%	68.0%	38.7%	32.2%	18.8%	10.2%	1.5%	27.2%	7.4%	60.3%	3.6%
Employee turnover rate[7]	**8.7%**	8.6%	8.8%	11.7%	8.3%	6.7%	10.5%	5.7%	6.7%	4.9%	11.3%	7.6%

1. Includes our total workforce based on managed operations (excludes the Group's share of non-managed operations and joint ventures) as at 31 December 2021.
2. Excludes Non-Executive Directors and contractors.
3. Rates have been calculated over average monthly headcount in the year per category.
4. Less than 1% of the workforce gender is undeclared.
5. Total hiring rate is calculated as total employee hires over average employee headcount for the year.
6. Hiring rate includes total employee hires per category over total hires for the year.
7. Turnover rate excludes temporary workers and the reduction of employees due to business divestment. Turnover rate includes total terminations per category over average monthly headcount in the year per category.

Employees by employment type[8, 9] (2021)

	Gender[10]			
Category	Female (count)	Male (count)	Female %	Male %
Senior leaders	147	390	27.4%	72.6%
Managers	1,119	2,389	31.9%	68.1%
Supervisory and professional	4,729	11,597	29.0%	71.0%
Operations and general support	4,051	22,695	15.1%	84.9%
Graduates	178	119	59.9%	40.1%
Total	**10,224**	**37,190**	**21.6%**	**78.4%**

8. Includes our total workforce based on managed operations (excludes the Group's share of non-managed operations and joint ventures) as at 31 December 2021.
9. Excludes Non-Executive Directors, Executive Committee, contractors and people not available for work. From 2021, the definition used to calculate diversity was changed to include people not available for work and contractors (those engaged on temporary contracts to provide services under the direction of Rio Tinto leaders) excluding project contractors.
10. Less than 1% of the workforce gender is undeclared.

Workforce data by region[11, 12]

Region	Average employee headcount[13]	Headcount distribution %	Absenteeism[14]	Average contractor headcount[15]	Headcount distribution %
Africa	2,360	5.6%	2.8%	69	1.3%
Americas	14,289	33.9%	1.6%	689	13.2%
Asia	4,144	9.8%	2.0%	430	8.2%
Australia/New Zealand	20,288	48.3%	4.2%	4,000	76.6%
Europe	1,018	2.4%	0.9%	36	0.7%
Total[16]	**42,099**	**100.0%**	**3.0%**	**5,223**	**100.0%**

11. Includes our total workforce based on managed operations (excludes the Group's share of non-managed operations and joint ventures) as at 31 December 2021.
12. Rates have been calculated over average monthly headcount in the year.
13. Employee headcount excludes Non-Executive Directors, contractors and people not available for work.
14. Absenteeism includes unplanned leave (sick leave, disability, parental and other unpaid leave) for populations on global, centralised HR systems. Excludes Non-Executive Directors and contractors.
15. Contractors include those engaged on temporary contracts to provide services under the direction of Rio Tinto leaders.
16. The sum of the categories may be slightly different to the Rio Tinto total due to rounding.

Human rights

Our commitment to human rights is core to our values. It is fundamentally about treating people with dignity and respect – our employees and contractors, workers in our value chain, communities and others with whom we interact.

Our Board Sustainability Committee oversees our approach, as we work to improve our human rights performance. This includes strengthening our processes to prevent any involvement in adverse human rights impacts and, importantly, to provide for, or co-operate in, remediation when we identify that we have caused, or contributed to, human rights harm.

Our salient human rights issues are those where we could have the most severe impacts on people through our own activities or business relationships. Taking into account our operational footprint, value chain and external contexts, we updated our salient human rights issues in 2021 to include land access and use; Indigenous peoples' rights; security; inclusion and diversity; community health, safety and wellbeing; workplace health and safety; labour rights; and climate change and just transition (respecting human rights while transitioning to a low-carbon economy).

We recognise the importance of acting on any involvement we might have in human rights harm through our business relationships with our suppliers, customers and joint venture partners, in line with the UN Guiding Principles on Business and Human Rights and international standards. We look for ways to work with our business partners to advance respect for human rights in line with international standards and our values.

Using a risk-based approach, we pre-screen potential business partners on human rights and require suppliers (including subcontractors) to adhere to our Supplier Code of Conduct, which requires respect for human rights. Our standard global supply contract and purchase order terms and conditions, as well as our Marine chartering contracts, include modern slavery provisions.

We build our employees' understanding through general and targeted human rights training.

Commitment to international standards

We are committed to respecting all internationally recognised human rights, as set out in the Universal Declaration of Human Rights, and implementing the UN Guiding Principles on Business and Human Rights (UNGPs). We voluntarily uphold a range of other international standards, including the Voluntary Principles on Security and Human Rights (VPSHR), the OECD Guidelines for Multinational Enterprises (OECD Guidelines) and the UN Global Compact's Ten Principles.

Consistent with the UN Declaration on the Rights of Indigenous Peoples, we are committed to acknowledging and respecting Indigenous peoples' connections to lands and waters and strengthening the application of the principles of Free, Prior and Informed Consent of affected Indigenous communities in line with the International Council on Mining and Metals Position Statement on Indigenous Peoples and Mining. We acknowledge that the destruction of the rock shelters at Juukan Gorge was a breach of our values, standards and procedures, including those that help us respect human rights. This year, we progressed a remedy process with the Puutu Kunti Kurrama and Pinikura (PKKP) people. We continue to engage with Traditional Owners, Indigenous groups, civil society organisations and other stakeholders, to inform our approach to the management and protection of cultural heritage.

Key actions during 2021

Governance

- Revised our salient human rights issues.
- Consulted on an updated human rights policy to be published in 2022.
- Started development of a responsible sourcing labour rights action plan to evolve our approach on labour rights risk management across Rio Tinto Procurement managed suppliers.
- Completed an external audit of our community complaints, disputes and grievance mechanisms for alignment with the UNGPs' criteria for effective non-judicial grievance mechanisms.
- Integrated human rights considerations into our refreshed marine safety and crew welfare strategy.

Training and awareness-raising

- Delivered mandatory human rights training for Rio Tinto Procurement and Logistics.
- Provided targeted human rights training for our Sales and Marketing, Ethics and Compliance, Legal, Communities and Social Performance, and Marine teams, including our ship managers for our Rio Tinto owned fleet.
- Refreshed our VPSHR training for security personnel.

Stakeholder engagement and reporting

- Published our fourth VPSHR Implementation Report and our fifth Modern Slavery Statement in compliance with the Australian and UK Modern Slavery Acts.
- Engaged with the Australian National Contact Point responsible for promoting the OECD Guidelines, the Human Rights Law Centre and community representatives regarding the former Panguna copper mine in Bougainville. More information can be found on page 92.
- Provided support to the Compagnie des Bauxites de Guinée SA, in its discussions with the International Finance Corporation's Office of the Compliance Advisor Ombudsman and community complainants regarding the Sangaredi mine in Guinea.
- Engaged with human rights-related shipping initiatives, including in relation to the risks faced by seafarers during the COVID-19 pandemic.
- Hosted more than 40 civil society organisations in three environmental, social and governance roundtables with Board and Executive Committee members in North America, Europe and the UK, and Australia which included discussions about human rights.

Transparent and responsible business

The way we do business is increasingly important to our stakeholders who want assurance that we not only conduct ourselves responsibly, but also that suppliers and customers across our value chain do so as well. We look for opportunities to improve transparency about our business practices and work to ensure our people understand and fulfil their obligations. We participate in assessment and accreditation programmes to verify our performance and identify opportunities for improvement so our stakeholders can have confidence in the way we work.

Cape Lambert ship loading operations. The Pilbara, Australia.

Value chain

As consumers become more mindful of the sustainability of the products they choose, they want reassurance that the materials consumed reflect responsible practices throughout the value chain. Materials used in products today may not be the preferred choice in the future if they cannot establish their environmental, social and governance (ESG) credentials or develop strong circular solutions. This starts with transparency and includes our suppliers, operations and customers.

We are part of a huge ecosystem that includes 37,000 suppliers and 2,000 customers across multiple industries and countries. More than 230 marine vessels transport our products. We are improving our knowledge of suppliers through enhanced due diligence and ongoing monitoring.

Our Supplier Code of Conduct lays out our expectations on human and labour rights, safety and environment. Our global supply contract outlines our expectations for how our suppliers should manage modern slavery risks.

In our operations, we are providing our customers with assurance that our value chain is responsible through independent industry stewardship programmes. Our Kennecott and Oyu Tolgoi copper operations have been awarded the Copper Mark, the copper industry's independently assessed responsible production programme. In 2021, our ISAL smelter in Iceland was certified under the Aluminium Stewardship Initiative, joining other aluminium assets in Canada, Australia and New Zealand. Our three Canadian mines – Diavik Diamond Mine, Iron Ore Company of Canada, and Rio Tinto Fer et Titane – are assured under the Towards Sustainable Mining programme. See the 2021 Sustainability Fact Book for more information.

We also have a product stewardship strategy and programmes that guide our approach to managing regulatory and sustainability risks and opportunities in delivering our product to market. Our programmes address the regulatory requirements of both our host countries and end markets, as well as those that apply during transport.

Working across our value chain

We progressed a number of activities to reduce our impacts in 2021.

Mining

- Electrifying mine trucks through the Charge On Innovation Challenge
- Zero-emission autonomous mining haulage with Caterpillar and Komatsu
- Trialling our first renewable diesel-powered haul truck using organic biomass at Boron in the US
- Additional solar generation capacity at Weipa in Australia
- Renewable energy for QMM in Madagascar

Processing and production

- Transforming iron ore pellets into hot briquetted iron using green hydrogen and hydro-electricity
- Producing low-carbon aluminium at the ELYSIS Industrial Research and Development Centre
- Developing a new steel powder and aluminium-scandium alloy for 3D printing applications using materials extracted from waste
- Assessing the use of hydrogen in alumina refining processes with ARENA

Distribution and customer use

- Studying ammonia as a zero-carbon marine fuel with ITOCHU
- Building a fleet of liquefied natural gas (LNG) dual-fuel vessels
- Transitioning to a low-carbon emission steel value chain with POSCO
- Exploring low-carbon steelmaking using Pilbara iron ores with BlueScope
- Researching low-carbon ironmaking, combining raw, sustainable biomass with microwaves

End of life

- Extracting high-purity scandium oxide from waste streams of titanium dioxide production
- Recovering tellurium as a by-product of copper smelting
- Melting scrap to make alloys with recycled content for aluminium customers with Shawinigan Aluminium Inc.
- Launching Regeneration Enterprises to re-mine and process waste from legacy mine sites with the ambition to create full restoration outcomes

Lifecycle

- Exploring a lithium battery lifecycle initiative with InoBat
- Joined Japan's Green Value Chain Platform Network to lead transparent decarbonisation efforts
- Launched START, an aluminium traceability and transparency initiative

Ethics and Compliance

We expect our people to uphold the highest standard of integrity and to act ethically. Sometimes this requires courage, which is one of our values. This expectation extends to our partners, that they behave and operate in a way that aligns with our values and priorities.

Business integrity

Our code of conduct is clear that we do not offer, pay or accept bribes, no matter where we operate, what the amount, what the situation, and who is involved. Our code of conduct applies to all our people and is available to our external partners and stakeholders at riotinto.com/ethics. In 2021, we updated the code of conduct to reflect our new values of care, courage and curiosity and the new name of our confidential reporting programme, myVoice. Our Business Integrity Standard and Procedure require our employees, core contractors and any third parties acting for, or on behalf of, the company to not commit, authorise or be involved in bribery, corruption, fraud or other economic crimes. We also have clear rules regarding third-party benefits, managing conflicts of interest, facilitation payments, sponsorships, donations and community support, mergers, acquisitions and joint ventures, and engaging third parties. Our Ethics and Compliance team helps our people navigate any grey areas.

This year, we updated our Business Integrity Standard and Procedure to simplify and optimise the efficiency of our processes and better guide our people on how to make the right decisions and demonstrate ethical behaviours. In 2021, we updated the New Country Entry Procedure outlining steps to assess the potential risks (including corruption risks), and internal approvals process, for us to enter a new country. This year, we also established the Export Controls Procedure setting out the requirements for compliance with export control laws.

We have further enhanced our Risk Monitoring Review Forum to regularly review Group-level business integrity risks, and to identify and mitigate new and existing business integrity risks across our operations. In 2021, we established the Group Ethics & Compliance Committee, a sub-committee of the Executive Committee, to provide strategic oversight and input on compliance matters. The Committee provides a formal, structured forum for senior leaders to discuss compliance risks, and ensure the compliance programme is working effectively in practice. In addition, the Board oversees ethics and compliance matters, including myVoice, our confidential reporting programme.

We encourage and equip our people to do the right thing. Our employees are required to complete annual online compliance training, tailored to suit the risks they are most likely to encounter in their specific role and team. We are also continuing our ethics ambassador programme to extend the sharing and reach of integrity initiatives and champion an integrity-driven culture across the business. In 2022, we will update our code of conduct to align with our new strategy and values. We will also ensure it reflects our increased focus on supporting a culture where everyone feels safe to challenge and speak up freely when something does not feel right.

Working with third parties

Understanding the beneficial ownership and activities of the parties with whom we transact business is an important part of living our values and maintaining impeccable environmental, social and governance (ESG) credentials.

In 2021, we amalgamated the Know Your Supplier and Know Your Customer Procedures into a single Know Your Third Party Procedure. This simplified document aligns risk criteria and clearly articulates the due-diligence requirements for all types of third parties. We have also included additional risk criteria to address human rights, labour rights, and modern slavery risk. We also implemented a new Sanctions Standard in March 2021, setting out the requirements and framework for compliance with applicable economic sanctions laws and regulations in the jurisdictions where we operate, and all our third parties are screened for sanctions.

EY completed an external review of our due diligence process. This work will help guide us to streamline and automate processes and better align the level of due diligence with the assessed third party's inherent risk.

myVoice, confidential reporting programme

In 2021, we launched our enhanced confidential reporting programme, myVoice, designed to help our people voice concerns about potential misconduct or improper behaviour. We have increased the independence and effectiveness of the programme through organisational changes and clearly defined governance, responsibilities and accountabilities. The programme is managed by a dedicated Business Conduct Office (BCO) reporting to the Chief Legal Officer & External Affairs. The BCO and the Investigations team report regularly to the Group Ethics & Compliance Committee.

Our employees' response has been positive, and we are seeing an increase in reporting and believe this means that more people are feeling comfortable to share their concerns. In 2021, for the period from 1 January to 31 December, we received 1,246 reports through the myVoice programme channels. Of these cases, 51% were substantiated including 18 cases which were reports received in 2020. The substantiation rate increase in 2021 reflects a single substantiated incident where 139 reports were received.

myVoice – confidential reporting programme

myVoice[1] case activity	2021	2020	2019	2018	2017
Number of reports	1246	748	805	679	712
Number of reports per 1,000 employees	26.0	16.3	17.9	14.3	15.1
Substantiated claims (%)	51%	42%	34%	34%	33%

1. In March 2021, Rio Tinto launched its new confidential reporting programme called myVoice. myVoice replaces the programme formerly known as Talk to Peggy or Speak-OUT.

Transparency

Being open and transparent about our tax payments, mineral development contracts, beneficial ownership and our stance on a range of other sustainability issues – like climate change – allows us to enter into open, fact-based conversations with our stakeholders in detail, and provides a better understanding of everyone's roles and responsibilities.

We are recognised as a leader in transparent tax reporting: we were the first in our industry to disclose our payments to governments in detail, and we have been reporting on our taxes and royalties paid, and our economic contribution, in increasing detail since 2010. We are a founding member of the Extractive Industry Transparency Initiative (EITI) and have actively supported EITI's principles and global transparency and accountability standards since 2003. In 2018, we became a signatory to the B Team Responsible Tax Principles. In 2021, we reinforced our commitment to transparency over tax reporting by being one of the first companies to fully implement the disclosure requirements under the Global Reporting Initiative Tax standard GRI 207.

In 2021, we joined other leading extractive-sector companies in confirming our commitment to support beneficial ownership transparency, including through the disclosure of ownership information, and in using ownership information in undertaking due diligence on partners and suppliers.

Political integrity

We do not favour any political party, group or individual, or involve ourselves in party political matters. We prohibit the use of funds to support political candidates or parties. Our business integrity procedure includes strict guidelines for dealing with current and former government officials and politicians, and they cannot be appointed to senior employee positions or engaged as consultants, in certain circumstances, without the approval of executive management and our Chief Ethics & Compliance Officer.

We regularly engage with governments and share information and our experiences on issues that affect our operations and our industry.

We join industry associations where membership provides value to our business, investors and other stakeholders. At riotinto.com/industryassociations, we outline the principles that guide our participation, the way we engage, as well as a list of the top five associations by membership fees paid. We also track and disclose how we engage on climate policy issues, disclosing when the policies and advocacy positions adopted by industry associations differ materially from ours.

This year, we have further strengthened our approach and disclosures on industry associations.

Training

In total, 4,307 employees and contractors in 18 countries had face-to-face training, and over 23,000 had online training in recognising and managing business integrity dilemmas.

Partnering to strengthen business ethics in Mongolia

In partnership with the Mongolian National Chamber of Commerce and Industry (MNCCI), and Transparency International Mongolia, we launched a new Business Integrity Centre in 2021 to help support the country's efforts to promote transparency, business ethics, and corporate governance.

Learn more at riotinto.com/ethics.

Value chain

	2021
Due-diligence checks on third parties	4,754
Due-diligence checks on third parties – baseline screening only	8,040
Centrally monitored third parties[1]	44,495

1. Once third parties are screened, they then form part of ongoing monitoring.

We have applied the reporting principles of GRI 101: Foundation 2016 Standard in this report.

Voluntary commitments, accreditations and memberships

We take part in a number of global, national and regional organisations and initiatives that inform our sustainability approach and standards, which in turn allows us to better manage our risks. External organisations and initiatives assess and recognise our performance, and we participate in industry accreditation programmes for some of our products. These organisations and initiatives include the following:

Aluminium Stewardship Initiative (ASI)

The ASI aims to create sustainability and transparency throughout the aluminium industry. It has developed the world's first global Responsible Aluminium Standard, used to assess environmental, social and governance practices across the aluminium supply chain for responsible sourcing. We were the first company in the world to receive certification under the ASI.

Blue Green Alliance (BGA)

The BGA aims to solve environmental challenges in ways that create and maintain quality jobs and build a stronger, fairer economy. We are on the Advisory Board of the BGA.

Business for Social Responsibility (BSR)

BSR is a global non-profit organisation that works with its network of more than 250 member companies and other partners to build a just and sustainable world. As a member, we share information on sustainable practices.

Extractive Industries Transparency Initiative (EITI)

We are a founding member of the EITI and have played an active role in this global standard since 2003. The EITI promotes open and accountable management of natural resources to make sure our activities benefit the many, not the few. We are transparent about the taxes and royalties we pay – publishing an annual Taxes Paid Report since 2010.

Global Reporting Initiative (GRI)

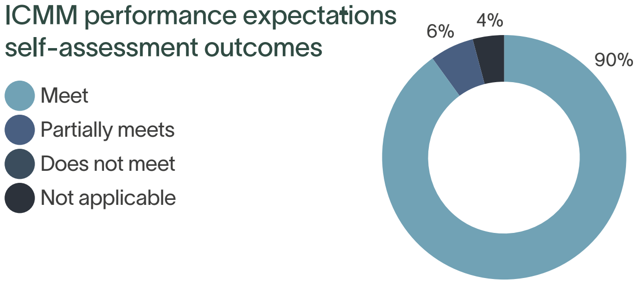
GRI is an international independent organisation with an international framework and standards for sustainability reporting. Our Group-level sustainability reporting is informed by the GRI Sustainability Reporting Standards (Core option) and the GRI Mining and Metals Sector Supplement.

International Council on Mining and Metals (ICMM)

As a member, we commit to implementing and reporting on ICMM's Ten Principles for Sustainable Development. These cover corporate governance, environmental stewardship and community engagement. Our Chief Executive is a member of the ICMM Council, and we participate actively in various working groups, such as the climate change and energy working group. In 2021, our Chief Executive signed the ICMM Climate Change statement, committing Rio Tinto and other member companies to a goal of net zero by 2050 or sooner.

We are also committed to implementing the ICMM Performance Expectations (PEs). The ICMM Mining Principles framework focuses on the implementation of systems and practices related to a broad range of sustainability areas. Eleven Rio Tinto managed assets completed self-assessments in 2021. These assets met the requirements in the areas of ethical business practice, decision making, health and safety, social performance, and stakeholder engagement. Our teams identified opportunities to improve our performance in human rights, risk management, environmental performance, conservation of biodiversity, and responsible production.

ICMM performance expectations self-assessment outcomes



Kimberley Process (KP)

We participate in the Kimberley Process through our involvement with the World Diamond Council (WDC). The KP is a joint initiative between governments, diamond industry bodies and civil society organisations, mandated by the United Nations and the World Trade Organization, to stem the flow of "conflict diamonds".

London Bullion Market Association (LBMA)

The LBMA has renewed Rio Tinto Kennecott's responsible gold and silver certificate, which guarantees that the precious metals produced from Kennecott's refinery are accepted and traded globally. The certificate is one of the requirements for precious metal refineries to be placed on the LBMA's Good Delivery List (GDL), an internationally recognised standard for quality and responsible production. Many precious metal exchanges will accept gold and silver bars only from refiners that appear on the GDL.

Natural Diamond Council

We are a founding member of the Natural Diamond Council whose mission is to advance the integrity of the diamond and jewellery industry to inspire, educate and protect the consumer.

OECD Guidelines for Multinational Enterprises

The OECD Guidelines for Multinational Enterprises are recommendations by governments to multinational enterprises operating in or from adhering countries. They include non-binding principles and standards for responsible business conduct in a global context consistent with applicable laws and internationally recognised standards. These guidelines are a multilaterally agreed and comprehensive code of responsible business conduct that governments have committed to promoting.

Proteus Partnership

The Proteus Partnership was formed in 2003 as a collaborative effort between leading extractive companies and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) to improve accessibility to biodiversity data for better decision making and support the development of global biodiversity resources. As a Proteus Partner, we have access to the UNEP-WCMC online biodiversity assessment tool, which allows us to scan for potential sensitive areas in places where we are seeking tenure before major investments are made.

Responsible Jewellery Council (RJC)

The RJC is an international non-profit organisation that promotes transparent and responsible ethical, human rights, social and environmental practices throughout the jewellery industry – from mine to retail. We are a founding member and were the first mining company to be certified in 2012. Since then, we have continued to uphold the ESG standards and maintained RJC certification, which needs to be renewed every three years. We were re-certified in 2021 against the RJC Code of Practice Standards. RJC certification covers operations or activities of our businesses that produce diamonds, gold or gold in concentrates that contribute to the jewellery supply chain. This includes our Diavik Diamond Mine in Canada and our Kennecott copper mine in Utah for gold.

The B Team Responsible Tax Principles

We are a signatory to The B Team Responsible Tax Principles, developed by a group of cross-sector, cross-regional companies to define what leadership in responsible tax looks like. The disclosures in our Taxes Paid Report, available at riotinto.com/taxespaidreport, demonstrate our approach to The B Team's seven Responsible Tax Principles.

The Copper Mark

Developed by the International Copper Association – with input from a range of stakeholders, including customers, NGOs and producers – The Copper Mark is a comprehensive assurance framework to demonstrate the copper industry's responsible production practices and contribution to the United Nations Sustainable Development Goals. Our Kennecott mine, in Utah, US, and Oyu Tolgoi, in Mongolia, were the first producers to be awarded the Copper Mark – verifying our copper as responsibly produced.

Towards Sustainable Mining (TSM)

We participate in the TSM programme through our membership of the Mining Association of Canada (MAC). TSM is a sustainability certification that applies to members of MAC operating in Canada.

United Nations Global Compact (UNGC)

The UNGC is a voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals. As members, we incorporate the Ten Principles of the UN Global Compact into our strategies, policies and procedures.

United Nations Guiding Principles on Business and Human Rights (UNGPs)

The UNGPs are a global reference point for preventing and addressing the risk of adverse impacts on human rights linked to business. We seek to operate in a manner consistent with the UNGPs.

United Nations Sustainable Development Goals (SDGs)

The SDGs are a set of 17 goals and 169 targets endorsed by the UN in 2015. These present a broad sustainability agenda focused on the need to end poverty, fight inequality and injustice, and respond to climate change by 2030. Please see page 75 for more on our approach to the SDGs.

United Nations Universal Declaration of Human Rights (UDHR)

The UDHR is a milestone document in the history of human rights, which sets out, for the first time, fundamental human rights to be respected. We respect and support all internationally recognised human rights consistent with the UDHR.

Voluntary Principles on Security and Human Rights (VPSHR)

The VPSHR guides extractives companies on how to maintain the safety and security of their operations in line with respect for human rights. Participants, including governments, companies and non-governmental organisations, agree to proactively implement or support the implementation of the VPSHR. We published our VPSHR Report for the first time in 2018 (previously only provided to other participants) and have committed to doing this each year.

World Economic Forum (WEF)

WEF brings together the foremost political, business, cultural and other leaders of society to shape global, regional and industry agendas. It is independent, impartial and not tied to any special interests. The Forum strives to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance.

External assessment

External assessment of our activities and performance, and associated ratings, provides important inputs that help us better understand stakeholder expectations, drives transparency and helps us improve.

Indices and ratings

Sustainability indices	Maximum rating	2021	2020	2019	2018	2017
Dow Jones Sustainability Index (DJSI)	100	**76**	68	66	67	67
FTSE4 Good	5	**4.0**	4.3	4.3	4.3	4.2

Rating providers	Maximum rating	2021	2020	2019	2018	2017
CDP	A	**B**	B	C	C	B
EcoVadis	100	**55**	50	53	47	45
ISS OEKOM	A+	**C+**	C+	C	C	–
ISS Corporate Solutions						
Environment	1	**1**	1	1	3	2
Social		**1**	1	1	1	1
Governance		**6**	2	3	3	1
MSCI	AAA	**A**	A	A	BBB	BBB
RMI (Responsible Mining Index)	6	[3]	–	–	–	–
Economic development	6	[3]	1.43	–	1.20	–
Business conduct		[3]	3.08	–	2.69	–
Lifecycle management		[3]	2.01	–	1.13	–
Community wellbeing		[3]	1.49	–	0.83	–
Working conditions		[3]	2.26	–	2.13	–
Environmental responsibility		[3]	2.17	–	2.06	–
Sustainalytics	Risk rating – Low	**High**	High	Medium	High	–
Environment	100[1]	**–**	–	–	–	56
Social		**–**	–	–	–	60
Governance		**–**	–	–	–	98
Disclosure		**–**	–	–	–	97
Vigeo Eiris	100	**53**	53	54	Responded	–

Other initiatives	Maximum rating	2021	2020	2019	2018	2017
Corporate Human Rights Benchmark	100, 26 (2020)	**–**	23.5	76	76.3	63
Transition Pathway Initiative	Level 4	**Level 4**	Level 4	Level 4	Level 4	Level 4
Workforce Disclosure Initiative (WDI)	Responded	**Responded**	Responded	Responded	–	–

1. From 2018, ranking and metrics were changed from numerical to risk rating.
2. From 2019, the maximum scoring was against 6 compared to earlier which was 1.
3. 2021 rating pending at time of publication.

Risk management

Taking and managing risk responsibly is essential to operating and growing our business safely, effectively and sustainably.

Our risk appetite

Our commitment to position our business for the transition to a low-carbon economy is reflected in our strategic priorities, with high-risk appetite for growth and innovation.

Accelerate the decarbonisation of our assets

We support the global effort to address climate change and we are committed to taking action. We are accelerating the decarbonisation of our assets and will seek to meet our Scope 1 and 2 targets, reaching a 15% reduction by 2025 and a 50% reduction by 2030 (over 2018 levels).

We intend to invest an estimated $7.5 billion in capital expenditure between 2022 and 2030 (inclusive) in green energy and carbon abatement projects.

We will apply an internal price of $75 per tonne of CO_2 to incentivise energy efficiencies and carbon abatement projects – prioritised in our planning process.

Develop products and technologies to support our customers' decarbonisation

Our products enable the energy transition, giving us comfort in the level of transition risk facing our business. Some of our value chains, in particular steel and aluminium, are energy intensive and need to decarbonise. To thrive in the long term we need to be part of net zero value chains.

We are partnering with our customers, competitors, suppliers and technology developers as well as governments and universities, to find solutions.

We are increasing our investments in research and development, developing new products and breakthrough technologies that will enable our customers to decarbonise in line with our Scope 3 emission goals.

Grow in materials that enable the energy transition

We are focused on excelling in development in commodities that are essential for the drive to net zero.

We have increased our appetite for higher-risk jurisdictions and broadened our target commodities.

Our ambition is to increase our investment in growth capital expenditure up to $3 billion per year and will maintain capital discipline in pursuit of value-accretive opportunities.

Our 2021 Climate Change Report provides further details on our analysis of transition risks to our portfolio and the decarbonisation roadmaps to meet our Scope 1 and 2 targets, as well as our approach to and goals for Scope 3 emissions.

Our determination to be the best operator and have impeccable environmental, social and governance (ESG) credentials is underpinned by our zero tolerance for non-compliance with our operational procedures, laws and our obligations. These expectations are outlined in our Group policies, standards and procedures, published on our website at riotinto.com/policies.

Details of our management of principal risks to our performance, future prospects and reputation can be found in the principal risks and uncertainties section of this report.

Managing our risks effectively ensures we deliver our strategic priorities and strengthens our social licence.

Our approach to risk management

Our Group's strategy, values and risk appetite inform and shape our risk management and internal controls framework. We embed risk management at every level of the organisation to effectively manage threats and opportunities to our business and host communities, and our impact on the environment. The Board and the Executive Committee provide oversight of our principal risks, and the Audit Committee monitors the overall effectiveness of our risk management processes and internal controls. All employees are required and empowered to identify and manage the risks that arise within their area of responsibility.

Our management system consists of six core elements (see page 114) that we continuously monitor and improve to ensure that we are effectively managing current risks and identifying emerging risks.

The risk management framework sets out clear roles and responsibilities, standards and practices. The overall effectiveness of the risk management framework requires clear expectations and consistency in the application of internal controls across the Group. To enable this, we have begun the journey to digitalise our control requirements in line with our standards and procedures, within our enterprise risk management platform.

The tragic events at Juukan Gorge in May 2020, highlighted the importance of having a strong risk culture as well as robust risk management practices and systems, to ensure a resilient organisation. To achieve this, we have enhanced our internal training and guidance materials for leaders and risk owners on risk management responsibilities and practices, including the disclosure and escalation of risk information to ensure management response is at the right level of the organisation.

We will continue to invest in ways to support and coach our leaders and teams in risk management, ensuring alignment with our risk appetite and code of conduct.

Our three lines of defence provide assurance that risks are effectively managed in line with our policies, standards and procedures. You can view our risk management policy and standard at riotinto.com/policies.

Three lines of defence	Responsibilities	Accountability
1st – All operational leaders	Identification, management, verification, and monitoring of risks and controls	Management
2nd – Centre of Excellence, Areas of Expertise and Group functions	Oversight of risks and control effectiveness, design of Group controls, advice on capabilities and objective assurance of compliance with the Group's policies, standards and procedures	Management
3rd – Group Internal Audit	Independent objective assurance to evaluate the effectiveness of risk management, internal controls and governance	Board and Board committees

Risk management framework

Group roles and responsibilities, standards, procedures and guiding principles for effective, consistent and integrated risk management.

Capability and culture

Risk capability is built through coaching and training for leaders and teams across our business.

A risk culture of actively managing risks is embedded into how we run our business.

A risk culture fosters the collective ability to identify, understand, escalate and then openly discuss and respond to current and future risks.

Reporting and insights

Oversight is supported by proactive and regular reporting to relevant Executive and Board committees.

Decision making is supported by connected and insightful risk and control analysis.

Risk management effectiveness

Risk assurance

We ensure that risks and critical controls are being implemented and managed effectively.

Systems, technology and data analytics

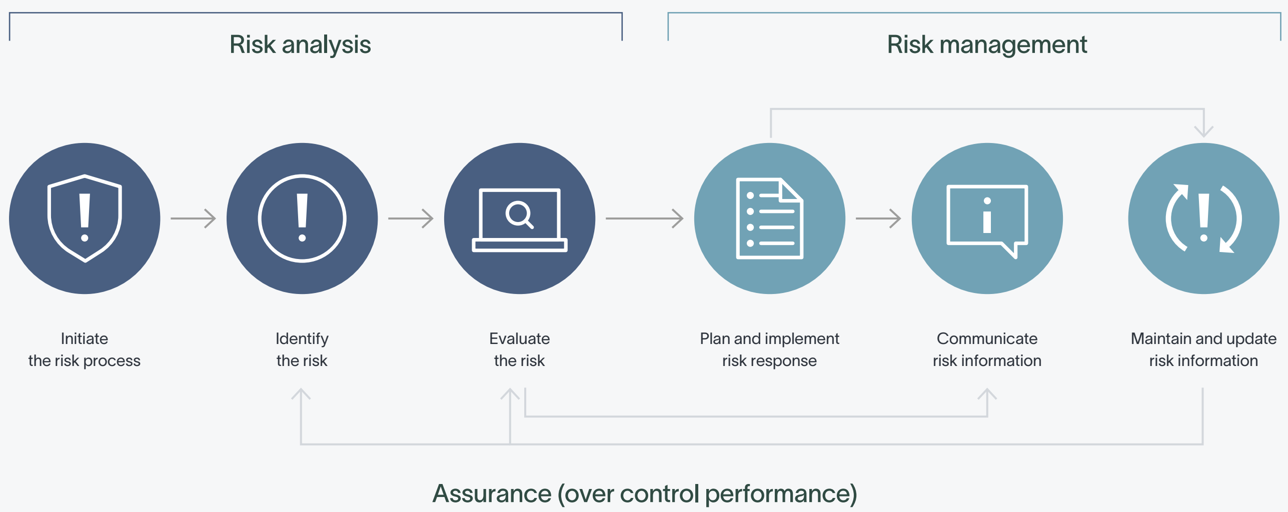
We leverage systems and data analytics to support risk and control analysis, management and oversight.

Risk analysis and management

Risks are measured, monitored and managed, which requires critical controls performance to also be measured, monitored and managed.

Risks and their control information are current, transparent and connected.

The analysis and management are led by leaders.



Emerging risks

COVID-19 continued to be prevalent in regions where we have assets and offices, including Mongolia, India, the Americas and South Africa. As the pandemic is now becoming more endemic with varying pathways to recovery across countries, the longer-term impact of how we adapt to this new normal is still uncertain. This includes the productivity of a hybrid workforce environment, the impacts of tighter labour markets, and supply chain disruptions.

The recent disruptions caused by the post-pandemic demand surge and the inability of supply chains to keep up, have highlighted the complexity and vulnerability of the global supply chain infrastructure. Supply chain disruptions can also be caused by a number of principal risk events – as described in our principal risks and uncertainties section – such as natural disasters and geopolitical tensions. Inflationary pressures may also affect the competitiveness of suppliers, leading to supplier market contraction further impacting supply chain resilience. Severe supply chain disruptions have the potential to impact not only inbound and outbound flows of our feedstock, services and products, but also the delivery of our sustaining and growth projects.

In the longer term, as the world transitions to a low-carbon future and consumer demand for sustainable goods flows through the value chain, the supply-demand dynamics of commodities are expected to shift. This will lead to increasing demand for sources and solutions with low CO_2 emissions, and a lower social and environmental footprint, in addition to a growing demand for transparent, sustainable and circular value chains. While the commodities within our portfolio are needed in a decarbonising world, this shift will shape the future of the mining industry, impacting supply cost structures, and demand for global commodities, and increasing the focus on the non-financial performance measures.

Our future reserves are increasingly overlapping with sensitive social and ecological regions, requiring new extraction and technology advancements to minimise our impact when exploring, mining and processing. Technology advancement will not only be a key enabler for us to reach our net-zero emissions ambition, but it will also play a key role in how we achieve impeccable ESG credentials.

Our 2021 Climate Change Report explains in detail our current and future initiatives and partnerships, and how they will help us meet our Scope 1 and 2 targets.

Longer-term viability statement

Business planning process

Our long-term planning reflects our business model of running our business in a way that is safer, smarter and more sustainable. To ensure we remain resilient in the long term, our business model is continuously stress tested against the key uncertainties within the emerging risks areas with recommended actions to mitigate the potential downside. These are presented to the Board annually as part of the Group strategy discussions. We then develop our strategy and make capital investment decisions based on this assessment. We also regularly assess our financial capacity to ensure our capital commitments can be funded in line with our disciplined approach to capital allocation.

Our business planning processes include preparing a one-year detailed financial plan and a longer-term life-of-asset outlook. This planning process includes modelling a series of macroeconomic scenarios and using a range of assumptions that consider both internal and external factors. As part of our robust risk management framework, we closely track, monitor and mitigate principal risks to our business plan and model.

The main assumptions underpinning our long-term plan include:

- long-term economic growth and commodity demand in major markets, such as China;
- continued access to, and economic viability of, resources and reserves to support organic and inorganic growth programmes;
- pathways to reduce our carbon footprint;
- sensitivities to potentially disruptive technologies and productivity improvements;
- no operational risks materially impacting the long-term plan; and
- continued access to capital markets.

Viability assessment process and key assumptions

The assumptions underlying our business plan and macroeconomic forecast have the greatest level of certainty for the first three years. However, like last year, our longer-term viability assessment examines the first five years (2022-2026) of the business plan. This enables a detailed analysis of the potential impact of risks materialising in quick succession in the first three years, and to further stress test the business plan for risk materialising towards the end of the time period, although with less certainty. This allows Directors to assess Rio Tinto's capacity to exercise financial and other levers available in both the three-year and five-year timeframes to maintain the Group's viability.

Our principal risks and uncertainties, as outlined in the following section, are risks that could materially affect our performance, future prospects or reputation. For the viability assessment, we have considered principal risks that could have a severe impact on the Group's liquidity and solvency in addition to non-financial consequences.

Assessment of viability

The principal risks and assumptions considered in our longer-term viability assessment are as follows:

- **Commodity economic risk (economic-focused risk):**

  A global financial crisis is triggered as the COVID-19 pandemic persists and global tensions intensify, resulting in positive but low growth in China and an economic downturn in the rest of the world. Large negative pricing shocks are assumed in 2022, sustained through 2023 and followed by slow growth rates.

  There continues to be great uncertainty on the recovery pathway from the COVID-19 pandemic as the situation evolves with new variants and varying actions by governments. To mitigate some of this uncertainty, and to give a greater level of confidence to the Directors in assessing our long-term viability, we have assumed a cautious recovery pathway in our scenario.

- **Major hazards risks (operationally focused risk):**

  Occurrence of a singular catastrophic event resulting from a major operational failure, such as a tailings and water storage facility failure, an extreme weather event, or an underground or geotechnical event resulting in multiple fatalities and/or the cessation of operations incurring significant financial impacts. We have assumed that two such events occur within the assessment period ie in 2022 and 2025.

- **ESG-focused risk:**

  Materialisation of an ESG-focused risk, impacting how we operate and our ability to access current and future resources. This could include a severe deterioration in our relationship with Indigenous peoples or communities where we operate, new prohibitive laws or regulations, or water scarcity. We have assumed an impact on our current development pipeline and considered available alternatives. The financial impact assumed here is in addition to any non-financial impact, such as reputational damage to the Group or the disruption to the culture and way of life of the communities where we operate.

We quantify the expected financial impact of each risk based on internal macroeconomic and business analysis, as well as internal and external benchmarking on similar risks. We apply a probabilistic approach to quantify risks and impacts where relevant.

The first five years of the Group's business plan were stress tested for each risk to assess the impact on the Group's longer-term viability, including whether additional financing facilities would be required. In addition to liquidity and solvency, the assessment also considered other financial performance metrics as well as dividend payments. These metrics are subject to robust stress tests and reverse stress tests.

The most severe scenario considers the financial impact of all three risks materialising at the start of the assessment period, followed by a second operational risk occurring towards the end of the five-year time period. Without management action, this scenario would create both an immediate and prolonged severe impact, resulting in the Group's free cash flow performance over the assessment period being an estimated negative $20 billion in aggregate.

The Group has a suite of management actions available to preserve resilience through the period of assessment, including accessing lines of credit, reducing organic and inorganic growth capital expenditure, and raising capital. Our financial flexibility could potentially be limited during the peak of the crisis, but the longer-term viability of the Group under all the scenarios tested remains sound.

We have also conducted reverse stress testing by assessing the impact of reducing price levels, on a synchronised basis, and concluded that the Group remains viable in a very low probability event of prolonged price declines across all commodities.

The resilience of the Group's business model is largely underpinned by four factors:

- The competitive position and diversification of our commodities portfolio.
- The disciplined capital allocation framework and commitment to prudent financial policy.
- The payout shareholder return policy based on earnings, and accordingly more sustainable.
- The objective to achieve impeccable ESG performance and, therefore, strengthening our social licence and allowing for growth and maintaining access to debt capital and bank loan markets.

Taking into account the Group's current position and the robust assessment of our principal risks, the Directors have assessed the prospects of the Group over the next five years (until 31 December 2026) and have a reasonable expectation that we will be able to continue to operate and meet our liabilities as they fall due over that period.

The following principal risks, which have longer-dated consequences or continue to evolve, could potentially have a material impact on our business beyond the viability assessment period. Please refer to the Emerging risks and Principal risks and uncertainties sections for further details and current management responses.

- **Developing products and technologies that enable our customers to decarbonise**

  As the global effort to tackle climate change continues, consumer demand for sustainable goods is expected to flow through the value chain. If our customers do not reduce Scope 3 emissions, demand for our products may decline as lower-carbon alternatives are developed and adopted.

- **Our ability to replenish or convert resources to reserves in a timely manner**

  As market dynamics, regulations, cultural and environmental assessments, and societal expectations change, key assumptions underlying our ore resources and reserves and project development plans could change with material impact to the Group (positive or negative). This is addressed in our principal risks "Growing in materials essential for energy transition" and "Resources to reserves conversion of our existing assets".

- **Closure, reclamation, rehabilitation and legacies**

  Plans and provisions for closure, reclamation and rehabilitation at our operational and legacy sites could be impacted by changes in stakeholders' expectations, legislation, standards, technical understanding and techniques.

Principal risks and uncertainties

The principal risks and uncertainties outlined in this section reflect the risks that could materially affect (negatively or positively) our performance, future prospects or reputation.

A principal risk is one or a combination of risks that emerge due to external and internal factors, it could be of any nature and manifest and escalate from any part of the business, as an opportunity or a threat. Where risks are material to the Group, they are escalated to the Executive Risk Management Committee and, as appropriate, to the Board or its committees. This requires a strong risk culture, which we continue to develop and foster.

We regularly assess the potential impact and likelihood of our principal risks to support the prioritisation of our efforts and resources. The assessment of these principal risks, and the effectiveness of our associated controls, reflect management's current expectations, forecasts and assumptions, and by definition, involve subjective judgments and are subject to changes in our internal and external environments. While we deploy preventative and mitigative controls to reduce the likelihood, and to manage potential impacts, the following describes the inherent risks to our business. Certain threats remain, such as natural disasters, where there is limited capacity in the international insurance markets to transfer such risks. We closely monitor these threats and develop business resilience plans. We also seek to bring a commensurate level of rigour and discipline to our managed and non-managed joint ventures as we do to our wholly owned assets, through engagement and influence, in line with applicable laws.

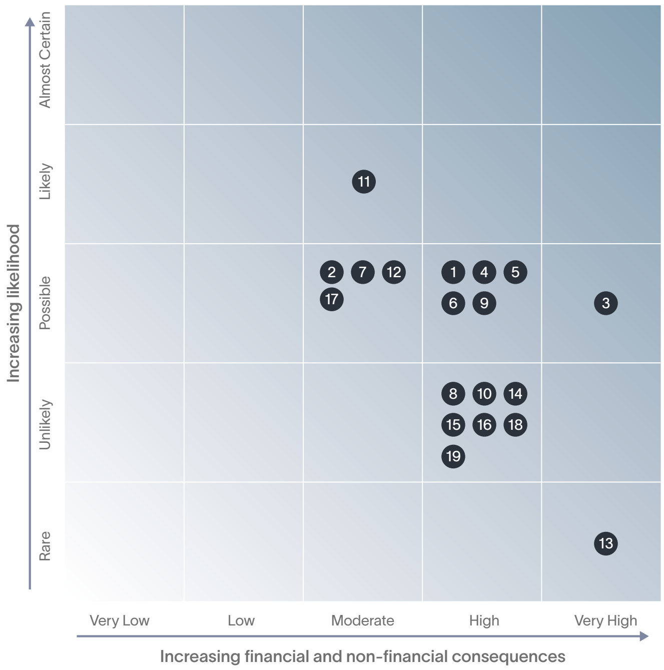
Our principal risks, in the table below, note the interconnectivity of our Strategic[1], Economic[2] and Operational[3] risks within an Environmental[4], Social[5] and Governance[6] (ESG) framework.

The timeframe of principal risks is within five years, unless explicitly stated otherwise. The principal risks, uncertainties and trends outlined in this report should be considered as forward-looking statements and are subject to the cautionary statement on page 420.

Current assessment of principal risks

As of February 2022

	Principal risk	Focus
1	Living our corporate values	Strategic, ESG
2	Attracting, developing and retaining talent	Strategic, ESG
3	Decarbonising our business competitively	Strategic, ESG
4	Developing products and technologies that enable our customers to decarbonise	Strategic, ESG
5	Growing in materials essential for energy transition through excelling in development	Strategic, ESG
6	Building trusted relationships with Indigenous peoples	Strategic, ESG
7	Building trusted relationships with communities	Strategic, ESG
8	Maintaining our competitiveness through economic cycles	Economic
9	Resources to reserves conversion of our existing assets	Economic
10	Geopolitics impact on our trade or investments	Economic
11	Global and domestic tax policy and administration instability	Economic, ESG
12	Breach of our policies, standards and procedures, obligations or regulations	Operational, ESG
13	Major hazard or safety event	Operational, ESG
14	Physical resilience to natural disasters and extreme weather	Operational, ESG
15	Significant biodiversity-related ecological impact	Operational, ESG
16	Water scarcity and management	Operational, ESG
17	Closure, reclamation, rehabilitation and legacies	Operational, ESG
18	Cyber breach	Operational, ESG
19	Pandemic prolonged	Operational, ESG



1. **Strategic** – risks arising from uncertainties that may impact our ability to achieve our strategic objectives.
2. **Economic** – risks that directly impact financial performance and realisation of future economic benefits.
3. **Operational** – risks arising from our business that have the potential to impact people, environment, community and operational performance, including our supply chain. Health, Safety, Environment and Security (HSES) risks are specific operational risks.
4. **Environment** – risks arising from our business that have the potential to impact air, land, water, ecosystems and human health.
5. **Social** – risks arising from our business that have the potential to impact society, including health and safety.
6. **Governance** – risks arising from our workplace culture, business conduct and governance.

1. Living our corporate values

Living our values (care, courage and curiosity) goes to the heart of our Group's performance, prospects and reputation. Sharing and demonstrating our values unlocks opportunities in all that we do, every day. We are focused on building a culture where all our people are trusted and empowered to be their best selves and help drive change. This begins with a workplace where everyone feels safe, respected and included.

Strategic | ESG

Potential impact

- Group reputation
- Licence to operate
- Future financial and operational performance
- Attraction, engagement and retention of our people

Opportunities

Our reputation and ability to build respectful and trusting partnerships depend on our business conduct being consistent with our values.

Threats

Greater transparency is expected of organisations on how they are preventing and addressing behaviours not consistent with their values.

Management's response:

We are embarking on a cultural change programme led by the launch of our new values in 2021. Our code of conduct, *The Way We Work*, clearly sets the standard of behaviour for our people, and provides guidance on how we should conduct our business, no matter where we work or where we are from.

Management's response includes:

- Launching our new values, and a programme to support how they are embedded
- Launching the Everyday Respect task force, to better understand and address bullying, sexual harassment and racism and other forms of discrimination in our workplace
- Reinvigorating our internal whistleblowing programme (myVoice) managed by a dedicated Business Conduct Office, open to our workforce and external stakeholders to report on conduct inconsistent with our values and code of conduct
- Offering behavioural training for leaders and employees, to reinforce positive behaviours
- Offering business integrity training tailored to role responsibilities and risk exposures
- Conducting bi-annual People Survey and presenting an annual values scorecard to the Executive Committee and the Board

2. Attracting, developing and retaining people with the requisite skills

Our ability to achieve our business strategy depends on attracting, developing and retaining a wide range of internal and external skilled and experienced people.

Strategic | ESG

Potential impact

- Access to skilled labour
- Future financial and operational performance
- Communities and social performance
- Group reputation

Opportunities

Enhancing productivity, innovation and business resilience through investment in critical skills required now and for the future.

Threats

Business interruption or underperformance may arise from a lack of access to capability. Tight labour markets are leading to heightened competition for diverse talent and critical skills, such as digital, climate and energy.

Changing societal expectations are placing pressure on our corporate and employer brand – who we are and what we stand for.

Management's response includes:

- Implementing Group-wide initiatives to positively shape our workplace culture and employee experience, focused on creating a safe, respectful and inclusive workplace. Examples include the Rio Tinto Safe Production System and the Everyday Respect task force
- Ensuring talent management and planning across our global assets and for critical technical capabilities
- Talent acquisition strategy which targets multiple labour markets, and a diverse range of skills
- Maintaining competitive remuneration and benefits
- Providing learning and career development opportunities for our people to build skills for today and our future
- Hosting a global graduate programme and taking part in strategic partnerships with universities
- Offering local trainee (apprenticeship) programmes and other future-skills development partnerships

3. Decarbonising our business competitively

Ensuring our ability to deliver longer-term strategic objectives and our Scope 1 and 2 targets within the required timeframe, while balancing the need to invest for growth, deliver superior shareholder returns and remain competitive.

Strategic | ESG

Potential impact

- Business model and value
- Future financial and operational performance
- Group reputation
- Partner to operate
- Litigation
- Social and human rights impacts

Opportunities

Decarbonising our assets has the potential to enhance our competitive advantage as well as embed a culture of energy efficiency. It also allows us to explore economic opportunities that will benefit our host communities.

Threats

Any delay in priority initiatives threatens our Scope 1 and 2 target delivery and ability to respond proactively and competitively. The pace of electricity grid decarbonisation plays an important part in our plans for our aluminium smelters in Australia and is a key uncertainty. Successful research and development investment is a critical enabler.

Failure to follow our social and human rights standards during implementation of the decarbonisation project could adversely impact people, relationships and our capacity to meet our targets.

Management's response includes:

- We intend to invest an estimated $7.5 billion to the delivery of our targets, for example through the development of 1GW of solar and wind power in the Pilbara. We are also looking at green-energy solutions for our Boyne and Tomago smelters, and accelerating current abatement projects by introducing an internal carbon pricing of $75/t CO_2
- Investing in new technologies and research and development, such as ELYSIS™, hydrogen pilots and cross-sector partnerships to develop zero-carbon trucks with Caterpillar and Komatsu
- Integrating our commitment to implementing core business and human rights standards, including the UN Guiding Principles on Business and Human Rights (UNGPs), into our decarbonisation plans and actions

4. Developing products and technologies that enable our customers to decarbonise

Our opportunity to decarbonise our value chain (Scope 3) by partnering with suppliers and innovating with our customers.

Strategic | ESG

Potential impact

- Business model and value
- Future financial and operational performance
- Group reputation

Opportunities

Collaborating on the development of new technologies with our customers, universities and research institutes to reduce emissions from the processing of our products.

Technologies being developed to decarbonise our business may assist in reducing the emissions of our customers and consequently our Scope 3 emissions, capturing the increasing demand for responsibly produced products and taking advantage of low-carbon offerings.

Threats

If our customers do not reduce Scope 3 emissions, demand for our products may decline as alternate lower-carbon alternatives are developed and adopted.

Exposure: Iron ore sales contributed approximately 60% of revenue in 2020 and our customers' processing of that iron ore contributed 73% of our overall Scope 3 emissions of 519Mt CO_2e. Processing of bauxite and alumina contributed 22% of Scope 3 emissions.

Management's response includes:

- Establishing a dedicated steel decarbonisation team to support the transition of the steel value chain towards net zero, collaborating with steel mills, research institutes and technology providers, focused on both blast furnace optimisation and green steel pathways. We continue to assess the feasibility of green hot briquetted iron (HBI) production with hydrogen from hydro-electricity in Canada
- Seeking to bring additional tonnes of high-grade iron ore to market from IOC and Simandou which can meet direct reduction specifications
- Partnering with our suppliers and developing sustainable supply chains with an aim to only purchase zero-emission haul trucks and locomotives and introduce net-zero emissions vessels by 2030
- Working with our customers on all ESG metrics by offering responsibly produced products, such as low-carbon aluminium RenewAl, and transparency and traceability of our aluminium products via START and the Copper Mark out of our Kennecott operations

5. Growing in materials essential for energy transition through excelling in development

Strategic | ESG

Our ability to deliver our growth strategy lies in the success of our exploration and/or acquisition activities, and our ability to develop these resources faster and more competitively than others. Developing these projects organically or inorganically requires complex multi-year study and execution plans and carries significant delivery risk.

Potential impact

- Valuation
- Future financial and operational performance
- Group reputation
- Ability to attract and retain key talent

Opportunities

Exploration and M&A have the potential to increase resources in commodities currently within our portfolio or diversify into new commodities. Our ESG credentials may provide a competitive advantage in accessing deposits. Through operational efficiencies, deployment of new technologies or improved understanding of our orebodies, we may convert a greater proportion of resources to reserves available more competitively.

Threats

Our Scope 1 and 2 targets may limit the target pool for M&A activity. New high-quality deposits are increasingly scarce and may require advances in processing technology and/or significant capital investment in infrastructure.

As studies and projects progress, they are susceptible to changes in technical requirements, approvals, societal expectations or changes in underlying commercial or economic assumptions. Current material threats include the delivery of our large underground projects, ie Oyu Tolgoi underground expansion, Resolution and Jadar. In the short term, project delivery remains susceptible to COVID-related supply chain disruptions and travel restrictions.

Management’s response includes:

- Increasing our appetite for growth capital expenditure
- Implementing our objective to excel in development to deliver inorganic and organic growth through alignment across the Group, leveraging our in-house capabilities and focusing on capital intensity
- Broadening our scope of jurisdictions and targets, ie include higher-risk jurisdictions and consider minimum viable projects that can grow and create optionality
- Ensuring a disciplined approach to all material acquisitions, including a detailed, objective due diligence and a stage-gate approval process
- Conducting post-investment reviews on divestments and acquisitions to identify key learnings and embed them in future initiatives
- Ensuring robust ESG and human rights due diligence during M&A and new country entry

6. Building trusted relationships with Indigenous peoples

Our partnerships with Indigenous peoples play a material role in delivering on our operational and strategic goals, and a loss of trust may impact current and future partnerships and our ability to operate. Our partnership approach is with a view to the long-term development of trusted relationships with Indigenous peoples.

Strategic | ESG

Potential impact

- Future financial and operational performance
- Withdrawal of social licence to operate restricting access to orebodies
- Valuation
- Group reputation

Opportunities

Partnerships offer opportunities to create mutual benefits and shared value for all parties involved by leveraging the differing strengths of the participants.

This may be realised through increased Indigenous participation in employment and procurement opportunities, access to resources, increased shareholder returns, or reduced political, portfolio and operational risks.

Threats

Mining activities may strain relationships with Indigenous peoples, particularly where actual or perceived damage (cumulative and/or acute) of significant cultural value occurs without consent. This may result in loss of trust between Indigenous peoples and our company, impacting our ESG credentials or ability to excel in development.

Exposure: Resolution, modernisation of agreements in the Pilbara, British Columbia

Management's response includes:

- Implementing an integrated cultural heritage management system and ensuring Community and Social Performance (CSP) metrics are embedded in approvals and decision-making processes at all levels of the organisation
- Strengthening consultation and engagement processes to demonstrate progress towards, or achievement of Free, Prior and Informed Consent of affected Indigenous and land-connected communities across all stages of the asset lifecycle, in accordance with the ICMM Indigenous Peoples and Mining Position Statement
- Modernising our agreements with Traditional Owners in the Pilbara, which includes modifying clauses to ensure respect, transparency and mutual benefit
- Setting clear guidance on how we should conduct our business, no matter where we work or where we are from, through our code of conduct, CSP standard and Human Rights policy
- Building cultural responsiveness and competence (including for cultural heritage) across our leadership teams and workforce

7. Building trusted relationships with communities

Rio Tinto may not be viewed as a trusted partner by communities and broader society, impacting our performance, future prospects and reputation.

Strategic | ESG

Potential impact

- Group reputation
- Future financial and operational performance
- Growth projects
- Communities and social performance
- Safety and security of employees and communities

Opportunities

Strong relationships with the communities in which we operate provide stable operating environments. Positive engagement with communities, governments and other stakeholders can support access to new resources, create stable and predictable investment and operating environments, and help shape mutually beneficial economic social and environmental outcomes.

Threats

Access to land and resources may be impacted if we are not considered a trusted partner that respects people's rights, manages adverse social and environmental impacts and sustainably improves the social and economic outcomes in existing or potential host communities. Other potential actions can include operational disruption, security incidents, expropriation, export or foreign investment restrictions, increased government regulation and delays in approvals, which may threaten the investment proposition, title, or carrying value of assets.

Exposure: RBM, CBG, Resolution, QMM, Jadar and Simandou.

Management's response includes:

- Setting out clear accountability of asset leaders for relationship management with host communities
- Uplifting capability in our leadership and teams across our organisation supported by our CSP Area of Expertise to coach in and elevate CSP expectations
- Implementing an integrated cultural heritage management system and ensuring CSP metrics are embedded in approvals and decision-making processes at all levels of the organisation
- Establishing appropriate social performance targets and reporting
- Delivering sustainable, long-term outcomes through strategic community investment, regional economic development and mutually beneficial partnerships
- Setting local procurement policies and targets, including local content commitments for major capital projects
- Deploying specialist technical resources where required to support business units to manage more complex issues and risks
- Ensuring respect for communities' human rights, aligning our commitments with international standards

8. Maintaining our competitiveness through economic cycles

The viability of our business is most sensitive to commodity economics. Our cost-competitive, diversified commodities portfolio, strong balance sheet, prudent financial policies and our decarbonisation efforts/targets help preserve the Group's resilience, including maintaining access to debt capital and bank loan markets.

Economic

Potential impact

- Future financial performance
- Liquidity
- Group reputation
- Credit risk/rating
- Financial flexibility

Opportunities

Favourable market conditions and strong internal capital discipline increase our liquidity and/or balance sheet strengths, allowing us to pursue investment or growth opportunities, pay down debt and/or enhance returns to shareholders. China continues to be the largest market for our products.

Threats

Falling commodity prices reduce cash flow, limiting profitability and shareholder returns. These may trigger impairments and/or impact our credit rating. Extended subdued prices impact cash flow streams and our ability to raise sufficient funds for investment and/or growth opportunities. Unfavourable changes in the cost of production can arise, such as increased labour or freight cost.

Management's response includes:

- Implementing the Rio Tinto Safe Production System (RTSPS) across the Group to find a sustainable way of working that is safer, more productive and cleaner, combined with specific improvement initiatives focused on debottlenecking, both of which aim to maintain or enhance our competitiveness
- Further diversifying our global commodity portfolio to include "greener" alternatives and alloys and critical minerals
- Maintaining a global portfolio of customers and contracts
- Working with partners to make our current portfolio more resilient to carbon pricing
- Ensuring capital discipline commensurate with a strong investment-grade credit rating including investment governance processes and a payout shareholder returns policy that adjusts returns through the cycle
- Maintaining a Revolving Credit Facility and a diversified source of funding in different capital markets and shelf programmes

9. Resources to reserves conversion of our existing assets

Our estimates of mineral resources and ore reserves are based on an assessment of geological, social, environmental, economic, commercial and technical information available at the time of reporting. As new information becomes known, the economic viability of some ore reserves, production plans, the timing of approvals and developments can be restated with material impacts (positive or negative).

Economic

Potential impact

- Future financial performance
- Valuation

Opportunities

Through the deployment of new technologies or improved understanding of our orebodies and effective management of permitting and approval processes, we may convert a greater proportion of our resources to reserves.

Threats

Failure to secure mining approvals or capture the benefits of new technologies, geotechnical variation or changes in product demand/specifications may reduce the economies of reserves or future conversion of resources to reserves in the required timeframe.

Exposure: Pilbara, Resolution.

Management's response includes:

- Increasing investment in resource development programmes to improve orebody knowledge
- Complying with the Group's Resources and Reserves Standard, and monitoring KPIs to track variation from expected asset production plans with assurance from the Orebody Knowledge Centre of Excellence
- Establishing the Iron Ore Mine Replenishment Programme (MRP)
- Progressing required regulatory and environmental approvals for future mining areas, including cultural heritage impact risk assessments

10. Geopolitics impact on our trade or investments

Geopolitical tensions have the potential to impact our key markets, operations and investments.

Economic

Potential impact

- Future financial and operational performance
- Communities and social performance
- Group reputation

Opportunities

Partnering with governments to realise their resource sustainability and security ambitions through our portfolio of products.

Leveraging new strategic alliances between countries as a result of global geopolitical alignment.

Threats

Increased trade tensions may undermine rule-based trading systems and lead to trade actions (increased tariffs, retaliations, and sanctions) potentially impacting our key markets, operations or investments. Current material threats include the potential development of further sanctions between Australia and China and the evolving situation of the coup in Guinea and, more broadly, the tensions between the US and China.

Management's response includes:

- Continually testing the resilience and optionality from our increasingly diverse portfolio of commodities, markets and jurisdictions
- Monitoring on an ongoing basis of the political environments where we operate as well as our key markets and close engagement with governments and customers in those areas
- Establishing the Group External Affairs function providing subject matter expertise, global insight and intelligence to inform and guide our business strategy and decision making
- Implementing the new Sanctions Standard and Export Control Procedure

11. Global and domestic tax policy and administration instability

Instability in tax policy and administration may result in significant impact to business value and/or reputation. COVID-19 recovery, resource nationalism and the recent G20 and Inclusive Framework consensus on the OECD digital global tax framework, are creating a time of unprecedented change in global and domestic tax policies.

Economic

Potential impact

- Future financial performance
- Valuations
- Stakeholder relations
- Licence to operate

Opportunities

While additional tax cost is expected as a consequence of these developments, there is an opportunity to work with local governments on domestic policy proposals to strike a balance which raises additional revenue while also supporting growth and investment.

Where additional tax is expected under the OECD digital reforms there is potential to increase tax payments to host governments rather than HQ locations, to support local communities.

Threats

Political imperatives driving tax policy may result in aggressive proposals. Implementation of these proposals poses the threat of contagion across other jurisdictions. The OECD digital reforms may incentivise additional domestic proposals, raising the risk of double taxation and/or bi-lateral and multi-lateral disputes. The translation of the new global tax framework into domestic law poses significant uncertainty and potential for double taxation/disputes. Increasing pressure on stabilisation/investment agreements is expected.

Exposure: The potential financial consequences of these risks are significant given the political dynamic and the COVID-19 economic recovery effort. Domestic resource tax proposals in countries like Chile would have a material impact on business value and pose contagion threat across that region. The OECD digital proposals are expected to result in material additional taxation and will place additional strain on stabilisation arrangements.

Management’s response includes:

- Engaging constructively in local and international tax reform dialogue to contribute to the development of sustainable and effective tax systems, including becoming a trusted adviser to the OECD to support the development of the new global tax framework
- Ensuring our tax policies and governance seek to keep pace with increasing community expectations, increasing tax authority and government expectations, and civil society initiatives promoting responsible tax and transparency
- Maintaining our commitment to the B Team Responsible Tax Principles, which are intended to provide a leadership standard driving best practice in tax governance, reporting and interactions with tax authorities. These principles are embedded in our Tax Policy
- Verifying our compliance to our Tax Policy through our Internal Audit which sets the following expectations:
  - Ensuring full compliance with statutory obligations accompanied by full disclosure
  - Ensuring high standards of tax risk management
  - Fostering constructive working relationships with tax administrators
  - Proactively managing taxes pursuant to a robust tax governance framework

12. Breach of our policies, standards and procedures, obligations or regulations

This risk can materialise through the illegal actions of just one employee through inappropriate conduct or through a lack of competency or governance, but can greatly impact our reputation and licence to operate. We need to foster a culture aligned with our values, provide regular education and guidance and proactive compliance monitoring to maintain the highest standards in the way we conduct our business.

Operational | ESG

Potential impact

- Group reputation
- Licence to operate
- Future financial and operational performance
- HSES & communities

Opportunities

Good corporate citizens are acknowledged to operate to a high ethical standard, thus attracting talent and securing access to resources and investment opportunities.

Threats

A serious breach in our operations or in our value chain of anti-trust rules, anti-corruption legislation or sanctions, human rights or inappropriate business conduct, could result in serious harm to people and significant reputational and financial damage.

Management's response includes:

- Integrating our commitments to core business and human rights standards, including the UN Guiding Principles on Business and Human Rights (UNGPs), into our business plans and actions
- Ensuring dedicated legal and compliance teams to assist our businesses in identifying, understanding and complying with current and emerging regulatory obligations
- Ensuring a centralised Litigation team and Centres of Excellence in the areas of Anti-Bribery and Corruption, Anti-Trust, and Export Controls & Sanctions
- Providing training and awareness on regulatory obligations for employees working in high-risk roles and third parties
- Ensuring compliance with our policies, standards and procedures, including the new third party due diligence procedure and human rights due diligence in the supply chain
- Implementing the Voluntary Principles on Security and Human Rights and a strong security management framework
- Maintaining management oversight and reporting through risk, assurance and compliance forums with operational and functional teams, supported by Ethics and Compliance Risk Management Review forums

13. Major hazard or safety event

Our operations and projects are inherently hazardous, with the potential to cause illness or injury, damage to the environment, and disruption to communities. Major hazards include process safety, underground mining, slope geotechnical and tailings management.

Operational | ESG

Potential impact

- Multiple fatalities
- Operations disruption
- Communities and social performance
- Group reputation
- Financial loss

Opportunities

Meeting and exceeding our commitments in safety and hazard management.

Threats

Failure to manage our major hazards or mass passenger transport, could result in a catastrophic event or other long-term damage.

Exposure: mass passenger transport; tailings facility; underground operations; open pit walls or dumps; processing facilities.

Management's response includes:

Nothing is more important than the safety and wellbeing of our employees, contractors and communities.

Management's response includes:

- Providing oversight by the Sustainability Committee and support by the Group's Risk Management Committee, with quarterly Major Hazard Steering Committee meetings at each product group
- Providing the second line assurance by our central support functions and technical CoE teams to verify compliance with Group policies, standards and procedures
- Implementing slope geotechnical, tailings management, underground mining and process safety technical and safety standards and procedures
- Focusing on fatality elimination through our critical risk management
- Conducting regular review and audit of HSES processes, training and controls to promote and improve effectiveness at managed and (where practicable) non-managed operations
- Reporting, investigating and sharing learnings from HSES incidents and ensuring monthly monitoring of HSES performance at the Group level including Group-wide PFI sharing
- Building safety targets into personal performance metrics to incentivise safe behaviour and effective risk management (see page 175 of the Remuneration report)
- Planning for business resilience and execution exercises for severe but plausible scenarios

14. Physical resilience to natural disaster or extreme weather

Our operating sites may be vulnerable to natural disasters or extreme weather events. Climate change may increase the frequency and severity of these events including rising sea levels, floods, droughts, bushfires or extreme temperature impacts on operating environments.

Operational | ESG

Potential impact

- Multiple fatalities
- Operations disruption
- Financial loss

Opportunities

By understanding specific exposures across our portfolio, our capital programmes can incorporate measures to improve resilience in the event of a natural disaster or extreme climatic event.

Threats

Natural disasters or extreme weather events can endanger our workforce and communities, damage our assets or cause significant operational interruption.

Exposure: An extension of the tropical cyclone season in the Pilbara would impact our Iron Ore operations and surrounding communities. A significant warming trend, particularly influencing maximum temperatures, may impact the way we operate, including the impacts on employee health and assets operating outside optimal conditions. Physical resilience of our supply chain also requires monitoring.

Management's response includes:

- Incorporating potential changes to climate into the way we design, operate and close our assets through increased understanding of our exposure at each asset, eg Critical Risk Assessment (CRA) Programme and Climate Change physical impact assessments
- Assessing medium and long-term risks by the Energy and Climate Change Centre of Excellence
- Developing business resilience plans and emergency response plans, training and annual exercises to prepare for a natural disaster event, including established communication plans and co-ordination with local, regional and state agencies
- Providing capital expenditure for resilience projects, such as those planned for Cape Lambert jetty and Dampier to Yurralyi Maya Power Station

15. Significant biodiversity-related ecological impact

Our operations and projects are inherently hazardous, requiring proactive management to minimise potential biodiversity loss or ecosystems degradation.

Operational | ESG

Potential impact

- Group reputation
- Environment
- Communities

Opportunities

Development of a carbon-credit business, in collaboration with governments and host communities, that generates carbon and biodiversity credits for the Group, while remediating disturbed lands, protecting existing pristine areas and supporting the development of associated socioeconomic opportunities independent of mining (thus addressing dependencies).

Threats

A number of our operations and future development opportunities exist within, or close to, sensitive biodiverse regions. Our licence to operate and develop requires us to demonstrate our capability to protect ecosystems through improved practices and technological solutions.

Exposure: QMM, Simandou, RBM, Weipa, non-managed operations.

Management's response includes:

- Fostering proactive relationships with international civil society organisations, governments and environment departments to support protective legislation
- Applying protective principles—instead of a compliance-driven approach—at all our operations
- Ensuring operations proactively manage their land and water stewardship risks to protect ecosystems that rely on these resources
- Identifying and acting on opportunities to contribute to nature conservation

16. Water scarcity and management

Across geographies and commodities, proactive water management is required in new asset developments, existing operations and closures. In some regions where we work, water scarcity is an inherent risk. Many other sites also experience variations in rainfall and water availability due to climate change.

Operational | ESG

Potential impact

- Financial
- Valuations
- Production and growth constraints
- Reputational impact
- Ecosystem impacts
- Stakeholder relationships

Opportunities

Improving the way we design and run our operations, to avoid permanent impacts to water resources and carefully manage the quality and quantity of the water we use and return to the environment.

Threats

Our water management may cause unacceptable operational, environmental, cultural heritage or community impacts.

Exposure: Gobi Desert, Pilbara, Northern Queensland.

Management's response includes:

- Balancing our operational water needs with those of local communities, Indigenous peoples and ecosystems by managing against four risk areas: water resource, quantity and quality, dewatering and long-term obligations
- This framework allows us to identify, assess, manage and communicate water risk, controls and actions both internally and to the communities where we operate
- Providing water management plans and controls and Annual Environmental Certification across all assets
- Actively supporting and reporting our practices against the commitments outlined in the International Council on Mining and Metals' position statement on water stewardship

17. Closure, reclamation, rehabilitation and legacies

Our closure, reclamation, rehabilitation and legacy plans, assumptions and expectations may change, impacting financial outcomes and reputation.

Operational | ESG

Potential impact

- Valuation
- Future financial and operational performance
- Group reputation
- Communities and social performance

Opportunities

We are actively assessing opportunities to find solutions to repurpose and reuse sites for future economic or social benefit through working collaboratively with our stakeholders. For all new asset developments, we incorporate closure into the design of our assets, and find ways to optimise decommissioning, remediation and any long-term management obligations. For existing operations, where possible, we aim to progressively rehabilitate land throughout the life of the operations.

Threats

Plans and provisions for closure, reclamation and rehabilitation may vary over time due to changes in stakeholders' expectations, legislation, standards, technical understanding and techniques. In addition, the expected timing of expenditure could change significantly due to changes in the business environment and orebody knowledge that might vary the life of an operation.

Exposure: Pilbara operations and near-term closure including Channar, NZAS, Argyle, Diavik and ERA.

Management's response includes:

- Complying with Group policies and standards, which provide guidance concerning risk management, communities and social performance. This is overseen by our Closure Steering Committee
- Maintaining a central closure capability to develop leading practices, influence operations, manage closure execution to realise efficiencies and synergies across assets, and proactively manage the legacy portfolio
- Collaborating with key stakeholders and participating in strategic partnerships and/or governance structures to create opportunities and mitigate threats

18. Cyber breach

Cyber risk, if materialised, may disrupt our operations, affect how our employees work and/or breach data privacy and other sensitive information related to customers, contractors and suppliers.

Operational | ESG

Potential impact

- Operational disruption and/or breach of operational integrity
- Breach of data privacy or commercially sensitive data
- Group reputation
- Financial loss

Opportunities

N/A

Threats

Cyber breaches can come from malicious external or internal attacks, but also inadvertently through human error. In addition, Rio Tinto data may reside on service provider systems and rely on the effectiveness of controls on those networks.

Management's response includes:

- Improving IS&T asset management with executive-level sponsorship and oversight from our Cyber Security Steering Committee
- Investing on an ongoing basis in IS&T infrastructure, technology solutions and upskilling to advance our automation projects, safeguard our assets and improve cyber threat detection and response for critical assets
- Ensuring business resilience plans for cyber breaches across all critical assets

19. Pandemic recovery prolonged

The potential for transmission across our teams, communities and supply chains continues to be a threat that requires proactive management. The pathways and speed of recovery remain variable across our markets, operations, communities and supply chains.

Operational | ESG

Potential impact

- Heath, safety and security
- Future financial and operational performance
- Group reputation

Opportunities

N/A

Threats

While COVID-19 continues to circulate, the chance of further variants developing remains. A new variant could lead to further health impacts to our workforce and disruption to our operations and/or supply chain. Global supply chain disruptions and reduced freight capacity could continue if further outbreaks occur, impacting the inbound and outbound flow of our feedstock and products, eg recent disruptions have increased the risks of stock shortages for alumina and aluminium at our North American operations. In Mongolia, the situation continues to be challenging, with high case rates in Ulaanbaatar.

Management’s response includes:

- Fostering proactive relationships with governments and health departments to support vaccination programmes and align responses to outbreaks. This includes travel management protocols to sites and offices to prevent transmission among vulnerable people and communities
- Ensuring supply chain resilience planning by our operations and procurement teams, eg securing alternative sources for critical goods and services

Five-year review

Selected financial data

The selected consolidated financial information below has been derived from the historical audited consolidated financial statements of the Rio Tinto Group. The selected consolidated financial data should be read in conjunction with, and qualified in their entirety by reference to, the 2021 financial statements and notes thereto. The financial statements as included on pages 212-311 have been prepared in accordance with IFRS as defined in note 1.

Rio Tinto Group

Income statement data

For the years ending 31 December Amounts in accordance with IFRS	2021 $m	2020 $m	2019 $m	2018 $m	2017 $m
Consolidated sales revenue	**63,495**	44,611	43,165	40,522	40,030
Group operating profit[1]	**29,817**	16,829	11,466	17,687	14,135
Profit for the year	**22,575**	10,400	6,972	13,925	8,851
Basic earnings for the year per share (US cents)	**1,303.4**	604.0	491.4	793.2	490.4
Diluted earnings for the year per share (US cents)	**1,295.0**	599.8	487.8	787.6	486.9
Dividends per share					
Dividends declared during the year					
US cents					
– interim	**376.0**	155.0	151.0	127.0	110.0
– interim special	**185.0**	–	61.0		
– final	**417.0**	309.0	231.0	180.0	180.0
– special	**62.0**	93.0		243.0	
UK pence					
– interim	**270.84**	119.74	123.32	96.82	83.13
– interim special	**133.26**	–	49.82		
– final	**306.72**	221.86	177.47	135.96	129.43
– special	**45.60**	66.77		183.55	
Australian cents					
– interim	**509.42**	216.47	219.08		
– interim special	**250.64**	–	88.50	170.84	137.7
– final	**577.04**	397.48	349.74	250.89	228.5
– special	**85.80**	119.63		338.70	
Dividends paid during the year (US cents)					
– ordinary	**685.0**	386.0	331.0	307.0	235
– special	**278.0**	–	304.0	–	–
Weighted average number of shares basic (millions)	**1,618.4**	1,617.4	1,630.1	1,719.3	1,786.7
Weighted average number of shares diluted (millions)	**1,628.9**	1,628.6	1,642.1	1,731.7	1,799.5
Share buy-back ($ million)	**–**	208	1,552	5,386	2,083
Balance sheet data					
Total assets	**102,896**	97,390	87,802	90,949	95,726
Share capital/premium	**8,097**	8,302	7,968	8,000	8,666
Total equity/Net assets	**56,590**	51,903	45,242	49,823	51,115
Equity attributable to owners of Rio Tinto	**51,432**	47,054	40,532	43,686	44,711

1. Group operating profit or loss includes the effects of charges and reversals resulting from impairments (other than impairments of equity accounted units) and profit and loss on disposals of interests in businesses. Group operating profit or loss amounts shown above excludes equity accounted operations, finance items, tax and discontinued operations.

Directors' approval statement

This Strategic report is delivered in accordance with a resolution of the Board, and has been signed on behalf of the Board by:

Simon Thompson
Chairman

23 February 2022

Directors' report

The future success of Rio Tinto will be secured through effective and responsive corporate governance. This section outlines how the Board and its committees have sought to fulfil this objective in 2021.

Directors' report

Chairman's introduction

Effective corporate governance is a continuous process of prioritisation and improvement, and we must adapt our processes and activities to be relevant to the evolving external and internal landscapes.

As expectations about the role of business in society evolve, we must adapt and continuously improve our corporate governance processes to ensure that they remain fit for purpose in a rapidly changing internal and external environment.

The matters on which the Board and its committees focused in 2021 evolved in line with developments in the external environment, the unprecedented senior management changes that took place at the start of the year, the approval of our new strategy and values, and the need to ensure that the lessons learned from the tragic events at Juukan Gorge in May 2020 are fully embedded in our management processes and culture.

Culture and values

As Rio Tinto resets its strategy and priorities under the new leadership team, culture and values will play a critical role in meeting the company's aspiration to become the best operator, to excel in development and to achieve impeccable ESG credentials, while strengthening our social licence to operate.

Among the many lessons from Juukan Gorge was the recognition that any risk management system will fail unless we create a work culture where everyone considers the impact of our individual and collective actions on other people and the environment, actively listens and questions how we can do things better, and feels empowered to speak up when something is wrong.

These lessons were reinforced by the findings and recommendations outlined in the Everyday Respect report, which we commissioned to better understand and improve our work culture. This year we introduced our new values of care, courage and curiosity. These values will guide how we work and how we treat each other, drive better decision-making, strengthen relationships and enable us to deliver superior performance by unlocking the knowledge and insights of the entire workforce.

Feedback from our employee engagement survey, conducted in late 2021, suggests that the new values resonate well with our workforce. But actions speak louder than words and it will take time and consistent commitment by leaders throughout the organisation to embed the changes we are seeking.

Workforce engagement

The Board has long recognised the importance of understanding the views of our workforce to ensure they are considered in Board discussions and decision making. In 2021, we took a further step to enhance this approach with the appointment of Simon McKeon as the designated Non-Executive Director for workforce engagement. In this role, Simon oversees the annual programme of engagements and regularly reports back to the Board on the insights gained, to ensure our people's voices are heard and acted upon in the boardroom.

Board changes and succession planning

We welcomed Ben Wyatt as a Non-Executive Director this year. Together with the three Non-Executive Director appointments in 2020, these new voices in the boardroom have challenged and tested our thinking in a very positive way and brought fresh and diverse perspectives to our discussions.

This continual refreshment of Board composition will receive further impetus in 2022 under Dominic Barton's leadership, with mining experience a key focus.

The other matters we discussed in 2021 are detailed on the following pages. This work has taken place within the context of continuing COVID-19 restrictions, largely preventing meetings in person and Board visits to operations. While there is no substitute for face-to-face meetings, I am grateful to my colleagues for the commitment and flexibility they have shown to enable our programme of work to be completed so effectively via virtual Board meetings.

S.R. Thompson

Simon Thompson
Chairman

23 February 2022

Board of Directors

Rio Tinto plc and Rio Tinto Limited have a common Board of Directors. The Directors are collectively responsible for the stewardship and long-term sustainable success of the Group.

Simon Thompson
Chairman

MA, PhD. Age 62. Appointed April 2014; Chairman from March 2018.

Skills and experience: Simon has significant global experience in mining and metals, finance, and corporate governance. Simon was an Executive Director of Anglo American plc, where he held a number of senior roles, including Chairman and Chief Executive of the Base Metals Division and Chairman of Tarmac. Earlier in his career, he held various investment banking positions at S. G. Warburg and N M Rothschild. Simon has chaired 3i Group plc, from 2015 to 2021, and Tullow Oil plc and has served as a Non-Executive Director on the boards of AngloGold Ashanti Limited and Newmont Mining Corporation. Simon is also a Commissioner at the Energy Transitions Commission.

Simon will step down from the Board at the 2022 annual general meetings.

Current external appointments: None.

Jakob Stausholm
Chief Executive

Ms Economics. Age 53. Appointed Chief Financial Officer September 2018; Chief Executive from January 2021.

Skills and experience: As Chief Executive, Jakob brings strategic and commercial expertise, and governance experience, and a strong focus on sustainability, particularly climate change, and a continued focus on capital allocation and delivering returns to shareholders. He is committed to rebuilding trust with communities, Traditional Owners and stakeholders globally, embedding improved operational performance and creating growth options for the Group.

Jakob has over 20 years' experience, primarily in senior finance roles, at Maersk Group and Royal Dutch Shell plc including in capital-intensive, long-cycle businesses, as well as in innovative technology and supply chain optimisation. He was also a Non-Executive Director of Woodside Petroleum and Statoil (now Equinor).

Current external appointments: None.

Dominic Barton BMM
Chair-designate

BA (Hons), M.Phil. Age 59. Appointment from April 2022; Chair from May 2022.

Skills and experience: Dominic spent over 30 years at McKinsey & Company, including nine years as the Global Managing Partner. Most recently, he served as Canada's Ambassador to China. Dominic brings a wealth of global business experience, as well as a deep insight of geopolitics, corporate sustainability and governance. Dominic was previously Chair of Teck Resources, from 2018 to 2019, and, in 2019, served as a Non-Executive Director at Singtel Group and Investor AB.

Current external appointments: Chancellor of the University of Waterloo.

Megan Clark AC
Independent
Non-Executive Director

BSc, PhD. Age 63. Appointed November 2014.

Skills and experience: Megan's experience in the mining and metals industry and in science, research and technology brings valuable insights on sustainable development and innovation to the Board. Previously, she was Head of the Australian Space Agency and Chief Executive of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Following mining and exploration roles with Western Mining Corporation, Megan was a Director at N M Rothschild and a Vice President Technology at BHP. Megan received the Australian Academy of Science Medal in 2019.

Current external appointments: Non-Executive Director of CSL Limited since 2016 and Chair of the Advisory Board of the Australian Space Agency.

Peter Cunningham
Chief Financial Officer

BA (Hons), Chartered Accountant (England and Wales). Age 55. Appointed Interim Chief Financial Officer January 2021; Chief Financial Officer from June 2021.

Skills and experience: As Chief Financial Officer, Peter brings extensive commercial expertise from working across the Group in various geographies. He is strongly focused on the decarbonisation of our assets, investing in the commodities essential for the energy transition and delivering attractive returns to shareholders while maintaining financial discipline.

After nearly three decades with Rio Tinto, Peter has held a number of senior leadership roles, including Group Controller, Chief Financial Officer – Organisational Resources, Global Head of Health, Safety, Environment & Communities, Head of Energy and Climate Strategy, and Head of Investor Relations.

Current external appointments: None.

Hinda Gharbi
Independent
Non-Executive Director

BSc, MSc. Age 51. Appointed March 2020.

Skills and experience: Hinda is Executive Vice President of Services & Equipment at Schlumberger Limited, based in the UK. With Schlumberger for some 26 years, her previous roles include Executive Vice President of Reservoir & Infrastructure, Vice President of Human Resources for Schlumberger Limited, President of the Reservoir Characterization Group, President of Wireline, President of Schlumberger Asia, and Vice President of Health, Safety & Environment. Hinda has held technical and management positions in operations, product development, and human resources in France, Thailand, the UK and the US. She began with Schlumberger in 1996 as a Wireline Field Engineer in Nigeria.

Current external appointments: None.

Simon Henry
Independent
Non-Executive Director

MA, FCMA. Age 60. Appointed April 2017.

Skills and experience: Simon has significant experience in global finance, corporate governance, mergers and acquisitions, international relations, and strategy. He draws on over 30 years' experience at Royal Dutch Shell plc, where he was Chief Financial Officer between 2009 and 2017.

Current external appointments: Independent Director of PetroChina Company Limited since June 2017, Senior Independent Director of Harbour Energy plc since March 2021, member of UK Defence Board, member of the Advisory Board of the Centre for European Reform, and member of the Advisory Panel of the Chartered Institute of Management Accountants (CIMA).

Sam Laidlaw
Independent
Non-Executive Director

MA, MBA. Age 66. Appointed February 2017; Senior Independent Director from May 2019.

Skills and experience: Sam has more than 30 years' experience of long-cycle, capital-intensive industries in which safety, the low-carbon transition and stakeholder management are critical. Sam has held a number of senior roles in the energy industry, including as CEO of both Enterprise Oil plc and Centrica plc. He was also a member of the UK Prime Minister's Business Advisory Group.

Current external appointments: Chairman of Neptune Energy Group Holdings Ltd, Chairman of the National Centre of Universities & Business, board member of Oxford Saïd Business School, and advisory board member of the Smith School of Enterprise and Environment.

Jennifer Nason
Independent
Non-Executive Director

BA, BCom (Hons). Age 61. Appointed March 2020.

Skills and experience: Jennifer has over 35 years' experience in corporate finance and capital markets. She is a Global Chairman of Investment Banking at JP Morgan, based in the US, and for the past 20 years, she has led the Technology, Media and Telecommunications global client practice. During her time at JP Morgan, she has also worked in the metals and mining sector team in Australia and co-founded and chaired the Investment Banking Women's Network. She currently sits on JP Morgan's Executive Committee of Global Chairs of Investment Banking.

Current external appointments: Board member of the American Australian Association.

Ngaire Woods CBE
Independent
Non-Executive Director

BA/LLB, D.Phil. Age 59. Appointed September 2020.

Skills and experience: Ngaire is the founding Dean of the Blavatnik School of Government, Professor of Global Economic Governance and the Founder of the Global Economic Governance Programme at Oxford University. As a recognised expert in public policy, international development and governance, she has served as an adviser to the African Development Bank, the Asian Infrastructure Investment Bank, the Center for Global Development, the International Monetary Fund, and the European Union.

Current external appointments: Vice-Chair of the Governing Council of the Alfred Landecker Foundation and board member of the Mo Ibrahim Foundation, the Van Leer Foundation, and the Schwarzman Education Foundation.

Steve Allen
Group Company Secretary

BA, Solicitor (England and Wales). Age 50. Appointed January 2017.

Skills and experience: Steve is Company Secretary of Rio Tinto plc and Joint Company Secretary of Rio Tinto Limited. Before joining Rio Tinto, Steve worked at BG Group plc, where he held a number of senior legal roles, including Deputy General Counsel, Company Secretary and Chief Counsel, Corporate. Before joining BG Group, Steve was a corporate lawyer for Herbert Smith LLP in London.

Current external appointments: Vice-Chair of the Association of General Counsel and Company Secretaries working in FTSE-100 companies, a member of the Corporate Governance Council and Industry Champion (Securities Sector) for the Dormant Assets Expansion Board.

Simon McKeon AO
Independent
Non-Executive Director

BCom, LLB, FAICD. Age 66. Appointed January 2019; Senior Independent Director, Rio Tinto Limited from September 2020.

Skills and experience: Simon brings insights into sectors including financial services, the law, government and charities. He practised as a solicitor before working at Macquarie Group for 30 years, including as Executive Chairman of its business in Victoria, Australia. Simon served as Chairman of AMP Limited, MYOB Limited, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and was the first President of the Australian Takeovers Panel.

Current external appointments: Chancellor of Monash University, Chairman of the Australian Industry Energy Transitions Initiative Steering Group, and Non-Executive Director of National Australia Bank Limited since February 2020.

Simon is the designated Non-Executive Director for workforce engagement.

Ben Wyatt
Independent
Non-Executive Director

LLB, MSc. Age 47. Appointed September 2021.

Skills and experience: Ben had a prolific career in the Western Australian Parliament, before retiring in March 2021. He held a number of ministerial positions and became the first Indigenous treasurer of an Australian parliament. His extensive knowledge of public policy, finance, international trade and Indigenous affairs brings valuable insight and adds to the depth of knowledge on the Board. Ben was previously an officer in the Australian army and went on to have a career in the legal profession, as a barrister and solicitor.

Current external appointments: Non-Executive Director of Woodside Petroleum Ltd from June 2021.

Tim Paine
Joint Company Secretary,
Rio Tinto Limited

BEc, LLB, FGIA, FCIS. Age 58. Appointed January 2013.

Skills and experience: Tim joined Rio Tinto in 2012 and became Joint Company Secretary of Rio Tinto Limited in January 2013. He has over 25 years' experience in corporate counsel and company secretary roles, including as General Counsel and Company Secretary at Mayne Group, Symbion Health and Skilled Group. Tim also spent 12 years at ANZ Bank, including as Acting General Counsel and Company Secretary.

Current external appointments: Company secretary for the Foundation for Australia-Japan Studies and member of the Governance Institute of Australia's Legislation Review Committee.

Former Directors

Michael L'Estrange stepped down from the Board on 6 May 2021.

Past external appointments over the last three years

For details of each Director's previous directorships of other listed companies, see the Directors' report on page 200.

Board committee membership key

- Committee Chair
- Audit Committee
- Remuneration Committee
- Nominations Committee
- Sustainability Committee

Executive Committee

Day-to-day management of the business is delegated by the Board to the Chief Executive and, through him, to other members of the Executive Committee and to certain management committees.

Jakob Stausholm
Chief Executive

Biography can be found on page 134.

Peter Cunningham
Chief Financial Officer

Biography can be found on page 134.

Bold Baatar
Chief Executive, Rio Tinto Copper

Bold was appointed Chief Executive, Copper in February 2021. Prior to this, he led the Energy & Minerals product group, a position he had held since 2016. Since joining Rio Tinto in 2013, he has held a number of leadership positions across operations, marine, iron ore sales and marketing, and Copper.

Bold brings to the role deep experience across geographies, commodities and markets. A passionate advocate for the integration of ESG into decision making across the business landscape, he combines strong commercial and business development expertise with a focus on developing markets and partnerships with our host communities and nations.

Mark Davies
Chief Technical Officer

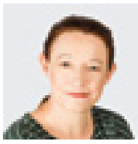
Mark was appointed to the Executive Committee in 2020 and became Chief Technical Officer in October 2021. Mark joined Rio Tinto in 1995 as a Senior Mechanical Engineer and has worked in operational and functional leadership roles, including in our Iron and Titanium business unit, Group Risk, and Global Procurement.

Mark is responsible for our development teams including Exploration and Major Capital Construction, Renewable Energy Projects, and Closure teams working to rehabilitate and repurpose mines and facilities at the end of the development cycle. Mark's remit also includes our technical centres of excellence as well as the Office of the Chief Scientist, which drives our global research and development activities.

Alf Barrios
Chief Commercial Officer

Alf was appointed Chief Commercial Officer and Chairman for China and Japan in 2021. He joined Rio Tinto in 2014 as Chief Executive, Aluminium. Alf has 30 years' global experience in the resources sector across operations, marketing, trading and business development.

Commercial is accountable for the Group's sales and marketing business, procurement, marine, and logistics activities. Alf and the team drive commercial value and growth across Rio Tinto by working closely with our assets, customers and suppliers. Alf is focused on building industry-leading customer and supplier partnerships to deliver innovation and ESG leadership, and create future value for the company.



Sinead Kaufman
Chief Executive, Rio Tinto Minerals

Since Sinead joined Rio Tinto in 1997 as a geologist, she has held senior leadership and operational roles across Aluminium, Copper & Diamonds, Energy & Minerals, and Iron Ore. Most recently, she was Managing Director, Operations, at Copper & Diamonds.

Sinead brings to her current role strong operational expertise combined with a track record of delivering future-focused sustainability outcomes. Since joining the Executive Committee in early 2021, Sinead has led the commitment of funding to our Jadar lithium-borates project in Serbia and the signing of a binding agreement to acquire the Rincon lithium project in Argentina, in support of our battery materials strategy, as well as other sustainability initiatives to help us reach our decarbonisation ambition.

Isabelle Deschamps
Chief Legal Officer & External Affairs

Isabelle joined Rio Tinto in November 2021. She has extensive international experience and is admitted to the England and Wales Law Society and to the Quebec (Canada) Bar. Most recently, Isabelle was General Counsel of the AkzoNobel Group and a member of its executive committee. Prior to this, Isabelle worked at Unilever.

Alongside leading our global Legal, Communication, and External Affairs teams, Isabelle oversees a range of governance functions, including Company Secretariat, Ethics & Compliance, and the Technical Evaluation group. Isabelle is a pragmatic, transparent leader with a passion for equal opportunities, inclusion and diversity, continuous learning, and driving a culture of integrity.

Kellie Parker
Chief Executive, Australia

Prior to being appointed Chief Executive, Australia in 2021, Kellie was Managing Director, Pacific Operations, Aluminium. She joined in 2001 and has held a number of safety, operational and leadership roles across both the Iron Ore and Aluminium businesses.

Kellie represents our Australian interests with all stakeholders and brings her operational experience and community values to listen, respond and set the direction for the business. Kellie also leads our Health, Safety, Environment & Security (HSES) and Communities & Social Performance (CSP) areas of expertise. She has a people-centric approach, with a strong commercial background and she is an advocate for Indigenous Australians.

Simon Trott
Chief Executive, Rio Tinto Iron Ore

Simon has been with our company for over 20 years and has held a variety of operating, commercial and business development roles across a number of commodities. Prior to his current role, Simon was Chief Commercial Officer from 2018 to 2021. He has also served as Managing Director of the salt, uranium and borates division, overseeing operations in Australia, Namibia and the US.

Simon knows Western Australia well and has a deep understanding of the iron ore business and customers globally. He is focused on transforming Rio Tinto Iron Ore's safe operational performance while building the business we need for the future.

James Martin
Chief People Officer

Prior to becoming our Chief People Officer in 2021, James was at Egon Zehnder for 21 years. He led a range of global practices and specialised in coaching, talent management and leadership development. Prior to this, he worked in equity research and began his career as an air force pilot.

James has been supporting our culture evolution, from building a new leadership programme, to paving the way to a more inclusive work environment and helping create our new values. His vision is to help unlock more of our potential and to inspire even more of our colleagues to feel the pride in Rio Tinto that many already do.

Arnaud Soirat
Chief Operating Officer

Arnaud joined in 2010 and was previously Chief Executive, Copper & Diamonds from 2016 to 2020. Prior to this, he had 20 years' experience in commercial and operations roles in the metals and mining industry, including at Alcoa and Pechiney.

As Chief Operating Officer, Arnaud uses his extensive operational and leadership experience to drive company-wide, sustainable improvements in our production system with deployments under way at every product group. From his previous roles, Arnaud brings significant experience in safety and operational excellence, improving business profitability and competitiveness, and deploying lean manufacturing to help achieve stable and optimised operations through stronger employee engagement.

Ivan Vella
Chief Executive, Rio Tinto Aluminium

Ivan was appointed Chief Executive, Aluminium in March 2021 and has held senior leadership positions across the Iron Ore, Copper and Coal product groups. He brings deep operational experience and critical understanding of end-to-end value chain processes to our Aluminium business.

Under Ivan's leadership, in 2021 we launched partnerships with Carbfix to capture carbon at our ISAL smelter in Iceland and with the Government of Queensland to drive the state's clean energy future. He also continues to focus on building capability in Rio Tinto to enhance the long-term positive role mining can have when partnering with First Nations and Indigenous peoples, along with the host communities we operate in.

Former Executive Committee members who served during the year

Vera Kirikova

Vera stepped down as Chief People Officer on 5 April 2021.

Peter Toth

Peter stepped down as Group Executive, Strategy and Development on 18 October 2021.

Barbara Levi

Barbara stepped down as Chief Legal Officer & External Affairs on 20 October 2021.

Board insights

How the Board considered our new values and culture

Lessons learned from Juukan Gorge

In 2021, the Board conducted a joint exercise with the Executive Committee to learn the lessons from the destruction of the rock shelters at Juukan Gorge, and the Group's response to the tragic events. In addition to strengthening crisis management and communications, the key learnings which the Board and Executive team are committed to addressing are: (i) promoting an inclusive, open and transparent culture that empowers people to raise and escalate concerns on operational and ethical issues; and (ii) applying a more values-driven approach to guide decision making. Our new values of care, courage and curiosity, support these desired behaviours.

Employee survey

The Board received and considered reports and updates from the Chief People Officer on the results of our twice-yearly employee engagement survey in July and December, which provided useful insights into themes arising from the rollout of the Group's new strategy and values. In considering the reports, the Board made a number of recommendations aimed at improving: (i) communications from senior leadership to the wider workforce; (ii) opportunities for career growth and learning; and (iii) psychological safety to embed the desired leadership ethos in the organisation and support and incentivise the desired behaviours and values.

Employee engagement sessions

As part of the Board's ongoing commitment to engage with our people, a number of interactive employee sessions were held during the year.

The first session was with Simon Thompson, Simon McKeon, Simon Henry, Ngaire Woods, Hinda Gharbi and some of our RioExperts (employee representatives from RioExcel, a Technical Excellence initiative designed to grow technical expertise and capability by creating a technical career pathway for recognised experts). At the session, the group discussed our new values and how to embed them, the importance of research and development, and enabling employees to be innovative.

The second session was attended by Megan Clark, Jennifer Nason, Ben Wyatt, Sam Laidlaw and a group of employees from our graduate development programme. The discussions focused on leadership, our culture, and our values, including why they have evolved and how to embed and measure them.

We also held employee town halls in Melbourne, London and Serbia. In Melbourne, Simon McKeon spoke about a range of issues, including: his role as Senior Independent Director; the appointment of Dominic Barton as Chair-designate; Juukan Gorge; climate change; and cultural heritage. He took questions on our reputation, risk management, and the challenges we might face in the future.

At the town hall in London, Simon Thompson shared his reflections on the year, including on Board changes, our new priorities, values and strategy, our safety performance, and the challenges of COVID-19. He took questions from our people covering topics including why our values have evolved, growth opportunities for the Group, embedding our new strategy and values, and how to maintain employee wellbeing.

Employee dashboard

The Board received a quarterly "employee dashboard" which provides insights into how management is progressing with employee-related initiatives, key employee metrics, a summary of employees' concerns and interests, and people-focused activities that will be undertaken in the following quarter.

The dashboard covers the following people metrics: progress with female representation; fatigue management and annual leave usage; reports received via myVoice (our enhanced confidential reporting programme); Employee Assistance Programme usage; and employee turnover and absenteeism.

In the fourth quarter of 2021, the following topics were top of mind for employees: our Everyday Respect initiative; COVID-19 and vaccines; fatigue and mental wellbeing; and our new strategy and values.

Ben Wyatt visits the Ranger Mine

In September, Ben Wyatt, Non-Executive Director, visited the Ranger Mine near the town of Jabiru in the Northern Territory, Australia. During the visit, Ben met with the Chief Executive, Australia, the General Manager, Communities and Social Performance, and representatives of Energy Resources of Australia (ERA) to discuss the asset. ERA employees gave Ben a tour of Jabiru. He also met with the CEO of Gundjeihmi Aboriginal Corporation (GAC), the Senior Adviser to GAC, and a group of Traditional Owners.

Ben also visited the Ranger site and the Traditional Owners took him to Madjedbebe, a very significant heritage site that confirms human occupation of the area going back more than 50,000 years. This is on the edge of the Jabiluka mineral lease and has very high concentrations of rock art and a significant burial ground.

Simon Thompson and Megan Clark visit Karratha

In 2021, Chairman Simon Thompson and Independent Director Megan Clark visited the Pilbara to engage first-hand with stakeholders, including representatives of a Pilbara Aboriginal Corporation.

Simon and Megan spent time listening and hearing stories to understand the deeply felt experience stakeholders have with Rio Tinto and how changes to the way we manage cultural heritage within our operations are being received.

The Sustainability Committee: site visits

Members of the Sustainability Committee participated in several site visits during 2021. COVID-19 travel restrictions required in-person site visits to be undertaken by individual committee members. Committee members visited the Brockman mine and the Winu project in Western Australia, the Resolution Copper project in Arizona, US, and Energy Resources Australia in the Northern Territory, Australia.

At these site visits, Sustainability Committee members received briefings on Health, Safety, Environment and Security (HSES) and Community and Social Performance (CSP) matters and the management of material HSES and CSP risks, and met with key personnel. These visits gave the Directors a chance to observe the culture and leadership, consider the CSP frameworks and management systems, and see the daily cadence of risk management with a diverse cross-section of the workforce from frontline to leaders, partners and contractors. These visits provide a valuable opportunity to assess whether we are meeting the expectations of Traditional Owners, First Nations peoples, and local communities.

Winu project site, and Brockman 4 mine, Western Australia

Megan Clark visited the Winu project in the Paterson region of Western Australia and received briefings on engagement with Traditional Owners, the Nyangumarta Warrarn and Martu, drilling results, health and safety systems and risk management. Daily pre-start meetings showed our safety maturity model in action.

She also visited Brockman 4 operations and reviewed the progress of the Juukan Gorge remediation programme with the Puutu Kunti Kurrama Elders. While on site, the front line leaders also shared real life examples of the Integrated Heritage Management Process, including the new heritage checklist for blasting activities and their approach to water management.

China Advisory Panel

At the China Advisory Panel in December 2021, members of the Board and Executive Committee heard from a diverse group of external experts, and discussed the potential impacts of domestic and international China-related developments for the Group. The topics discussed included:

China's national climate change policy and the implications for the mining industry and metal sectors

The discussion on this topic focused on the challenge of balancing economic development with carbon reduction, the future development of the aluminium industry in China, and on the policy framework to be applied to energy and carbon-intensive industries, and the need for technological innovation.

China's 14th Five-Year Plan and implications for China's domestic social and economic development pathways

The policies were expected to serve the interest of healthier, environmentally friendly, and fairer growth in the long term, and ensure more resilient and sustainable economic and political development.

Recent Chinese Government policymaking and the potential impact on foreign investment.

The attendees recognised the key dynamics influencing international political and economic relations, and the role of trade and investment for long-term sustainable growth and best practice sharing.

Employees at the Winu copper-gold project, Western Australia.

Our stakeholders - Section 172(1) statement

The Board is required by the UK Companies Act 2006 to promote the success of the Company for the benefit of our shareholders, and in doing so, to take into account the interests of our wider stakeholders. Our key stakeholders are our workforce, the communities in which we operate, civil society organisations, governments, our investors, our customers, and our suppliers.

On pages 20-22 of this report, we have set out why the interests of these stakeholders are of strategic importance to Rio Tinto. In the section below, we provide more information on how the Board engages and communicates with stakeholders, and how it takes account of their interests in its decision making.

This section, together with the information on pages 20-22, constitutes our section 172(1) statement.

Our workforce

How we engage and communicate

We engage with our workforce regularly and through a wide variety of channels. In 2021, these channels included twice-yearly engagement surveys and more regular, local surveys to gauge concerns around COVID-19, as well as email and video updates on subjects such as people changes, safety shares and Group news, including video interviews with the Chief Executive and Chairman during COP26. In addition, we held focus groups with members of the Board, town halls with the Chief Executive, Chairman, Executive Committee members and our local Business Resilience Teams, and shared these events more widely via our intranet, Element, and employee app, RT Connect.

During the year, we also launched a series of podcasts entitled "Conversations with the Board". In the first of these, Ben Wyatt and Ngaire Woods spoke about their thoughts on the company's key priorities, its values, what attracted them to join Rio Tinto, and their first impressions of the Board and the Group. The second podcast featured Jennifer Nason and Simon McKeon who reflected on how the Group has evolved since they joined the Board, how they see their role in supporting our new strategy, with the low-carbon transition at its heart, and what they took away from their engagement sessions with some of our RioExperts and employees from our graduate development programme.

In March, we launched a new, enhanced confidential reporting programme – myVoice. It is designed to help our people voice concerns when something at work does not feel right. To date, we have seen a noticeable increase in reporting, which we believe indicates that more people are feeling comfortable to share concerns and more confident that they will be addressed.

In response to employee focus groups held in 2020 and new research into workplace culture, the Everyday Respect task force was launched in March 2021 to improve how we prevent and respond to bullying, sexual harassment, racism and other forms of discrimination at work. The work of the task force has been shaped by our people, combined with the support of independent, external subject matter experts and well-founded research. The first step was to listen to our people. We held 109 group listening sessions and had more than 10,000 survey responses, and over 3,000 frontline insights were shared. More information about Everyday Respect can be found on page 101.

How the Board has taken account of these interests

At the beginning of 2021, we appointed Simon McKeon as our designated Non-Executive Director for workforce engagement. In this role, Simon has overseen the development of the programme of workforce engagement events (including the town halls, podcasts, videos and site visits described above) and reports back to the Board twice-yearly on feedback received via these engagements. These reports are supplemented by a newly developed quarterly "employee dashboard" which provides insights into our people's interests and concerns. See page 138 for more details on the employee dashboard.

The results and reflections of our twice-yearly People Survey are also considered by the Board, together with proposed actions and improvement ideas.

As part of our commitment to ensure sustained cultural change across our global operations, we commissioned a comprehensive review of our workplace culture by Elizabeth Broderick & Co. The review identified disturbing findings of bullying, sexual harassment, racism and other forms of discrimination throughout the Group.

The Board reviewed a draft of the report as part of the work being undertaken by our Everyday Respect task force. The Board fully endorsed management's recommendation to publish the findings of the review in full as part of the Group's commitment to creating a safer, more respectful and more inclusive workplace. It also fully supports the recommendations of the report and will monitor the progress of their implementation.

In recognition of the findings in the Everyday Respect report, the management team recommended that a downward adjustment be made to the 2021 STIP payments. The Remuneration Committee concluded that a reduction of 5% should be applied to the total STIP payment for current Executive Committee members and an equivalent adjustment be made to the 2020 unvested Bonus Deferral Awards (BDA) held by former Executive Committee members. The STIP for 2022 will also include objectives linked to the recommendations arising in the report.

Communities

How we engage and communicate

We have made numerous improvements to the way we connect with communities and Traditional Owners. Accountability for Traditional Owner and community relationships has been reallocated to sit clearly with the site General Manager. This means that Traditional Owners and those in the community now have direct access to the site team and are able to resolve issues much more quickly.

Board members have met many Traditional Owners and communities at site visits, four of which took place during the year. More information on the site visits can be found on pages 138-139.

How the Board has taken account of these interests

In response to the Board Review following the tragic destruction of the rock shelters at Juukan Gorge, a Communities and Social Performance (CSP) Area of Expertise (AoE) was established, reporting to Kellie Parker, our Chief Executive, Australia who is based in Brisbane and is a member of our Executive Committee. The CSP AoE ensures conformance with Group policies, standards and procedures, including the Integrated Heritage Management Process, and shares best practice worldwide. The CSP AoE sits alongside the existing Health, Safety, Environment and Security (HSES) function. This helps to ensure that communities and heritage risk processes are aligned with our existing robust health, safety and environmental systems. The CSP AoE also oversees internal assessments and reviews, including deep dives and operational reviews in conjunction with experts from our Group Risk function.

The framework includes a rigorous annual self-assessment and certification of impacts and risks. Internal Audit provides a third line of defence.

In September 2021, we published our first Communities and Social Performance Commitments Disclosure Interim Report. We are committed to ensuring that the Traditional Owners of the lands on which we operate contribute to and shape how we report. During July and August 2021, we sought feedback from Traditional Owner groups in the Pilbara on our progress regarding some of the commitments made as part of the Board's review of our management of cultural heritage.

We have established an Australian Advisory Group (AAG) which brings together an eminent group of independent advisers to provide guidance on current and emerging issues, and better manage policies and positions that are important to both Australian communities and our broader business. This is one of the 11 commitments we made as part of our action to strengthen our processes and approach to cultural heritage, following the destruction of the rock shelters at Juukan Gorge in May 2020. Advising the Chief Executive, Australia, the AAG will comprise a minimum of 60% Aboriginal or Torres Strait Islander membership, with an Indigenous Australian Chairperson. The Sustainability Committee will engage with the AAG to share experiences in the Australian context. The group has not yet met, with the first AAG meeting to be held in late March, 2022. Recognising that trust still needs to be earned, the inaugural meeting will explore how the group will work together with Rio Tinto leaders. This will include setting of expectations and co-designing protocols for the group's governance. More information can be found on page 95.

Civil society organisations

How we engage and communicate

We use different methods to engage with civil society organisations and tailor those methods to the needs of each group. We have established channels of dialogue with community organisations at our sites and projects, and since 2018 have held annual regional roundtable discussions involving civil society organisations, members of the Board, Executive Committee members and senior leaders.

By highlighting concerns about environmental, social and governance issues, and advising us on how we can improve, civil society organisations can be an important advocate for change. We believe that significant progress in preventing and addressing complex ESG challenges will only be achieved through genuine dialogue and engagement between governments, business, investors, consumers and civil society organisations. The challenges include climate change, water management, biodiversity, human rights violations, and bribery and corruption. In order to build trust and sustain public support, we also recognise that it is vital that all parties adopt high standards of integrity, transparency and accountability in their work in these areas and that civil society organisations maintain their independence from party politics.

How the Board has taken account of these interests

In November 2021, the Board held three roundtables in Australia, northern America and Europe. A diverse group of civil society organisations was represented. The agendas were tailored for each region and informed by preparatory conversations with the participants.

Topics discussed were wide ranging and included our new strategy, our new climate change targets, nature, Juukan Gorge, QIT Madagascar Minerals (QMM), human rights, and our key projects.

A number of agreements were reached regarding information sharing, follow-up meetings were arranged, and actions were agreed by members of the Board, Executive Committee and senior leaders in response to the issues raised by the civil society organisations that attended. We also sought feedback on the sessions from the attendees via a survey and some direct messages. In general, participants felt the roundtables provided a valuable opportunity to engage with senior leaders and welcomed the tone and openness to listening to their perspectives.

The members of the Board who did not join the meetings received and noted a paper which summarised the discussions and outcomes.

Representatives of civil society organisations are periodically invited to engage directly with the Board to inform decision making on critical areas of policy or strategy development. In 2021, the Board received a presentation from the World Benchmarking Alliance, which represents organisations working at global, regional and local levels to shape the private sector's contributions to achieving the United Nations Sustainable Development Goals (UN SDGs). See page 75 for information on our approach to the UN SDGs.

Governments

How we engage and communicate

We engage with governments at all levels on issues that affect, or could affect, the Group. We do this via direct engagement and indirectly through our trade association partners and international forums, such as the Extractive Industries Transparency Initiative and the International Council on Mining and Metals. We contribute relevant evidence and information, and share experiences and expertise that help to inform the development of robust public policy and regulation.

In 2021, we engaged with the Australian Government regarding our senior leadership changes, heritage issues, our investment strategy, energy and decarbonisation. With support from the Governments of Canada and Quebec, we continue to progress ELYSIS, our project with Alcoa that aims to eliminate direct greenhouse gases from the aluminium smelting process. We continue to work with the Government of Guinea to explore ways to optimise, develop and fund the world-class Simandou iron ore deposit. We regularly contribute to EU public policy development on issues such as critical minerals strategy, battery legislation, green mining principles and due diligence legislation. We work closely with the Government of South Africa to support the operational stability at Richards Bay Minerals. In the US, we advocate on public policy related to the North American supply chain and, specifically, alignment on climate change, critical minerals and materials, renewable energy, and trade.

How the Board has taken account of these interests

The Board receives regular updates and papers regarding all of these projects and in doing so oversees engagement with governments and considers their interests. Members of the Board also engaged directly with representatives of the Governments of Australia, Guinea, Serbia, Mongolia, Canada and the UK and discussed a wide range of issues including:

- Heritage issues, investment and decarbonisation, in Australia.
- The Jadar project, the development of battery and electric vehicle value chains in Serbia and Europe.
- The development of the Oyu Tolgoi underground project.
- Decarbonisation opportunities in Canada.
- The UK Government's critical minerals strategy.

Investors

How we engage and communicate

We hold two annual general meetings (AGMs) each year, one in Australia and one in the UK. Due to COVID-19-related restrictions, our UK AGM was an online event for the second consecutive year. However, we were able to host a hybrid AGM in Perth, Western Australia. Institutional and retail investors were able to engage directly with the Board and management at and around the AGMs.

We also maintain a programme of engagement with investors and analysts to ensure both current and potential new investors have the opportunity to hear from executives, the Chairman and subject matter experts from across the business. We held an online Communities and Social Performance seminar in March in which the Chair of our Sustainability Committee, our Chief Executive, our Chief Executive, Australia, our Chief Technical Officer and other experts from across the Group provided investors and analysts with an update on our approach to cultural heritage, which also included case studies from some of our operations in Canada and the Northern Territory of Australia.

Every two years, we update financial markets on our strategy. In October, we held an in-person Investor Seminar in London, hosted by our Chief Executive and the entire Executive Committee, which included presentations from Perth, Brisbane and Singapore. The focus of the event was to outline the actions being taken to strengthen the business and improve performance. At the event, we also unveiled our longer-term strategy to ensure we thrive in a decarbonising world and continue to deliver attractive shareholder returns, in line with our policy.

How the Board has taken account of these interests

In responding to feedback from investors, the Board has continued to deliver a strategy of maximising shareholder returns while allocating capital with discipline for future growth and sustained operational performance through the macroeconomic and commodity cycles.

Given investor interest in ESG issues, including climate change and our work with communities around the world, the Board considers these issues during its strategy sessions when assessing our portfolio positions.

The Chairman engaged extensively with investors across multiple markets in advance of our AGMs to understand their perspectives. He also led twice-yearly meetings with the Climate Action 100+ (CA100+) investor groups in Europe and Asia, to convey how our new strategy integrates the net zero transition into our business, including our portfolio, capital investment decisions, and business planning. The discussions focused on the key indicators in the CA100+ Net Zero Company Benchmark. In particular, our Scope 1 and 2 targets, the approach to Scope 3 emissions, capital allocation alignment, governance, and our climate policy engagement. These engagements with CA100+ provide us with a valuable sounding board as we implement our strategy, respond to requisitioned resolutions and develop our reporting.

At the 2021 AGMs, we received strong shareholder support for our new Remuneration Policy which included the introduction of ESG metrics into our incentives. At the same AGMs, shareholders also registered a vote against our Remuneration report, specifically in response to the treatment of departing executives in the light of Juukan Gorge. The Committee engaged extensively with shareholders and proxies before and after the AGMs on remuneration-related matters. The feedback received contributed to the establishment of the Consequence Management Framework that provides a set of guardrails to guide the Remuneration Committee in the exercise of discretion and application of malus and clawback. In addition, we updated the Long term incentive plan leaver provisions to further strengthen the Committee's ability to apply discretion so as to ensure that incentive pay outcomes are fair, appropriate and defensible.

Customers

How we engage and communicate

Throughout 2021, we have expanded our commercial activities into new areas to meet customer needs. This includes the expansion of our portside sales presence to 15 ports in China, meeting demand from more than 80 iron ore customers, and the expansion into bonded warehouse sales for our aluminium business. Following a successful rollout in other products, including iron ore, we expanded our WeChat presence to the boron agriculture market in China. This new channel provides a simple way for customers to interact with our local team.

Climate change is one of the biggest challenges facing our customers and our supply chains, and it will take a coordinated effort to make meaningful progress. We continue to focus on innovative partnerships with customers to meet their needs and help produce sustainable products. This includes partnering to develop new products such as with AB InBev to produce beverage cans made from low-carbon aluminium that meets industry-leading sustainability standards. We are also partnering with Shawinigan Aluminium, to create custom alloys containing our lowest carbon metal with our customers' scrap. In addition, we are partnering with our customers to support the decarbonisation of their processes to reduce Scope 3 emissions. More information can be found on page 71.

For the past three years, we have sought feedback annually via our customer survey, the results of which are shared with the Board by the Chief Executive and allow us to continue to shape these important relationships.

How the Board has taken account of these interests

In response to customer requirements for greater transparency on ESG standards throughout the value chain, we have set a new standard in traceability for the aluminium industry with START, a "nutritional label" for responsible aluminium. Through blockchain technology, START helps customers meet the demand from consumers for transparency on where and how the products they purchase are made and aims to empower end-users to make informed choices about the products they buy.

We continue to work closely with our customers to manage the pressures placed on the supply chain as a result of COVID-19.

Suppliers

How we engage and communicate

Our suppliers are critical to the development and safe running of our global operations and we are committed to continuing to build strong relationships with them. We engage regularly with our supplier partners. Throughout the COVID-19 pandemic our relationships with our suppliers have deepened. We have partnered with key suppliers, Komatsu and Caterpillar, to develop zero-emissions technologies and applications for mine-haulage systems.

For the past two years, we have sought our suppliers' feedback annually via our supplier survey, the results of which are shared with the Board by the Chief Executive. The survey results allow us to continue to shape these important relationships, building on general satisfaction and areas for improvement. The Board began tracking the progress of supplier satisfaction from the baseline developed in the 2020 survey.

How the Board has taken account of these interests

We fully recognise the importance of paying suppliers promptly, in particular in the case of smaller companies. In 2021, we introduced faster payments for small suppliers across much of the world. We also reduced payment terms for regional and Indigenous suppliers in Australia.

For more information on our work with our suppliers, including our partnerships to reduce emissions and decarbonise, and our work with local suppliers, see pages 66-67 and 70-71.

Matters discussed in 2021

The Board had seven scheduled meetings in 2021 and three additional meetings were held to discuss matters outside the Board's regular agenda items. Set out below are some of the matters which the Board has considered during the year.

At every Board meeting, the Chief Executive and Chief Financial Officer report on the safety, operating and business performance of the Group against our key performance indicators, as well as how certain material stakeholder issues are being managed. The Board also received detailed reports from the management team relating to progress on major growth projects and updates on operations. In addition, the Board invites external subject matter experts to present on issues relevant to major strategic or operational matters. Examples in 2021 included:

Growth projects

- In April, the Board considered and approved a proposal to enter into binding heads of agreement with Turquoise Hill Resources for an updated funding plan for the completion of the Oyu Tolgoi underground project in Mongolia.
- In July, the Board considered and approved a request for development capital of $2.4 billion for the Jadar lithium-borates project in Serbia. This project remains subject to receiving all relevant approvals, permits and licences.
- In December, the Board considered and approved a request to acquire the Rincon lithium project in Argentina.
- In December, the Board also noted an update regarding our capital projects, including Resolution Copper and Simandou.

Operational

- In February, the Board received an update on the Resolution Copper project. The project had achieved a critical permitting milestone with the publication of the Final Environmental Impact Statement under the United States National Environmental Policy Act.
- In July, the Board received an update on Energy Resources of Australia (ERA) and the transfer of tenure for the town of Jabiru. The Board agreed to include ERA as a regular item on the Sustainability Committee's agenda as part of that Committee's responsibility in monitoring progress on cultural heritage management issues across the Group.
- In July, the Board also received an update on challenges at Richards Bay Minerals. The Board considered the security situation and endorsed the management team's proposal that operations would not be restarted until the community-related issues were resolved satisfactorily. The Board acknowledged that the priority was to understand and resolve the root causes of the community issues.
- In December, the Board discussed and approved the Group's IS&T strategy and the Group's risks and controls relating to cyber security.
- In December, the Board reviewed an evaluation of the status of the Group's ore reserves and mineral resources.

ESG

The Board has ultimate oversight of environmental, social and governance matters, but has delegated responsibility for certain matters to the Sustainability Committee.

During the year, the Board reviewed its forward agenda of matters to be discussed, considered its constitution, composition and performance, and reviewed any new or amended Group policies. In addition, it considered the following governance matters:

- In February, the Board received and noted a paper regarding the Board and committee evaluation plan.
- In April, the Board was updated on the steps being taken to rebuild stakeholder relations in Australia following the tragic events at Juukan Gorge in May 2020. During the update, the Board noted that listening to our stakeholders and ensuring that we meet their expectations will be critical to regain their trust. The need to focus on improving and consistently demonstrating our ESG credentials was also recognised. The management team continued to work on defining initiatives to rebuild trust with each stakeholder group.
- In July, the Board received an update regarding a number of initiatives to continue to strengthen and improve our approach to cultural heritage and community relations. In particular, the Board considered progress with the Australian Advisory Group and our approach to the modernisation of our Rio Tinto Iron Ore agreements.
- In September, the Board and Executive Committee participated in a joint review of the events surrounding the destruction of the Juukan Gorge rock shelters. The aim was to analyse our response to the crisis, share and understand each other's experiences and perceptions during the crisis, reach a common understanding of lessons learned, reset and strengthen the relationship between the Board and the new Executive Committee, and improve our collective response to any future crisis.
- In December, the Board considered and endorsed the 2022 annual plan and received and noted an update on ethics and compliance.
- In December, the Board noted a paper regarding the draft "say on climate" resolution to be proposed at the 2022 AGMs.

People

The Board receives regular updates on our people-related initiatives to attract, develop and retain the best people, which is crucial to our success. Some of the topics covered in 2021 are below:

- In April, the Board discussed and approved the composition of the new Executive Committee. The Board noted that the transition was progressing as planned and that attention had turned to establishing the teams and structures below the Executive Committee.
- In July and December, the Board received papers on the Group's twice-yearly people engagement survey results and noted the initiatives being pursued in response to the findings.
- In December, the Board received an update on the Everyday Respect task force, including an overview of the discovery phase findings, recommendations and plan. (See page 101 for more details.)

Strategy and risk

In 2021, the management team carried out a comprehensive review of the Group's strategy and presented strategic topics and analysis to the Board in two separate meetings in May and September. The Board considered options presented by the management team and approved the new integrated Group strategy in September. (See pages 14-17 for full details of our strategy.) The topics discussed included:

May

- Industry trends and strategic context for the business
- Climate change and sustainability
- The energy transition and green steel
- Advancement of the Rio Tinto Safe Production System

September

- Culture, enablers and Group values
- Green energy and the decarbonisation of our assets and value chain
- Battery minerals and copper growth opportunities
- Approach to our "excel in development" objective
- New integrated strategy and financial implications

In-depth reviews

In addition, the Board received deep dives in October and December on key areas of the business including:

October

- Commercial update
- Risk management and assurance (three lines of defence)
- Review of our Iron Ore business

December

- An assessment of the Group's principal risks and associated controls
- An update on the aluminium market and trends and our strategy in response
- The China Advisory Panel provided perspectives on China domestic policy priorities, implications of current reforms for doing business in China and with Chinese business internationally, and China-relevant geopolitical tends. The Panel provided the opportunity for the Board to ask questions and test assumptions with a well-rounded group of external experts.

Oyu Tolgoi copper and gold mine. South Gobi Desert, Mongolia.

Governance framework

Good governance is about considering the right things, at the right time, with the right people and insights. We have tried to structure the way the Board works to support that objective, to strengthen our strategic focus, and to improve both the challenge and the support that the Board provides to the executive team. Here is a summary of the framework:

Board of Directors

Rio Tinto produces minerals and metals essential to human progress.

By doing so efficiently, effectively and sustainably, we aim to create long-term value for all stakeholders. Our purpose is supported by three core values - care, courage and curiosity. The Board is collectively responsible for pursuing this purpose and approves the strategy, budget and plans proposed by the Chief Executive to achieve this objective.

Board Charter

See the Board Charter for more information on the role of the Board and the delegation to management.
Available at riotinto.com

Audit Committee

Helps the Board to monitor decisions and processes designed to ensure the integrity of financial reporting, the independence and effectiveness of the external auditors, and robust systems of internal control and risk management.

See page 151

Nominations Committee

Helps the Board determine its composition, and that of its committees. They are regularly reviewed and refreshed, so they are able to operate effectively and have the right mixture of skills, experience and background.

See page 148

Remuneration Committee

Helps the Board ensure that remuneration policy and practices reward employees and executives fairly and responsibly, with a clear link to corporate and individual performance.

See page 160

Sustainability Committee

Helps the Board oversee the Group's integrated approach to sustainability and strategies designed to manage health and safety and social and environmental risks, including management processes and standards.

See page 156

Chairman's Committee

Supports the functioning of the Board and will consider urgent matters between Board meetings.

Chief Executive

Has delegated responsibility for the executive management of Rio Tinto, consistent with the Group's purpose and strategy, and subject to matters reserved for the Board, as set out in the Schedule of Matters Reserved for the Board (available at riotinto.com), and in accordance with the Group's delegation of authority framework.

Australia Forum

Advises the Board and Executive Committee on political, economic and social developments in Australia and how they could affect the business.

China Advisory Panel

Provides context and analysis to the Board and Executive Committee on political, commercial and policy developments relevant to our operations in China and with Chinese partners.

Executive Committee

The Executive Committee supports the Chief Executive in the delivery of strategy, annual plans and commercial objectives, and managing the financial and operational performance of the Group.

The following management committees support the Chief Executive in the performance of his duties.

Investment Committee

Reviews proposals on investments, acquisitions and disposals. Approves capital decisions within delegated authority limits, and otherwise recommends matters for approval to the Board, where appropriate.

Risk Management Committee

Oversees the management and mitigation of the principal risks that could materially impact the Group's business objectives and exceed its risk tolerances.

Ore Reserves Steering Committee

Responsible for standards and control procedures in the ore reserves estimation and disclosure process. Ensures that these are effective in meeting internal objectives and regulatory requirements.

Closure Steering Committee

Oversees the process and controls designed to manage the material risks related to rehabilitation, closure and legacy operations.

Disclosure Committee

Reviews and approves the release of all significant public disclosures on behalf of the Group. Oversees the Group's compliance with its disclosure obligations in accordance with all relevant legal and regulatory requirements, including processes to ensure such disclosures are accurate and timely.

Evaluating our performance

An effective Board depends on the personal development of individual Directors and continuous improvement in the operation of the Board as a whole.

The Board recognises the benefit of an evaluation exercise that provides meaningful insight to Board and committee members on how they can improve their individual and collective contribution to the leadership and effectiveness of the Group. The evaluation also provides an important opportunity to agree on priorities for the coming year and develop an appropriate Board agenda.

The Board undertakes an evaluation on an annual basis. This year, we undertook an internal evaluation which was facilitated by the Group Company Secretary and Lintstock, who consolidated responses to the questionnaires. The evaluations of the Board and committees were based on questionnaires distributed to all Directors. The views of Directors were consolidated into formal reports which were discussed by the Chairman with individual Directors and then in a plenary session by the Board and the relevant committees. A questionnaire was also sent to members of the Executive Committee and the Group Company Secretary to obtain their perspectives on the effectiveness of the Board and its committees.

Every third year, we engage a professional external adviser to carry out the Board review to obtain an independent evaluation. The next external review will take place in 2022.

Board and committee composition

While the size of the Board and the level of diversity amongst Directors received high ratings, the range of skills and geographic representation were identified as an area for further focus. It was agreed that the key changes that should be made to the Board's profile over the next three to five years might include (i) greater mining expertise, (ii) China experience, (iii) North America, particularly Canadian experience, and (iv) stronger ESG/decarbonisation expertise. It was also agreed that the Board should at least maintain the level of Australian representation.

Actions:

- Reinstate face-to-face meetings and site visits as soon as possible.
- Add one additional member to the Audit Committee with recent and relevant financial experience.
- Review the size and composition of the Sustainability Committee.
- Review Board composition after appointment of the new Chair to ensure appropriate geographical representation and mining expertise.

Stakeholder oversight

The Board's understanding of investors received a high rating, while the knowledge of other key external stakeholders received positive ratings overall. The value of the Board engaging with external stakeholders directly was highlighted by a number of respondents, for example through site and community visits, and the importance of maintaining a balanced understanding of stakeholder relationships was stressed. A few respondents indicated that there was scope to improve the understanding of communities and civil society organisations in particular. The importance of the monitoring of employee sentiment and culture was highlighted, acknowledging the COVID-19 constraints as in 2020. The decision to appoint a designated Non-Executive Director for employee engagement was supported.

Actions:

- Make greater use of the China Advisory Panel and other outside speakers.
- Schedule talent pipeline and succession planning for the Executive Committee, including diversity.
- Promote culture and values.
- Enhance oversight of community management outside Australia and environmental management (particularly water and biodiversity).

Board dynamics

It was noted that relationships are developing well with the new Executive Committee, and that these benefited from the reset as part of the lessons learned from Juukan Gorge. The importance of the Board meeting face-to-face and resuming in-person site visits, when possible, was emphasised.

Management and focus of meetings

The management of Board meetings received high ratings.

Actions:

- Increase regularity of updates on major projects, with emphasis on what has changed since the last review.
- Increase focus on operational delivery, through individual product group presentations.

Board support

The Board packs were positively rated, although scope remained to make some papers shorter, with greater use of summaries. A few respondents identified scope to further improve the induction of new Directors.

Response to Juukan Gorge

Respondents provided positive feedback on the extensive discussions held in September 2021 in relation to the lessons learned following the destruction of the Juukan Gorge rock shelters, and the benefit that these sessions had in building cohesion within the Board, as well as with the Executive Committee.

Strategy

The recent Board strategy session received high ratings, but the importance of engaging on sustainability considerations more proactively, rather than reactively, was stressed. A few respondents indicated that gaining additional external perspectives on the company would be useful. The importance of the Board devoting more time to the understanding of new technologies and digitalisation, in terms of the opportunities and threats they represent for the business, was stressed.

Actions:

- Improve benchmarking against competitors.
- Arrange presentations from each product group to provide the link between strategy and execution.
- Continue to focus on China and technology/digital.

Risk oversight

Some respondents indicated that the Board should devote more time to risk, and in supporting the Executive Committee in continuing to enhance risk management processes. The importance of ensuring balanced consideration of both financial and non-financial risks was stressed. There was a range of additional recommendations made for further enhancing the oversight of risk, which the Audit Committee will follow up on in 2022.

Action:

- Enhance risk management oversight and processes (with Audit and Sustainability Committees).

Directors' attendance at scheduled Board and committee meetings during 2021[1]

	Committee appointments	Board	Audit	Nominations	Remuneration	Sustainability
Chairman and Executive Directors						
Simon Thompson	● ⓒ ●	7/7		6/6	6/6	7/7
Jakob Stausholm		7/7				
Peter Cunningham – joined 17 June 2021		4/4				
Non-Executive Directors						
Megan Clark	● ● ⓒ	7/7		6/6	6/6	7/7
Hinda Gharbi[2]	● ● ●	7/7	6/6	5/6		7/7
Simon Henry	ⓒ ● ●	7/7	6/6	6/6		7/7
Sam Laidlaw	ⓒ ● ●	7/7		6/6	6/6	7/7
Michael L'Estrange – retired 6 May 2021[3]	● ●	2/3		3/3		2/2
Simon McKeon	● ● ●	7/7	6/6	6/6	6/6	
Jennifer Nason[4]	● ● ●	7/7		6/6	5/6	6/7
Ngaire Woods	● ● ●	7/7		6/6	6/6	7/7
Ben Wyatt – joined 1 September 2021	● ●	3/3		2/2		2/2

1. Outside of the scheduled meetings of the Board and committees for 2021, numerous ad hoc meetings took place to consider more urgent matters, including one Audit Committee meeting, six Board meetings, four Nominations Committee meetings and four Remuneration Committee meetings.
2. Hinda Gharbi was unable to attend a Nominations Committee meeting in December due to a prior conflicting commitment.
3. Michael L'Estrange was unable to attend a Board meeting in February for personal reasons.
4. Jennifer Nason was unable to attend meetings of the Sustainability Committee in October and the Remuneration Committee in December due to COVID-19 restrictions.

Board committee membership key

- ⓒ Committee Chair
- ● Audit Committee
- ● Remuneration Committee
- ● Nominations Committee
- ● Sustainability Committee

Nominations Committee report

The Nominations Committee seeks to ensure that the Board has the requisite mixture of skills, knowledge and expertise to provide robust oversight, and to identify and respond effectively to current and future opportunities and challenges.

In our approach to succession planning and appointments, we are committed to building an effective, diverse, knowledgeable, collegiate Board that provides robust oversight, encourages differing perspectives, promotes collaboration and inclusion, and convenes outside expertise effectively to help it navigate the increasingly complex opportunities and threats facing the Group.

The Nominations Committee was busy throughout the year, including overseeing the appointments of our new Chief Financial Officer, Peter Cunningham; a new Non-Executive Director, Ben Wyatt; and the new Chair-designate, Dominic Barton. In his first few months as Chief Executive, Jakob's priorities included the appointment of his new Executive Committee and a review of their development needs. The Committee supported Jakob in this process. In addition to the appointments of Peter as Chief Financial Officer, nine other members of the Executive Committee took up new roles during 2021.

Following the departure in October 2021 of our Group Executive – Strategy & Development, the Committee agreed with the recommendation of management that the role should cease as an Executive Committee position and endorsed a reallocation of the responsibilities, including:

- Business Development, Mergers and Acquisition (M&A) and Strategy now report to the Chief Financial Officer.
- Closure, Exploration and Energy & Climate Change report to the Chief Technical Officer.
- Health, Safety, Environment & Security (HSES), Communities & Social Performance (CSP) and Energy Resources of Australia report to the Chief Executive, Australia.
- Brand and Reputation, Communications and Media report to the Chief Legal Officer & External Affairs.

Following this period of unprecedented management change, during 2022 the Committee, and the Board, will refocus on broader talent management and succession planning. Following the appointment of Dominic Barton as our new Chair, the Committee will also review the composition of the Board to ensure, amongst other things, that it has adequate mining expertise.

Simon Thompson
Nominations Committee Chairman

23 February 2022

Chair succession

On 19 December 2021, the Board announced that it had selected Dominic Barton to succeed Simon Thompson as Rio Tinto's new Chair. Dominic will join the Board with effect from 4 April 2022 and be appointed to the role of Chair at the conclusion of the Rio Tinto Limited annual general meeting on 5 May 2022. Simon Thompson will step down as a Non-Executive Director of Rio Tinto and as Chairman at the same time on 5 May 2022, having served as Chairman for four years and as a Non-Executive Director since 2014.

A Ugandan-born Canadian, Dominic spent over 30 years at McKinsey & Company, including nine as the Global Managing Partner and six as Asia Chairman. Most recently, he has been Canada's Ambassador to China since 2019. He brings a wealth of global business experience having advised clients in a range of industries, including banking, consumer goods, high tech and industrials, as well as a deep insight of geopolitics, corporate sustainability and governance.

Dominic's previous corporate governance work includes being Chair of Teck Resources, a Non-Executive Director at the Singtel Group in Singapore and a Non-Executive Director at Investor AB in Sweden. He has held various public sector leadership positions, including Chair of Canada's Advisory Council for Economic Growth and Chair of the International Advisory Committee to the President of South Korea on National Future and Vision. His business acumen and public sector insights position him to provide critical guidance and oversight to Rio Tinto's leadership team.

The Board is delighted to have appointed such an outstanding individual and is confident Dominic will lead the Rio Tinto Board with distinction. He has an impressive track record, with extensive and broad business and international relations knowledge, particularly in Asia, and a deep understanding of the link between business, governments and society.

Nominations Committee members

Simon Thompson (Chairman)	Michael L'Estrange[1]
Megan Clark	Simon McKeon
Hinda Gharbi	Jennifer Nason
Simon Henry	Ngaire Woods
Sam Laidlaw	Ben Wyatt

1. A member during 2021, stood down at the Rio Tinto Limited AGM in May 2021.

Appointments to the Board – our policy

We base our appointments to the Board on merit, and on objective selection criteria, with the aim of bringing a range of skills, knowledge and experience to Rio Tinto. This involves a formal and rigorous process to source strong candidates from diverse backgrounds and conducting appropriate background and reference checks on the shortlisted candidates. We aim to appoint people who will help us address the operational and strategic challenges and opportunities facing the company and ensure that our Board is diverse in terms of gender, nationality, social background and cognitive style. As such, we only engage recruitment agencies that are signed up to the Voluntary Code of Conduct on diversity best practice.

When recruiting government or former government officials to join the Rio Tinto Board, we comply with any restrictions and obligations existing pursuant to relevant laws and regulations, including with respect to confidentiality, lobbying and conflicts of interest. For example, the timing and terms of the recent appointments of Ben Wyatt and Dominic Barton complied with all relevant restrictions and obligations. In Mr Wyatt's case, there was no requirement for any "cooling off" period between Mr Wyatt ceasing to serve as a government official and joining the Rio Tinto Board as a Non-Executive Director. However, as a matter of good practice, a six-month "cooling off" period after leaving office was mutually agreed by both parties.

We believe that an effective Board combines a range of perspectives with strong oversight, combining the experience of Directors who have developed a deep understanding of our business over several years with the fresh insights of newer appointees. We aim for our Board composition to reflect the global nature of our business. We currently have four different nationalities (including dual nationalities) on a Board of 11.

The Committee engaged Spencer Stuart to support the search for a new Chair. The recruitment of Ben Wyatt as a Non-Executive Director was not supported by an external agency. The Committee is satisfied that Spencer Stuart does not have any connections with the company or individual Directors that may impair their independence.

The key skills and experience of our Board are set out in the table at the end of this report.

Our diversity and inclusion policy sets out our expectations around the behaviours needed for an inclusive and diverse workplace. The policy is co-owned and supported by the Board and Executive Committee. At a Group level, we report against gender diversity targets (see page 28) and achievement of these targets contributes to the variable remuneration of senior executives. In addition, each of our operations has locally-set employment targets. Their performance against these targets can be found in our 2021 Sustainability Fact Book.

Read our full policy on our website – riotinto.com/sustainability/policies.

Our key responsibilities

The purpose of the Nominations Committee is to review the composition of the Board. The Committee leads the process for appointments, making recommendations to the Board as part of succession planning for both Non-Executive and Executive Directors. It also approves proposals for appointments to the Executive Committee and monitors the succession planning and development of a diverse talent pipeline for Executive Committee members and their direct reports.

Membership of the Committee

All Non-Executive Directors are members of the Nominations Committee.

The Chief Executive and the Chief People Officer are invited to attend all or part of meetings, as appropriate. The Committee is chaired by the Chairman of the Board, unless the matter under consideration relates to the role of the Chairman. During 2021, the Chairman did not attend meetings where his succession was discussed.

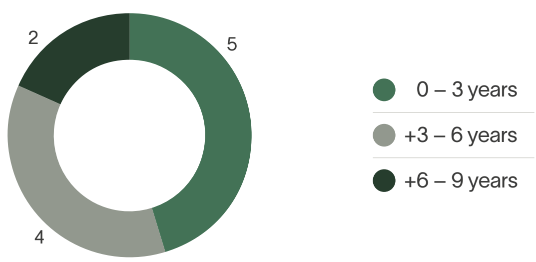
The Committee had six meetings in 2021. Attendance at these meetings is included in the table on page 147.

Gender diversity

The Board recognises that it has a critical role to play in creating an environment in which all contributions are valued, different perspectives are embraced, and biases are acknowledged and overcome. The Board shares ownership with the Executive Committee of the Group's inclusion and diversity policy, which can be found at riotinto.com. We also discuss diversity and inclusion in the Sustainability section of this Annual Report.

The proportion of women on the Board is 36.4% (four women and seven men). The Group has continued to set measurable gender diversity objectives for the composition of senior leadership and graduate intake. Progress on diversity is shown in the Sustainability section on pages 101-102, where we show a breakdown by seniority.

Length of tenure of Non-Executive Directors



The Chair appointment and induction process

Define	An executive search agency was appointed to manage the process, working with the Senior Independent Directors, Sam Laidlaw (UK) and Simon McKeon (Australia) and the Group Company Secretary. A candidate specification was prepared and agreed with the Committee. The finalisation of the specification also included discussions with a cross-section of our shareholders in relation to the attributes, experience and skills they expected in the new Chair. These included proven experience of managing highly complex, cross-border relationships across multiple stakeholders, a strong track record of working in Asia and emerging markets, a commitment to the highest ESG standards, and a proven ability to lead a Board and act as a mentor to the Executive team.
Review	The executive search agency, Spencer Stuart, identified potential candidates to create a longlist and presented this to the Committee for consideration.
Identify	The Board agreed the most suitable potential candidates from the longlist and instructed the executive search agency to approach them for interview and assessment.
Assessment	The shortlisted candidates were invited for initial assessment and interview, initially by the executive search agency and then by the full Board.
Appointment	The successful candidate was recommended for appointment to the Board.
Induction	The Group Company Secretary has arranged a comprehensive induction programme for the Chair-designate. It includes meetings with each Board member, the members of the Executive Committee and the senior leadership team. The overall programme is designed to ensure that Dominic will gain a thorough understanding of our: 1. Purpose, strategy and values. 2. Culture and people, including visits to our major sites and projects, with opportunities to meet with the local management teams and workforce. 3. Business and operations, through a series of tailored teach-ins, training programmes and site visits. 4. ESG agenda and what we are targeting to build our impeccable credentials. 5. Investors, including a detailed engagement plan with institutional and retail investors. 6. Key stakeholders, including host governments, communities, customers and suppliers. 7. Governance and regulatory framework, both in the UK and in Australia, and our capital and financing structure.

Skills and experience of the Chairman and Non-Executive Directors

Area of expertise		No. of Directors
Business leadership	Board level experience in a major corporation.	7
Capital projects	Experience of developing large-scale, long-cycle capital projects.	5
Financial	Proficiency in financial accounting and reporting, corporate finance, internal controls, treasury and associated risk management.	5
Mergers and acquisitions	Experience of mergers, acquisitions, disposals and joint ventures.	5
Global experience	Work experience in multiple global locations, exposed to a range of political, cultural, regulatory and business environments.	8
Corporate governance	Experience on the board of a major corporation subject to rigorous corporate governance standards.	6
Government and international relations	Interaction with governments and regulators or involvement in public policy development and implementation.	4
HSES/ESG	Familiarity with issues associated with workplace health and safety, asset integrity, environment and social responsibility, and communities.	6
Climate change	Knowledge and experience of climate-related threats and opportunities including climate science, low-carbon transition and public policy.	6
Communities and social performance	Experience of working with communities to optimise the benefits and minimise negative impacts of business activities.	6
Marketing	Senior executive experience in marketing, and the development of product and/or customer management strategies.	2
Mining	Senior executive experience in a large, global mining organisation involved in the discovery, development, operation and closure of mines.	2
HR/remuneration	Experience of talent recruitment, retention, development and incentives.	4
Technology/digital	Experience of managing research, development and innovation, including digital technology.	2

Audit Committee report

I am pleased to report on the work of the Audit Committee in 2021. This is set out in detail over the following pages, but in this introduction I would just like to highlight a few aspects of the year.

As usual, a significant proportion of the Committee's time has been spent considering the significant issues of judgment relating to the financial statements. In 2021, these included impairment charges/reversals, exclusions, closure provisions, climate change, tax, litigation and, for the first time, potential provisions for liabilities associated with Traditional Owners of land on which we operate. Our primary focus has been on potential impairments of assets and future closure liabilities. In each case, our work is focused on ensuring issues are identified early, the correct accounting judgments are made and that these matters are appropriately disclosed in our financial reporting. Further detail on these issues is provided on page 153.

In 2021 the Board has seen a further intensification of the focus on climate change. The Audit Committee has focused on the potential implications for the financial statements, in particular on price scenarios, asset valuations, lifetime of resources and future costs of closure. These matters contain significant uncertainties and complexity from an accounting perspective, and the Committee has carefully considered the accounting judgments involved and appropriate disclosures in our financial reporting. Further information on climate change-related financial reporting is provided on page 155 of the Audit Committee report.

We closely monitor developing regulatory requirements in the three jurisdictions in which we are listed, and have contributed fully to the likely 2022 release of new requirements in the UK. Our intent is to be a valued contributor to positive developments in corporate governance, and to adopt new requirements in a timely way. In addition, it is clear that regulator and societal expectations are increasing within existing requirements, and we have worked with our external auditors to ensure that our risk, control and assurance frameworks are developing at pace in line with best practice. In 2021, together with the Sustainability Committee, the Audit Committee has taken a particular interest in the effective development and operation of the "three lines of defence" assurance model. The Company's Internal Audit function has played a major role here, overseen by the Committee.

Lastly, I would like to express my thanks to my fellow Committee members and to others who support the work of the Committee. Sadly, 2021 has seen the continuation of the COVID-19 pandemic, and the travel restrictions associated with it have meant it has remained largely impossible for us to meet in person. That the Committee has managed to complete its full programme of work despite this challenge is testament to the skill and commitment of all involved.

I hope that readers will find the information set out on the following pages interesting and informative.

Simon Henry
Audit Committee Chair

23 February 2022

Audit Committee members

Simon Henry (Chair)

Hinda Gharbi

Simon McKeon

Membership

The members of the Committee are all independent Non-Executive Directors, and their biographies can be found on pages 134-135. The Chairman of the Board is not a member of the Committee.

As Rio Tinto's securities are listed in Australia, the UK and the US, we follow the regulatory requirements and best practice governance recommendations for audit committees in each of these markets.

Australian listing requirements

In Australia, the members, and the Committee as a whole, meet the independence requirements of the ASX Principles. Specifically, the Committee members between them have the accounting and financial expertise and a sufficient understanding of the industry in which the company operates to be able to discharge the Committee's mandate effectively.

UK listing requirements

In the UK, the members meet the requirements of the FCA's Disclosure Guidance and Transparency Rules, and the provisions of the UK Corporate Governance Code relating to audit committee composition. Simon Henry, the Chair of the Committee, is considered by the Board to have recent and relevant financial experience.

Simon Henry and Hinda Gharbi both have extensive prior experience of the natural resources sector. Simon McKeon has gained experience of the mining sector by serving on the Board and on the Committee, and through regular site visits, reports and presentations. The Committee as a whole has competence relevant to the sector in which the company operates.

US listing requirements

In the US, the requirements for the Committee's composition and role are set out in SEC and NYSE rules. The Board has designated Simon Henry as an "audit committee financial expert". The Board also believes that the other members of the Committee are financially literate by virtue of their wide business experience.

Committee remit

The Committee's objectives and responsibilities are set out in our terms of reference (see riotinto.com). These follow the relevant best practice recommendations in Australia, the UK and the US.

Our main duties are:

Financial reporting – we review the key judgments needed to apply accounting standards and to prepare the Group's financial statements. We also review the narrative reporting that goes with these, with the aim of maintaining integrity in the Group's financial reporting. Finally, we monitor any exclusions made in deriving alternative (non-GAAP) performance measures such as underlying earnings.

External audit – we oversee the relationship with the external auditors and review all the non-audit services they provide, and the fees for these, to safeguard the auditors' independence and objectivity. We also assess the effectiveness of the external audit and, when necessary, carry out a formal tender process to select new auditors.

Framework for internal control and risk management – we monitor the effectiveness of the Group's internal controls, including those over financial reporting. We also oversee the Group's risk management framework.

Group Internal Audit (GIA) – we oversee the work of GIA, and its head, who reports functionally to our Committee Chair.

Mineral resources and ore reserves – we oversee the reporting and assurance of mineral resources, and consider the impact on financial reporting.

Distributable reserves – we provide assurance to the Board that distributable reserves are sufficient, and in the correct corporate entities, to support any dividend proposals.

These duties feed into an annual work plan that ensures we consider issues on a timely basis. The Committee has authority to investigate any matters within its remit. We have the power to use any Group resources we may reasonably require, and we have direct access to the external auditors. We can also obtain independent professional advice at the Group's expense, where we deem necessary. No such advice was required during 2021.

The Committee Chair reports to the Board after each meeting on the main items discussed, and the minutes of our meetings are circulated to the Board.

We had six Committee meetings in 2021. Attendance at these meetings is included in the table on page 147. The Committee has met three times to date in 2022.

The Chairman of the Board, the Chief Financial Officer, the Group Financial Controller and the heads of GIA and Risk regularly attend our meetings, as do the Chief Legal Officer & External Affairs, and the Group Company Secretary. We invite other senior executives and subject-matter experts as needed.

The external auditors were present at all of the Committee meetings during the year. The auditors review all materials on accounting or tax matters in advance of each meeting, and their comments are included in the papers circulated to Committee members. The audit partners also meet with our Committee Chair ahead of each meeting to discuss key issues and raise any concerns.

The Committee meets regularly in private sessions. We also hold regular private discussions with the external auditors. Management do not attend these sessions. The Committee Chair also has regular contact and discussions with these stakeholders outside the formal meetings.

Use of Committee meeting time in 2021

Financial reporting	40%
External audit	20%
Internal control and risk management	20%
Internal audit	15%
Governance	5%

Other focus areas in 2021

In addition to our scheduled workload, the Committee also considered:

- An annual review and benchmarking of Rio Tinto's accounting policies and an overview of newly issued International Financial Reporting Standards (IFRS) standards and interpretations.
- A summary of the key financial measures relating to the Group's pension plans and the factors affecting those figures.
- Possible enhancements to the Group's long-term viability statement, and the scenario modelling that underpins it, based on the recommendation in the Brydon Report.
- After a robust process, in early 2022 the Committee recommended to the Board that the draft 2021 Annual Report is, taken as a whole, fair, balanced and understandable.

We also reviewed the quality and effectiveness of the Group's internal control and risk management systems in a joint session with the Sustainability Committee, which oversees a number of key corporate risks. This review included the effectiveness of the Group's internal controls over financial reporting, and the Group's disclosure controls and procedures in accordance with sections 404 and 302 of the US Sarbanes-Oxley Act 2002. The Committee also considered reports from GIA and KPMG on their work in reviewing and auditing the control environment.

Contact with regulators

During the year, the Company received a letter from the FRC's Corporate Reporting Review team requesting information in relation to their review of the 2020 financial statements. The principal areas where they required further information related to: Funding of Oyu Tolgoi, Alternative Performance Measures and deferred tax assets. Management's response was reviewed by the Committee Chair and discussed with the external auditors and additional disclosure has been incorporated in the 2021 financial statements in relation to these areas. The FRC Review team was satisfied with the response from the company and the proposed enhancements to disclosures. The scope of the review by the FRC was limited to reviewing the 2020 Annual Report and correspondence with management and does not provide assurance that the report and accounts are correct in all material respects.

Significant issues relating to the financial statements

There were six significant issues considered by the Committee in relation to the financial statements:

Matters considered	Conclusion
Review of carrying value of cash-generating units and impairment charges/reversals	The Committee assessed management's determination of cash-generating units, review of impairment triggers and consideration of potential impairment charges and reversals over the course of the year. Impairment triggers were identified at the Oyu Tolgoi and Kitimat cash-generating units. The Committee considered the key judgments made by management in relation to discount rates, forecast commodity prices and sensitivities in relation to climate change. Specifically with respect to Oyu Tolgoi the Committee received an update on the status of negotiations with the Government of Mongolia, technical readiness for the undercut and mine design. The Committee reviewed disclosures related to impairment reviews in note 6 and the impairment charges of $0.3 billion.
Application of the policy for items excluded from underlying earnings	The Committee reviewed the Group's policy for exclusion of certain items from underlying earnings and confirmed the consistent application of this policy year on year. The items excluded from underlying earnings comprised a net expense of $0.3 billion. A reconciliation of underlying earnings to net earnings is presented in note 2.
Estimate of provision for closure, restoration and environmental obligations	The Committee reviewed the significant changes in the estimated provision for closure, restoration and environmental obligations by product group and legacy management. The Committee received updates on closure studies completed in the period and discussed with management the accounting policy for legacy sites. The Committee noted the steps undertaken by management to review the preliminary information available from the reforecast of the closure costs for the Ranger Rehabilitation area at the Ranger Uranium mine and related controls undertaken as a result of the limited time available to reassess the provision. At 31 December 2021, the Group's balance sheet included a provision for close-down, restoration and environmental obligations of $14.5 billion.
Climate change	The Committee received an overview of the work management is undertaking in relation to climate change and the potential financial reporting implications thereof. The Committee reviewed the climate change summary provided in note 1 and discussed with management the three strategic scenarios, the portfolio strategy, and the linkage to accounting judgments. The Committee was pleased to see the enhanced voluntary disclosure of carrying value and useful economic lives of power generating assets in note 14.
The Group's tax exposures	The Committee considered management's assessment of the Group's tax exposures, including the recoverability of deferred tax assets which are uncertain due to the timing of expiry of tax loss carry-forwards in certain jurisdictions. The Committee received updates on the status of ongoing discussions with the Australian Tax Office relating to the transfer pricing of certain transactions with the Group's commercial centre in Singapore and considered the appropriateness of provisions for uncertain tax positions.
Litigation and disputes	The Committee considered any current or projected litigation and considered management's assessment of any financial provisions or contingent liabilities. This included discussion of the process to modernise agreements with Traditional Owners. Provisions are regularly updated, reviewed with the potential exposure and compared with the track record of settled outcomes.

External auditors

Engagement of the external auditors

For the 2021 financial year, KPMG are serving as our auditors. The UK entity of KPMG audits Rio Tinto plc, and the Australian entity audits Rio Tinto Limited. The UK audit engagement partner, Jonathan Downer, was appointed in March 2021 and the Australian partner, Trevor Hart, was appointed in 2020.

We agreed the scope of the auditors' review of the half-year accounts, and of their audit of the full-year accounts taking into consideration the key risks and areas of material judgment for the Group. We also approved the fees for this work and the engagement letters for the auditors.

Safeguarding independence and objectivity, and maintaining effectiveness

In our relationship with the external auditors we need to ensure that they retain their independence and objectivity, and are effective in performing the statutory audit.

Use of the external auditors for non-audit services

The external auditors have significant knowledge of our business and of how we apply our accounting policies. That means it is sometimes cost-efficient for them to provide non-audit services. There may also be confidentiality reasons that make the external auditors the preferred choice for a particular task.

However, safeguarding the external auditors' objectivity and independence is an overriding priority. For this reason, and in line with the FRC's Ethical Standard, the Committee ensures that the external auditors do not perform any functions of management, undertake any work which they may later need to audit or rely upon in the audit, or serve in an advocacy role for the Group.

We have a policy governing the use of the auditors to provide non-audit services. The cap on the total fees that may be paid to the external auditors for non-audit services in any given year is 70% of the average of the audit fees for the preceding three years. This is in line with the FRC's Ethical Standard. Non-audit assignments fall into two broad categories:

- Audit, audit-related or other "pre-approved" services where we believe there is no threat to auditors' independence and objectivity, other than through the fees payable.
- Other services approved under delegated authority. We apply different approval regimes to these areas of work. Approval of "pre-approved" services is as follows:
  - Up to $50,000 – subject to prior notification to management, this work can be awarded.
  - From $50,001 to $100,000 – requires the Chief Financial Officer's approval.
  - Over $100,000 and with a tender process – if the external auditors are successful in the tender, the appointment requires the Chief Financial Officer's approval.
  - From $100,001 to $250,000 without a tender process – requires the Chief Financial Officer's approval.
  - Over $250,000, without a tender process – requires the Committee's or Committee Chair's approval.

In each case, the nature of the assignment and the fees payable are reported to the Committee.

The Chief Financial Officer can approve other services up to the value of $50,000 and an aggregate value of no more than $100,000. Fees exceeding $100,000 in aggregate require approval from the Committee or the Committee Chair.

At the half-year and year-ends, the Chief Financial Officer and the external auditors report to the Committee on non-audit services performed and the fees payable. Individual services are also reported to the Committee at each meeting that have either been approved since the previous meeting, or that require approval for commencement following the meeting.

All of the non-audit services provided by KPMG in 2021 were either within the predetermined approval levels or approved by the Committee. We are satisfied that the provision of non-audit services by KPMG in accordance with this procedure is compatible with the general standard of independence for auditors and the other requirements of the relevant Australian, UK and US regulations.

Fees for audit and non-audit services

The amounts payable to the external auditors, in each of the past two years, were:

	2021 $m	2020 $m
Audit fees	**21.2**	17.3
Non-audit service fees:		
Assurance services	**3.7**	2.2
Taxation services	**0.0**	0.0
All other fees	**0.2**	0.1
Total non-audit service fees	**3.9**	2.3
Non-audit: audit fees (in-year)	**18%**	13%

For further analysis of these fees, please see note 38.

None of the individual non-audit assignments was significant, either in terms of the work done or the fees payable. We have reviewed the non-audit work in aggregate. We are satisfied that neither the work done, nor the fees payable, compromised the independence or objectivity of KPMG as our external auditors.

Independence of the external auditors

KPMG are required to provide a declaration to the Directors in relation to their compliance with the independence requirements of the Australian Corporations Act 2001 and the professional code of conduct for external auditors. A copy of this is on page 324.

No person who served as an officer of Rio Tinto during 2021 was a director or partner of KPMG at a time when they conducted an audit of the Group.

Effectiveness of the external auditors

We review the effectiveness of the external auditors annually. We consider the results of a survey containing questions on the auditors' objectivity, quality and efficiency. The survey, conducted in May 2021, is completed by a range of operational and corporate executives across the business, and by Committee members. In addition, the 2020 audit was the subject of an inspection by the Audit Quality Review team of the FRC with no significant findings.

We are satisfied with the quality and objectivity of KPMG's 2020 audit. 2020 represented KPMG's first year as external auditor and, unsurprisingly, some transition challenges were encountered which were exacerbated by COVID-19-related restrictions impacting the efficiency of the audit. We have seen improvement on this through 2021 as audit routines and testing programmes continue to embed across our Group functions and businesses.

Appointment of the auditors

The Committee has reviewed the independence, objectivity and effectiveness of KPMG as external auditors in 2021 and in the year to date. We have recommended to the Board that KPMG should be retained in this role for 2022, which the Board supports.

KPMG have indicated that they are willing to continue as auditors of Rio Tinto. A resolution to reappoint them as auditors of Rio Tinto plc will therefore be proposed as a joint resolution at the 2022 AGMs, together with a separate resolution seeking authority for the Committee to determine the external auditors' remuneration.

Subject to the approval of the above resolution, KPMG will continue in office as auditors of Rio Tinto Limited.

Risk management and internal controls

We review Rio Tinto's internal control systems and the risk management framework. We also monitor risks falling within our remit, especially those relating to the integrity of financial reporting. A summary of the business's internal control and risk management systems, and of the principal risks and uncertainties we face, is in the strategic report on pages 117-130.

Importantly, responsibility for operating and maintaining the internal control environment and risk management systems sits at asset level. Leaders of our businesses and functions are required to confirm annually: that adequate internal controls are in place; that these are operating effectively and are designed to identify any failings and weaknesses that may exist; and that any required actions are taken promptly.

Two management committees, the Executive Committee and the Disclosure Committee, review reports on the Group's control framework. The work they do satisfies the relevant requirements of the Code, the ASX Principles, the NYSE Standards and section 404 of the US Sarbanes-Oxley Act 2002.

The Audit Committee also regularly monitors our risk management and internal control systems (including internal financial controls). We aim to have appropriate policies, standards and procedures in place, and ensure that they operate effectively.

As part of considering the risk management framework, the Committee receives regular reports from the Group Financial Controller, the Chief Legal Officer & External Affairs, and the Head of Tax on material developments in the legal, regulatory and fiscal landscape in which the Group operates.

The Board, supported by the Audit Committee, has completed its formal annual review of the effectiveness of our risk management and internal control systems. This review included consideration of our material financial, operational and compliance controls. The Board concluded that the Group has an effective system of risk management and internal control.

Internal control over financial reporting

The main features of our internal control and risk management systems in relation to financial reporting are explained on page 204.

Internal audit programme structure

GIA provides independent and objective assurance of the adequacy and effectiveness of risk management and internal control systems. It also may recommend improvements.

While the head of GIA reports administratively to the Chief Financial Officer, appointment to, or removal from, this role requires the consent of the Audit Committee Chair. The head of GIA is accountable to the chairs of both the Audit and the Sustainability Committees, communicates regularly with both, and attends all regular committee meetings. Our GIA team therefore operates independently of management. Its mandate is set out in a written charter, approved by the Audit Committee. GIA uses a formal internal audit methodology, which is consistent with the Institute of Internal Auditors' (IIA's) internationally recognised standards.

When needed, the team brings in external partners to help achieve its goals. There is a clear policy to address any conflicts of interest, which complies with the IIA's standards on independence. This policy identifies a list of services which need prior approval from the head of GIA.

Governance of the annual plan

Each year's internal audit plan is approved by the Audit Committee and the Sustainability Committee. The plan is focused on higher-risk areas and any specific areas or processes chosen by the committees. It is also aligned with any risks identified by the external auditors. Both committees are given regular updates on progress, including any material findings, and can refine the plans as needed.

Effectiveness of the internal audit programme

The Audit Committee monitors the effectiveness of the GIA function throughout the year, with updates on performance at every meeting.

We are satisfied that the quality, experience and expertise of GIA are appropriate for the business and that GIA was objective and performed its role effectively. We also monitored management's response to internal audits during the year. We are satisfied that improvements are being implemented promptly in response to GIA findings, and believe that management supports the effective working of the GIA function.

Committee effectiveness

The Committee reviews its effectiveness annually. In 2021, this was accomplished through an internally facilitated evaluation of the Board and its committees.

The performance of the Audit Committee was highly rated, with no areas of concern raised and no significant changes recommended. In terms of improvements, it was suggested that a further in-depth session on risk management/risk tolerance would be useful, together with the resumption of themed teach-ins (assuming a return to physical meetings in 2022).

Climate change-related financial reporting

The Directors have considered the relevance of the risks of climate change and transition risks associated with achieving the goals of the Paris Agreement when preparing and signing off the company's accounts. The narrative reporting on climate-related matters is consistent with the accounting assumptions and judgments made in this report. The Audit Committee reviews and approves all material accounting estimates and judgments relating to financial reporting, including those where climate issues are relevant.

In developing its commodity price forecasts, the Group considers three strategic scenarios with differing underlying assumptions about geopolitics, technology and society. As existing climate policies in many countries are not aligned with achieving the Paris Agreement, only one of the three strategic scenarios assumes a temperature increase of well below 2°C. The three scenarios include differing assumptions on carbon pricing and result in differing commodity price forecasts. Our central case commodity price forecasts represent a blend of the three scenarios. As a consequence, our central case is not aligned with the goals of the Paris Agreement. These central case commodity price forecasts are used pervasively in our financial processes including impairment testing, estimating remaining economic life, and discounting closure and rehabilitation provisions.

We have disclosed sensitivity information based on cash flows flexed for the carbon and commodity price forecasts generated by the one scenario that we believe is consistent with achieving the goals of the Paris Agreement. These sensitivities indicate that, in relation to impairment testing for example, higher recoverable amounts would have been determined had we applied commodity price forecasts aligned with the Paris Agreement.

In addition to commodity price forecasts, given the significant investment we are making to abate our carbon emissions, we have also considered the potential for asset obsolescence, with a particular focus on our investments in the Pilbara, but no material changes to accounting estimates have been necessary. The closure date and cost of closure is also sensitive to climate assumptions, but no material changes have been made in the year specific to climate change.

Sustainability Committee report

Caring for our people and our communities, and helping to solve the world's biggest environmental challenges, sits at the heart of Rio Tinto's approach to sustainable development.

The purpose of the Sustainability Committee is to enhance Rio Tinto's social licence to operate by supporting and monitoring the sustainable development of Rio Tinto's businesses. This includes our work to support the health and safety of our people, the many ways we help our local communities, and our partnerships with Traditional Owners and First Nations peoples.

The Sustainability Committee oversees Rio Tinto's frameworks, management systems, and processes for ensuring the health and safety of our employees and contractors; monitors our key environmental risks such as water, tailings management and biodiversity; and supports the Group's contribution to the sustainable development of the communities in which we operate. In 2021, the Committee also monitored climate risk, and our progress against our climate change strategy.

The Committee has overseen a focus on the UN Sustainable Development Goals (UN SDGs) within the business, and the new sustainability framework reflects our focus on two lead goals – SDG12 (responsible consumption and production) and SDG8 (decent work and economic growth), which are most relevant to our business, and where we can have the most significant impact. In 2021, progress on SDG12 was made through a focus on recovery of critical minerals from waste, sustainability transparency and traceability in the aluminium value chain through START; and on SDG8 through increased investment in Indigenous leadership development, leading to a fivefold increase in Indigenous leaders in Australia, and an increase of approximately 53% on our 2020 voluntary social investment spend globally.

For the third year running, we experienced zero fatalities at our managed operations. While this is heartening, our people are still suffering injuries at our assets and we saw a small increase in our all-injury frequency rate in 2021. We believe all injuries are preventable and the Committee reviewed selected potentially fatal incidents with business leaders during the year to ensure that important lessons are learned from these incidents and communicated.

Core to our ongoing improvement in safety performance is the safety maturity model, which focuses on leadership behaviours in the field and critical risk management. In 2021, the Committee reviewed contractor safety action plans developed by management for each product group. We will further integrate contractors into the safety maturity model from 2022, to close the disparity in safety performance between employees and contractors. Our safety maturity model will also assess mindsets and behaviours to help create a safe work environment and support the work needed on the Everyday Respect initiative to ensure our workplaces are free from bullying, sexual harassment, racism and other forms of discrimination.

Tragically, there were eight fatalities across our non-managed operations and contracted marine transportation operations during 2021. We continue to work with our joint venture partners and shipping industry peers and counterparties to improve safety performance at those operations.

We continue to work on rebuilding respectful relationships with the Traditional Owners in the lands on which we operate following the tragic destruction of the rock shelters at Juukan Gorge in May 2020. The Committee reviewed actions to strengthen our approach and processes for managing cultural heritage – both within our Iron Ore business, and across our operations globally. On 30 September 2021, to ensure transparency of the work we are undertaking in this area, we released our first report on the progress we are making. The report includes an update on our progress against the recommendations of the interim report from the inquiry into Juukan Gorge by the Australian Government's Joint Standing Committee on Northern Australia. It also includes feedback from Traditional Owner groups in the Pilbara on our progress on some of the key commitments made as part of the Rio Tinto Board's 2020 review of our cultural heritage management. The full report is available at riotinto.com and an update on our progress is available on pages 94-95 of this report.

This year, our Chief Executive outlined a revised strategy that will see the company accelerate its decarbonisation by switching to renewable power, electrifying processing, and running electric mobile fleets. An increased research and development spend on technologies will enable our customers to decarbonise and we will prioritise growth capital in commodities that are essential to build a clean energy future.

In 2021, the Group continued to navigate the significant challenges to resourcing our operations presented by the COVID-19 pandemic. Our leadership team is to be commended for the measures adopted to keep our people healthy, and for keeping our operations running safely and smoothly. We have developed a position supporting vaccination of our people in line with the latest scientific knowledge, industry best practice and local regulatory requirements, and we have stepped up our support for employees in areas such as mental health, managing fatigue, and adjusting to working from home.

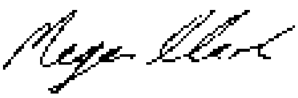
Other key areas of focus for the Committee in 2021 included:

- Major hazards: conducting deep dives on the major hazard risks and their control frameworks in our business.
- Water: overseeing our approach to water management and monitoring our progress against our water stewardship targets.
- Tailings: continuing to oversee the review of our control framework for tailings dams and water storage, and monitoring our implementation of the new Global Industry Standard for Tailings Management.
- ESG goals: establishing specific environmental, social and governance metrics to constitute one half of the individual component of the 2021 short-term incentive plan for our senior executives.
- Governance: reviewing our processes for oversight of key sustainability risks, particularly in relation to communities and social performance.
- Sustainability trends: reviewing emerging global sustainability trends including external briefings on nature-based solutions for climate change and growing the circular economy.

Site visits are an important element of the work of the Committee, and this year, despite COVID-19 restrictions, our Committee members made individual visits to our Iron Ore operations at Brockman in the Pilbara, Western Australia; our bauxite operations at Gove, Northern Territory; Energy Resources of Australia's operations in the Northern Territory; Kennecott's operations in Salt Lake, Utah; our Resolution Copper joint venture project in Arizona; and our lithium project at Jadar in Serbia.

In 2022, the Committee will oversee further definition of our sustainability ambitions and the introduction of additional ESG targets across the business.

By supporting and monitoring the broad range of sustainability issues facing our business, the Committee seeks to enhance Rio Tinto's social licence to operate for the benefit of our shareholders, employees and contractors, the communities in which we operate, and the world in which we live.



Megan Clark
Sustainability Committee Chair

23 February 2022

Sustainability Committee members

Megan Clark (Chair)	Jennifer Nason
Hinda Gharbi	Simon Thompson
Simon Henry	Ngaire Woods
Sam Laidlaw	Ben Wyatt (from 1 September 2021)
Michael L'Estrange (until retirement from the Board on 6 May 2021)	

The role of the Committee

The Committee's scope and responsibilities are set out in its terms of reference which can be found at riotinto.com.

Activities in 2021

The Committee met seven times in 2021, and focused on:

Health and safety

- Group performance across key health and safety metrics.
- Potentially fatal incidents (PFIs) occurring across the Group.
- Analysis of PFIs between 2017 and 2021 relating to falling objects and strategies to reduce the risk of injuries and fatalities caused by falling objects.
- Management actions to develop targeted contractor safety action plans for each product group.
- Group COVID-19 response, including developing a position on vaccination.
- Group strategic health priorities for 2021 to 2024, and strategies to meet the business's evolving requirements to protect our employees' health and wellbeing.
- Deep dives into key safety risks and controls, including:
  - mass passenger transport incident risk
  - process safety risk
  - functional safety systems risk

Environment, including climate change

- Group performance across key environmental metrics.
- Group environment risks, and progress in addressing those risks in line with our strategic vision and priorities.
- Progress against our climate change targets and related projects and partnerships.
- Assessment of the physical risk impacts from climate change, and the steps taken to mitigate and develop resilience to those risks.
- Progress against the Group's 2019 to 2023 water stewardship targets.
- An in-depth review of the Group's water management framework, risk profiles and controls.
- Implementation of an improved integrated site water management approach at QIT Madagascar Minerals (QMM).
- Group implementation of the Global Industry Standard for Tailings Management, and engagement with Accountable Executives in line with the Standard's requirements, and a review of tailings storage facilities at the non-managed bauxite joint venture Mineração Rio do Norte S.A. in Brazil.

Communities and Social Performance

- The Communities and Social Performance (CSP) function's annual plan and priorities for 2021.
- Group-wide review of CSP risks, and work to strengthen our control framework around CSP risks in line with our CSP standard, our Cultural Heritage Group Procedure and other CSP guidance documents.

- Iron Ore product group response to the findings of the Board review and the parliamentary inquiry preliminary report into the destruction of the rock shelters at Juukan Gorge, with particular focus on engagements with the Puutu Kunti Kurrama and Pinikura (PKKP) people, the agreement modernisation process, and the Integrated Heritage Management Process.
- Engagement with Native American tribes and the operation of our Integrated Heritage Management Process at our Resolution Copper joint venture project in Arizona.
- CSP targets for 2022-2026.

Governance, executive incentive metrics and disclosure

- Processes for oversight of key sustainability risks, particularly in relation to CSP.
- Group's 2020 short-term incentive plan in relation to safety, and the metrics for the 2021 targets.
- ESG metrics which now constitute one half of the individual component of the short-term incentive plan for our senior executives.
- Recommendations to the Remuneration Committee for the Group Safety and ESG metrics for the 2022 short-term incentive plan.
- Reviewed reporting materials including:
  - 2020 Climate Change Report published in February 2021, our third report
  - Group 2020 Sustainability reporting materials, including the Sustainable development sections of the 2020 Annual Report
  - Group 2020 Statement on Modern Slavery, ahead of its approval by the Board
  - Communities and Social Performance Commitments Disclosure Interim Report
- Assessment of the Group's most material sustainability topics to be reported on in the 2021 Annual Report, combining feedback from internal leaders and subject-matter experts, and considering stakeholder expectations as well as an analysis of the external environment.
- Statutory due diligence obligations applicable to Directors and officers under applicable workplace health and safety laws in the key jurisdictions in which Rio Tinto operates.
- Sustainability Committee's scope and responsibilities as reflected in its terms of reference.

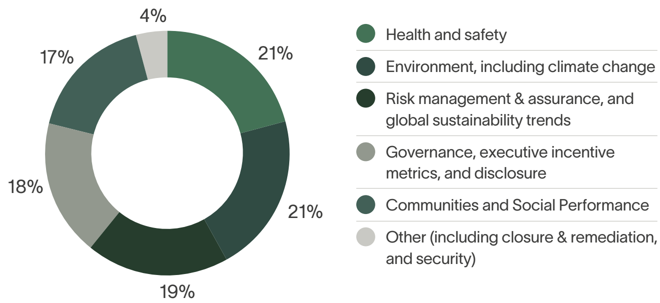
Risk management & assurance, and global sustainability trends

- External assurance programme of the Group's sustainability reporting, and safety performance data supporting the safety performance outcomes under the short-term incentive plan.
- Key sustainability risks for each product group and for the Group's marine operations as presented by product group heads.
- Reviews undertaken by the Group Internal Audit function relating to matters within the Committee's scope, including:
  - mine planning processes, particularly processes for obtaining cultural and environmental approvals
  - the CSP function's Assurance Programme for Cultural Heritage
  - water management control frameworks for the boron and Pilbara operations
  - key global sustainability trends associated with the circular economy, and nature-based solutions
  - Group risk management and internal controls systems to support the Board's risk disclosures in the Annual Report, in a joint session with the Audit Committee

Other (including closure & remediation, and security)

- Our current and emerging closure portfolio, including progress against the Group's closure plan.
- Closure and remediation process for Energy Resources of Australia's Ranger uranium mine.
- Group security issues and key insights on risk assessments and controls.

The chart below represents the allocation of the Committee's meeting time during 2021:



The Committee Chair reports to the Board after each meeting, and our minutes are tabled before the Board. All Directors have access to the Committee's papers.

Sustainability disclosures

Our sustainability framework and performance are described in detail on pages 74 to 78 of this report.

Further information in relation to Rio Tinto's approach to sustainability can be found on our website at riotinto.com/sustainability.

Our Climate Change Report can be found on our website at riotinto.com/climatereport.

Our Communities and Social Performance Commitments Disclosure Interim Report can be found on our website at riotinto.com/communities.

Our 2020 Statement on Modern Slavery can be found on our website at riotinto.com/modernslavery.

By supporting and monitoring the broad range of sustainability issues facing our business, the Sustainability Committee seeks to enhance Rio Tinto’s social licence to operate.

Remuneration report

Annual statement by the Remuneration Committee Chair

The Committee's overarching purpose is to ensure the remuneration structure and policies reward fairly and responsibly.

On behalf of the Board, I am pleased to introduce our 2021 Directors' Remuneration report.

Strategy and business performance

This was the first year under the leadership of our new Chief Executive with a new management team.

The Board approved four objectives – to become the best operator; achieve impeccable Environment, Social and Governance (ESG) credentials; excel in development; and secure a strong licence to operate – and a new strategy, including more ambitious targets to tackle climate change. We have accelerated our target reduction of 15% in our absolute Scope 1 and 2 carbon emissions from 2030 to 2025, and established a new target to achieve a 50% reduction by 2030, more than tripling our previous target.

Despite operational challenges, Rio Tinto delivered record financial results and returns to shareholders of US$15.4 billion during 2021. In support of our battery materials strategy, we committed to fund the high-quality Jadar lithium project, subject to receiving all relevant approvals, permits and licences, and the announcement of a binding agreement to acquire the Rincon lithium project. We continue to make progress, identifying opportunities for operational improvement, and advancing our ambitious ESG agenda.

2021 AGMs voting outcome

Although our Remuneration Policy received strong support (96.8%), shareholders registered significant concerns about the treatment of departing executives in light of the Juukan Gorge tragedy, with a significant vote against the Remuneration report. The Committee acknowledges that our pay policies, and the constraints they imposed on our ability to exercise discretion, were found to be insufficient in the unforeseen circumstances of the Juukan Gorge tragedy.

Responding to this, the new Policy approved in 2021, includes an expanded scope for the application of malus and clawback to cover events that impact on our social licence to operate. It also incorporates ESG targets in the short-term incentive plan (STIP) that are meaningful, transparent and quantifiable, and in 2021 specifically recognised the importance of communities and social performance, including heritage.

Over the past 12 months, I have engaged with shareholders and proxy advisers to explain the rationale for the decisions reached in 2021 and, most of all, to listen. The Committee revisited the questions as to whether greater sanctions could be applied. The legal advice remains that, following the agreements reached with the relevant departing executives, greater sanctions are not possible absent any new material information coming to light. However, the Committee has responded to the concerns expressed by shareholders by introducing two significant changes to our Policy.

Consequence Management Framework

We have established a clear Consequence Management Framework to provide guidelines as to how the Committee's discretion to apply malus and clawback will be exercised in the future. The framework underpins the exercise of discretion in our incentive plan rules, the scope of those discretions and their practical application across a range of circumstances. This has been informed by insight from remuneration consultants and external legal counsel, our own experience, as well as the Juukan Gorge tragedy.

We fully recognise that this framework can only ever be a guide and should avoid being overly prescriptive. Otherwise, it would deliver formulaic outcomes that fail to take account of all relevant and prevailing circumstances at any given point of time. We consider the framework to be a critical and practical reference point for future decision making in ensuring that our incentive pay is fair, transparent, appropriate, proportionate and supportable.

The Committee recognises that voting outcomes on future Remuneration reports will continue to be impacted by the actual decisions made by the Committee, and we will provide a transparent rationale for such decisions.

Equity Incentive Plan leaver provisions

We have also changed the structure of the leaver provisions in our Equity Incentive Plan 2018 (EIP) rules that will apply to prospective long-term awards. Prior to this change, the presumption is that long-term awards vest except in bad (ineligible) leaver circumstances. Going forward, awards will only vest if the Committee is satisfied the individual is an eligible leaver. This meaningfully strengthens the Committee's hand in the instances where it is appropriate, proportionate and fair to lapse all or part of unvested awards.

Pages 163-164 expand further on the Consequence Management Framework and leaver provisions on a forward-looking basis, and detail specific responses to investor feedback received during 2021.

Chief Financial Officer succession

The Committee also determined the remuneration of Peter Cunningham in his new role as Chief Financial Officer, following Jakob Stausholm's appointment as Chief Executive on 1 January 2021. All terms are consistent with the shareholder approved Remuneration Policy. Further details are outlined on page 185.

Short-term incentive plan

Safety performance

Rio Tinto has now achieved three consecutive years fatality free. This is a significant milestone given that 2019 was the first time in 147 years we were fatality free.

The company had another challenging year managing the pandemic and regrettably we saw a small increase in the number of people hurt on the job. The all-injury frequency rate in 2021 was 0.40 compared to 0.37 in 2020. There were no permanent disabling injuries (PDI) recorded across the Group in 2021.

The safety maturity model (SMM) was introduced to the business in 2019 and is now in its third year of implementation. Once again, most sites showed improvement from their baseline score. There is an increase across the Group from a combined average baseline of 5.0 (evolving) to an average maturity of 5.7 (evolving).

Overall, the Group's safety performance is 66% of maximum.

Financial performance

As a reminder, in comparing financial performance against the annual plan, we measure half against the original plan; the other half is "flexed" to exclude the impact of variations during the year associated with quoted metal and other prices along with foreign exchange rates, which are outside management's control. When commodity prices rise, or the variation in exchange rates results in a favourable impact to the financial results, we protect shareholder returns by ensuring that 50% of the STIP opportunity (as relates to financial performance) is denied the benefit of that rise. When the reverse happens, and commodity prices fall or there is a negative impact of exchange rates, the STIP opportunity is safeguarded (by 50%) against the fall. Our view is that this approach maintains appropriate incentive for executives, even in times of significant market volatility.

In 2021, Rio Tinto benefited from attractive trading conditions and the company was able to achieve record financial results. However, certain elements of operating performance were behind expectation. The ongoing impacts from COVID-19 caused significant headwinds which resulted in labour constraints, supply chain disruptions and project delays. The Group's unadjusted financial result of 60% of maximum is underpinned by the high pricing environment experienced in 2021, driving strong financial results on an unflexed basis (the earnings result exceeded the outstanding range while the cash flow result was just below outstanding). However, the challenging operating environment during the year resulted in the financial targets being towards the lower end of the range on a flexed basis.

The Committee considered whether any adjustments were warranted to ensure the outcome was a fair reflection of underlying performance. The adjustments made related to tax prepayments and the buyout of the French pension plan which did not reflect current year performance. Accordingly, the adjusted Group performance against the financial targets is 63% of maximum.

ESG performance

As part of the new Policy, we introduced an ESG component into the STIP scorecard in 2021 to complement the long-standing safety component. Overall, good progress was made against the different dimensions comprised in this component with an overall performance outcome of 52.3% of maximum.

For the Environment component, important steps were taken in 2021 to advance towards the company's ambitious climate change targets by approving abatement projects and the delivery of goals to progress our Scope 3 partnership strategy.

For the Social component, Rio Tinto's aspiration is to foster an environment where all aspects of diversity are represented, included and respected. Representation of women in the company's workforce increased by 1.5%, which was the highest increase in the last five years. However, the target of 2% was not achieved.

Finally, for the Governance component, following the Juukan Gorge tragedy, efforts were focused on strengthening the frameworks and processes by delivering the Group communities and social performance (CSP) improvements, developing and delivering locally and regionally relevant cultural awareness training to employees globally, as well as improving the Group's assurance and risk management.

Further details on our performance against the 2021 STIP measures are set out on pages 175-177.

Everyday Respect

In March 2021, we launched our Everyday Respect task force to better understand, prevent and respond to harmful behaviours in the workplace, specifically bullying, sexual harassment, racism and other forms of discrimination. To support the work of the task force, we engaged Elizabeth Broderick & Co. to conduct an independent review and to make recommendations to strengthen our culture and ensure sustained change. The report was published on 1 February 2022 and the findings shared are upsetting and confronting. We are committed to making the changes required to create a safe, respectful and inclusive workplace for our people.

Our new values of care, courage and curiosity reflect who we aspire to be. They guide the Committee in its decision making and are foundational to our remuneration-related policies, principles and practices. In recognition of the findings in the Everyday Respect report, the management team recommended that a downward adjustment be made to the 2021 STIP payments. The Committee concluded that a reduction of 5% should be applied to the total STIP payment for current Executive Committee members and an equivalent adjustment be made to the 2020 unvested Bonus Deferral Awards (BDA) held by former Executive Committee members. The STIP for 2022 will also include objectives linked to the recommendations arising in the report.

2021 short-term incentive plan awards

The adjusted 2021 STIP award for the Chief Executive is 61.3% of maximum, and for the Chief Financial Officer is 57% of maximum. This includes a personal performance score in which the Committee considered their achievements against personal objectives.

The Committee considered the Chief Executive's performance against his individual objectives, which included redefining and restructuring the Executive Committee, articulating the new strategy including the four objectives, resetting the culture and launching the company's new values, further development of the projects portfolio, and making good progress in restoring our reputation and licence to operate. For the Chief Financial Officer, this included strengthening the balance sheet through disciplined focus on cost management, being a key contributor in the evaluation and approval of key growth projects and capital improvement programmes, and leading our investor relations strategies across key markets. The Committee determined the Chief Executive's performance to be 80% of maximum and the Chief Financial Officer's performance to be 50% of maximum. Refer to pages 178-179 for further detail.

Long-term incentive plan

The estimated vesting for the 2017 Performance Share Award (PSA), combining the two TSR and EBIT margin portions, is two-thirds of maximum. In determining the estimated vesting of the 2017 PSA, the Committee considered the Consequence Management Framework principles to ensure the vesting outcome was fair and representative of the shareholder experience.

The portion of the award relating to TSR vests on 24 February 2022. The Committee will make a final determination of the relative improvement in the EBIT margin measure when the final EBIT margin performance of the comparator group companies becomes available in May 2022. If applicable, this portion of the award will vest on 31 May 2022.

Pay in the broader context

The Board continued to engage with employees through the year, as detailed on page 140. These engagements enable the Board to hear directly the views of our people on pay. The Committee remains cognisant of executive pay in the broader context of a post COVID-19 world, ensuring our Policy is implemented with the desired attributes of fairness, transparency, simplicity, proportionality, and alignment to broader organisational culture and societal expectations.

The median Chief Executive pay ratio of 32:1 is materially lower than last year, primarily because Jakob joined the Group after the award of the 2017 LTIP that vests in 2022. His first LTIP award is to be performance tested at the end of 2022.

Our focus on pay equity is evident in our gender pay metrics on which we continue to make progress. Pay equity is a key pillar of our annual remuneration approach. Gender diversity in senior management roles also remains a key aspect of our broader agenda on diversity and inclusion. Further details on both equal pay and the gender pay gap, together with a wider discussion on diversity and inclusion, are provided in the Sustainability section of this report on pages 101-103.

As always, I welcome shareholder feedback and comments on our 2021 Directors' Remuneration report.

Yours sincerely,

Sam Laidlaw
Remuneration Committee Chair

23 February 2022

Response to 2021 AGMs voting outcomes

The table below sets out the actions we have taken in response to feedback from shareholders and proxy advisers on the treatment of incentives for departing executives. Our actions have focused on how the Remuneration Policy is implemented. It is noted that the Remuneration Policy received support of 96.8% at the 2021 AGMs.

Changes approved at the 2021 AGMs	– Malus and clawback under incentive plans have been expanded to specifically include any future events that materially impact our social licence to operate. – ESG measures have been introduced into the STIP and the implementation of these in 2021 meaningfully aligns with our climate change ambition, our commitment to diversity and inclusion, our external partnerships and the communities which we operate in, as well as the governance of our cultural heritage management.
Changes post the 2021 AGMs	– The establishment of a Consequence Management Framework to further underpin the exercise of discretion in the incentive plan rules. The framework comprises a series of questions across a number of dimensions (including individual demeanour, leadership standards and alignment to company values) to be considered by the Committee in the context of exercising its discretion on future malus and clawback adjustments to variable pay outcomes. Further details are set out below. – The leaver provisions in the EIP rules made a presumption that eligible leaver treatment applied to all leavers, except those leaving by reason of resignation, dismissal for cause or for any other reason as the Committee decided. For future awards, the rules have been amended to presume that EIP awards lapse, unless the Committee determines that eligible leaver status should apply.

Consequence Management Framework

The Consequence Management Framework tests the extent that incentive pay is fair, appropriate and defendable. In instances where this is not the case, including scenarios where behavioural and leadership standards are not met, discretion would be exercised to adjust the outcome. The key elements of the framework are set out below.

Proportionate in factoring the appropriate levels of responsibility, accountability and materiality	**Defendable** against external scrutiny, while considered fair and justifiable to the executive	**Contextualised** where possible, learn from the past and take any relevant precedents (internal and external) into account	**Non-arbitrary** and evidence-based with a clear rationale for decisions made on executive pay

Framework guidelines

Discretion assessment	Determining incident severity	Nature and scope of adjustment
– Shareholder experience – Other relevant factors and dimensions – Exceptional events	– Severity of incident's impact – Extent of accountability/responsibility – Individual demeanour and leadership	– Determine nature of adjustment (malus, clawback, or suspension) – Determine element(s) of variable remuneration impacted – Determine magnitude of adjustment

Consequence Management Framework: Application in practice

Step 1: Determine if the exercise of discretion is warranted	Consider the relevant factors including corporate reputation and the extent of accountability in evaluating whether the application of discretion is warranted. This is a broad discretion that would apply as an overlay to the more formulaic calculation of the outturn on the performance metrics based on defined calculation criteria and frameworks.

Step 2: Consider the type of remedial action to be taken, and the form and magnitude of any adjustment to variable remuneration	In circumstances where the Committee determines that the application of malus, clawback and/or suspension is warranted under Step 1, Step 2 guides the Committee in determining the appropriate type and extent of adjustment by considering the nature and severity of incidents both within the company and more broadly, underpinned by a consistency check against other incidents. Step 2 will also include consideration of the time horizon within which the issue arose to assist the Committee in determining which awards should be subject to adjustments. Importantly, the Committee will consider the nature, immediacy and extent of remedial actions, if any, that have been undertaken, and outstanding remediation that needs to be undertaken.

Step 3: Consideration of the nature and severity of the incident	In the first instance, careful consideration of the incident against the backdrop of our values including codes of conduct (codified and implied) and behavioural standards needs to occur to guide the nature and direction of the remedial action(s). In addition, the Committee will need to consider, where relevant, the period of time it might take for the full extent of certain issues to emerge to enable a fulsome assessment of the severity and impact. In certain instances, it may be appropriate to suspend or make an initial adjustment to demonstrate timely action, position this accordingly and retain flexibility to revise it when the full impact of the incident is known.

Step 4: Types of incentives and level of malus/clawback	Once the Committee has formed a view on the severity of the incident and determined that an adjustment to pay outcomes is a component of the remedial action, the variable compensation element(s) in scope, whether short-term, long-term or both, and the magnitude of the adjustment will need to be considered.

Step 5: Consistency check and communication to executive(s)	Once the Committee has come to a provisional determination in relation to the remedial action(s) and adjustment to be made to the relevant executive's variable remuneration, a 'consistency' check will be carried out. Whilst it is acknowledged that expectations and standards evolve and the past should not automatically guide the future, it provides a useful additional lens and perspective which should ensure that: i. (if applicable) the proposed method and quantum of malus/clawback is consistent between different employees involved in a similar incident or event; ii. the determination is appropriate and proportionate when compared to previous unrelated malus/clawback determinations made by the Committee pursuant to the framework; and iii. if necessary, reassess precedent and establish a new standard.

Remuneration at a glance

Our Remuneration Policy applies to our Executive and Non-Executive Directors and to the Chair. In accordance with Australian law, it also sets out the broad policy principles that apply to members of the Executive Committee who are not directors. Our Remuneration Policy as approved at our 2021 AGMs can be found at: riotinto.com/annualreport. The Remuneration Policy applicable to our executives is summarised in the table below.

Element	Purpose	Operation and opportunity
Base salary	Competitive salaries are paid to hire, motivate and retain high calibre global talent.	– Base salaries are set to reflect broad alignment with comparable roles in the global external market and the executive's qualifications, responsibilities and experience. – Base salaries are reviewed annually by the Committee and any increase is normally aligned with the wider workforce, with a maximum individual annual increase of 5% plus CPI. – An individual increase may be higher in specific circumstances such as promotion, increased responsibilities or market competitiveness.
Pension or superannuation	Competitive post-employment benefits are provided in order to hire and retain.	– Rio Tinto may choose to offer participation in a pension plan, superannuation fund, or a cash allowance in lieu. – The maximum annual benefit is set to reflect the pension arrangements for the wider employee population and is currently capped at 14% of base salary.
Other benefits	Competitive benefits are provided in order to hire and retain.	– Executives are eligible to receive benefits which may include private healthcare cover, life and accident insurances, professional advice, and other minor benefits. – Secondment, relocation and localisation benefits may also be made to and on behalf of executives living outside their home country.
Short-term incentive plan (STIP)	STIP focuses participants on achieving demanding annual performance goals, which are based on the Group's objectives, in pursuit of the creation of sustainable value for our stakeholders.	– Measures and the relative weightings for the scorecard are selected by the Committee that are priorities for the financial year in question, including the achievement of financial, safety, ESG and other individual business outcomes. At least 50% of the measures will relate to financial performance and a significant component will relate to safety performance. – For financial performance, threshold performance results in a nil award and outstanding award results in 100%. The award is normally pro-rated on a straight-line basis between threshold and outstanding. – Maximum opportunity is capped at 200% of base salary for each executive. – Normally, 50% of the STIP is delivered in cash and the balance is delivered in shares that are deferred for three years as a BDA. – Dividends (or equivalents) are not paid on unvested BDA. Dividends (or equivalents) may accrue in respect of any BDA that vest. – The Committee retains the right to exercise discretion to ensure that the level of award payable is appropriate. – Malus, clawback and suspension provisions apply to the STIP and BDA.
Long-term incentive plan (LTIP)	Performance Share Awards (PSA) under the LTIP are designed to provide a simple and transparent mechanism to align executives' rewards with the delivery and execution of Rio Tinto's long-term strategy and ambitions which delivers superior long-term shareholder returns.	– Award levels are set to incentivise long-term strategic performance and to contribute towards the competitiveness of the overall remuneration package. – Performance is measured against TSR relative to the EMIX Global Mining Index and to the MSCI World Index. – The Committee will set performance conditions aligned with the Group's long-term strategic objectives for each PSA grant. Relative TSR has been chosen as the predominant measure of long-term performance. The Committee retains the discretion to adjust the performance measures and weightings as appropriate. – Awards have a maximum face value of 400% of base salary and threshold performance would result in the vesting of up to 22.5% of the face value of an award. – The awards have an expected value of approximately 50% of face value. – Dividends (or equivalents) are not paid on unvested LTIP. Dividends (or equivalents) may accrue in respect of any PSA that vest. – The Committee retains the right to exercise discretion and seeks to ensure that outcomes are fair and reflective of the overall performance of the company during the performance period. – Malus, clawback and suspension provisions apply to LTIP awards.

Shareholding requirements	Aligning executives' interests with shareholders through the requirement to build up and maintain a material shareholding in the company.	– Over a five-year period, executives should reach a share ownership in Rio Tinto shares equivalent in value to:
		  – Chief Executive: four times base salary
		  – Other executives: three times base salary
		– Longer periods may be accepted for new appointments.
		– Executive Directors are required to retain a holding for two years after leaving the Group in line with the shareholding requirements.

Element	Purpose	Operation and opportunity
Recruitment policy	Recruit high calibre global talent.	– No form of “golden hello” will be provided upon recruitment. In the case of internal appointments, existing commitments will be honoured. – Our approach with respect to ”buy-outs” is to determine a reasonable level of award, on a like-for-like basis, consisting primarily of share-based awards, but also potentially cash, taking into consideration the quantum of forfeited awards, their performance conditions and vesting schedules. – Other elements of remuneration are to be consistent with the Policy applicable to other executives.

Termination policy	Appropriately reward eligible and ineligible leavers.	– An Executive Director’s notice period is normally 12 months, during which they will receive their base salary and other benefits.
		– Ineligible leavers forfeit their unvested LTIP and STIP entitlement.
		– An eligible leaver may receive the following:
		  – A discretionary STIP award on a pro rata basis, payable on the normal STIP payment date in cash.
		  – Any unvested BDA from prior year awards will normally vest on the scheduled vesting date.
		  – Unvested LTIPs will normally be retained and vest on the scheduled vesting date, subject to performance conditions where applicable.
		– PSA and Management Share Awards (MSA), where applicable, will be reduced where the executive leaves within 36 months of grant.
		– STIP and LTIP awards are subject to malus, clawback and suspension following termination.

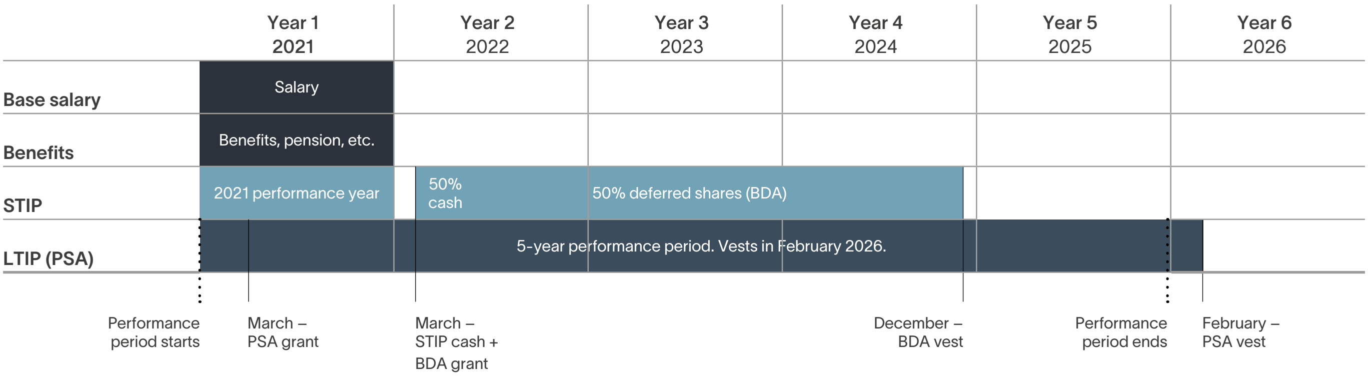
Malus, clawback and suspension	Enables the Committee to use its discretion to reduce incentive awards in the event of exceptional circumstances.	– Under both the malus and clawback provisions, where the Committee determines that an exceptional circumstance has occurred, it may at its discretion, reduce the STIP award or the number of shares to be received on vesting of an award, or, for a period of two years after the vesting of an award, the Committee can clawback value from a participant.
		– The Committee will apply the Consequence Management Framework and the circumstances under which the Committee exercises such discretion may include, inter alia:
		  – fraud, misconduct or an exceptional event which has had, or may have, a material effect on the value or reputation or social licence of any member of the Group;
		  – an error in the Group’s financial statements which requires a material downward restatement;
		  – personal performance and leadership behaviour of a participant, of their product group or of the Group does not justify vesting or where the participant’s conduct or performance has been in breach of their employment contract, any laws, rules or codes of conduct applicable to them or the standards or demeanour reasonably expected of a person in their position;
		  – misstatement or misrepresentation of performance;
		  – where any team, business area, member of the Group or profit centre in which the participant works or worked has been found guilty in connection with any regulatory investigation or has been in breach of any laws, rules or codes of conduct applicable to it or the standards, leadership behaviour or demeanour reasonably expected of it;
		  – where the Committee determines that there has been material damage to the Group’s social licence to operate; or
		  – a catastrophic safety or environmental event.
		– Under the suspension provisions, the Committee may suspend the vesting of an award for up to five years until the outcome of any internal or external investigation is concluded and may then reduce or lapse the participant’s award based on the outcome of that investigation. Where suspension applies, the 24-month clawback period will not extend beyond the period commencing from the original vesting date.

Discretion	Ensures pay outcomes reflect the Group’s overall performance and risk appetite.	– The Committee reserves the right to review all remuneration outcomes arising from mechanistic application of performance conditions and to exercise discretion to make adjustments where such outcomes do not properly reflect underlying performance or the experience of shareholders or other stakeholders. – The Committee may at its discretion adjust and/or set different performance measures if events occur which cause the Committee to determine that the measures are no longer appropriate or in the best interests of shareholders or other stakeholders, and that amendment is required so that the measures, as far as possible, achieve their original purpose. Such discretion will be exercised judiciously and clearly disclosed and explained in the Implementation report.

When developing the Remuneration Policy, the Committee considered the pay arrangements from the perspective of clarity, simplicity, risk, predictability, proportionality and alignment to culture. Further detail is set out on page 151 of the 2020 Annual Report.

When remuneration is delivered

The following chart provides a timeline of when remuneration is delivered, using 2021 as an example.



Incentives and link to strategy

Our new strategy reinforces our priority on ESG with decarbonisation at the centre of our focus to future proof our business.

Metrics / Group objectives		Best operator	Impeccable ESG credentials	Excel in development
STIP	ESG	✓	✓	
	Cash flow	✓		
	Earnings	✓		
LTIP	TSR	✓	✓	✓

Decarbonisation ambition		Link to remuneration
Accelerating decarbonisation	Accelerate our own decarbonisation, switching to renewable power, electrifying processing and running electric mobile fleets. Bringing forward our 2030 target of reducing our Scope 1 and 2 emissions by 15% to 2025. More than tripling our 2030 target, increasing it to a 50% reduction in our Scope 1 and 2 emissions. Investment in research and development to speed up the development of technologies that will enable our customers to decarbonise. Investing an estimated US$7.5 billion in decarbonisation from 2022 to 2030.	ESG metrics in STIP include progress of Scope 1 and 2 abatement projects and the delivery of Scope 3 target milestones. Long-term shareholder value creation and the delivery of the strategic ambition is measured through TSR and incentivised in the LTIP.
Invest in a low-carbon future	Prioritise growth capital in commodities that are essential for the drive to net zero. Increasing our investment in growth capital expenditure with an ambition to increase growth capital by up to US$3 billion annually.	

2021 remuneration outcomes

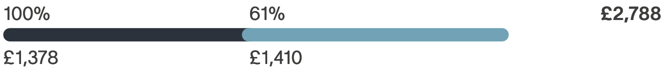
Executive Director remuneration (£'000)

The charts below set out the maximum and actual executive remuneration, as calculated under the UK regulations. As explained on page 171, there are differences in both reporting and methodology for measuring remuneration under the Australian regulations.

Chief Executive

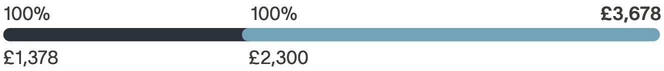
Jakob Stausholm

2021 Actual remuneration (percentage of maximum)



2021 Threshold remuneration (percentage of maximum)

2021 Maximum remuneration



Fixed STIP LTIP

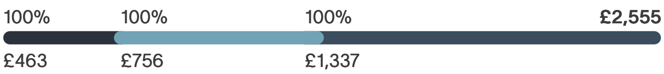
Chief Financial Officer

Peter Cunningham

2021 Actual remuneration (percentage of maximum)

2021 Threshold remuneration (percentage of maximum)

2021 Maximum remuneration



Fixed STIP LTIP

2021 short-term incentive plan

Performance	13.2%
Weighting	20%
Performance	31.5%
Weighting	50%
Performance	7.9%
Weighting	15%
Performance	see page 177
Weighting	15%

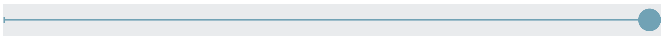
Group safety Group financial Group ESG Individual

Negative discretion applied to overall outcome – see page 177.

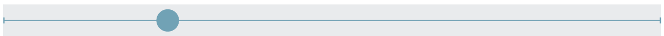
Safety performance

In 2021, the Group safety performance was above target at 66% of maximum.

Binary fatality measure 100%



All-injury frequency rate (AIFR) 25%

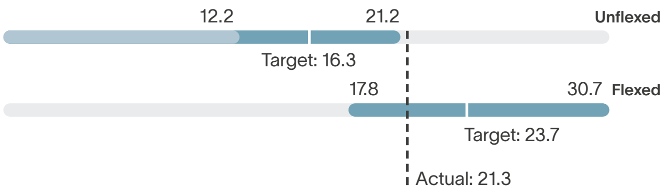


Implementation of safety maturity model (SMM) 52.5%

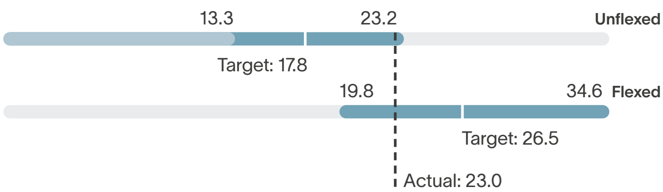
Financial performance

In 2021, the Group financial STIP outcome was above target at 63% of maximum.

Underlying earnings target range (threshold to outstanding) – US$(bn)



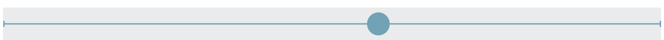
STIP free cash flow target range (threshold to outstanding) – US$(bn)



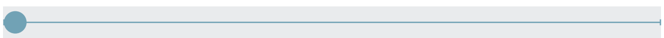
ESG performance

In 2021, the Group ESG outcome was above target at 52.3% of maximum.

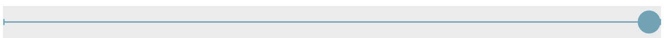
Environment 57%



Social 0%



Governance 100%



2017 – 2021 LTIP

■	Performance	33.3%
	Weighting	33.3%
■	Performance	33.3%
	Weighting	33.3%
■	Performance	Nil
	Weighting	33.3%

■ TSR relative to EMIX Global Mining Index ■ TSR relative to MSCI World Index ■ Relative financial performance – EBIT margin improvement versus sector peers (forecast)

LTIP

Performance for the 2017 grant was based on TSR relative to the EMIX Global Mining Index (one third) and the MSCI World Index (one-third), and improvement in EBIT margin relative to global mining comparators (one-third).

Rio Tinto outperformed against the EMIX Global Mining Index and the MSCI World Index, resulting in maximum vesting of two-thirds of awards.

It is currently estimated that for EBIT margin improvement Rio Tinto is ranked sixth against a comparator group of 10, which would result in a vesting of nil out of a maximum one-third of the award for this measure. The final performance and vesting outcome will be finalised in May 2022.

Share ownership requirements

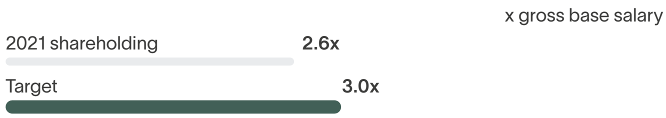
Following appointment to role in 2021, Jakob Stausholm and Peter Cunningham are in the process of building up their interest in Rio Tinto shares. Both are considered to be on target to reach their share ownership requirement of four and three times base salary respectively.

Jakob Stausholm

Appointed January 2021

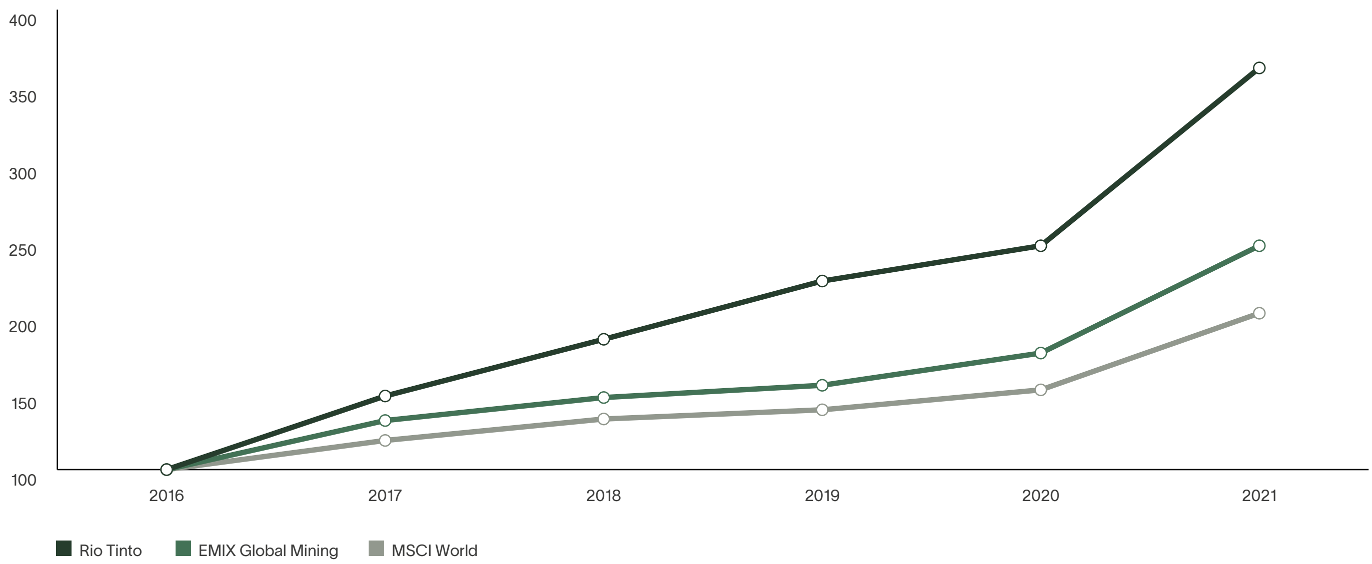
Peter Cunningham

Appointed June 2021



In addition, all past directors continue to meet their post-employment shareholding requirements.

Total shareholder return (five years)



(a) TSR for the MSCI and EMIX indices has been calculated using 12-month average Return Index data for the year sourced from DataStream.

(b) Rio Tinto's Group TSR has been calculated using a weighted average for Rio Tinto plc and Rio Tinto Limited. The weighting is based on the free-float market capitalisation of each entity as at the start of the period.

How is the Policy applied to the wider employee population?

The remuneration standard applied to the wider employee population is inspired by and consistent with the Policy applicable to the executives. This allows the total reward offering to employees to be competitive and strongly linked to performance whilst maintaining alignment with the company culture.

Remuneration principles

Competitive reward	Reward performance	Recognise potential	Focus on wellbeing	Retain talent

Fairness

Facilitating the achievement of equal pay for equivalent roles, contribution and performance. Pay equity is closely scrutinised and monitored through different lenses:

- In-depth pay equity analysis in the remuneration review process. Feeds into managing pay gaps from multiple perspectives including gender.
- Minimum global standards implemented across all countries to ensure the foundations of our total reward offerings meet levels determined by the Group irrespective of local market practices. Examples include global standards for parental leave and life assurance.

Ownership

- Promoting material participation in all-employee share plan (myShare) to give employees a sense of ownership and alignment with shareholders.
- As at 31 December 2021, approximately 25,000 (2020: 22,000) of our employees across more than 30 countries are shareholders in the company.
- Employees invest approximately US$16m (2020: US$14m) in Rio Tinto shares every quarter through the myShare plan.
- Employees eligible for LTIP awards receive these as either MSA, vesting over three years and not subject to performance conditions, and/or PSA which are performance tested over five years.

Consistency

- Consistency in implementation of the Remuneration Policy allows for more uniform approaches to remuneration across the Group.
- A good example is the incentive plans applicable to executives that are cascaded down to the broader employee population.

Wellbeing

- Leading benefits programmes across multiple industries, focused on holistic and integrated support for physical, mental and financial wellbeing.
- Providing flexible benefits that can be tailored to suit different needs and life stages, including employee assistance, minimum standard for life, accident and disability insurances, medical plans and virtual care, health screening and prevention, and subsidised health and wellbeing services.
- Understanding life is about more than work: family-friendly leave provisions and 100% employee coverage for our Family and Domestic Violence programme.

Security

- Reward principles that protect employee purchasing power globally.
- Accurate and timely payment of remuneration.
- Appropriate balance between fixed and variable pay at all levels.

<1.5%
Equal pay gap in favour of men

25,000
employee shareholders

21,000
STIP participants

1,800
LTIP participants

Implementation report

This Implementation report is presented to shareholders for approval at our AGMs. It outlines how our Policy was implemented in 2021, and the intended operation for 2022.

About our reporting

As our shares are listed on both the Australian and London Stock Exchanges, the information provided within our Remuneration report must comply with the reporting requirements of both countries.

Our regulatory responsibilities impact the volume of information we provide, as well as the complexity. In Australia, we need to report on a wider group of executives, as described in the following paragraph. In addition, as set out in the summary table below, the two reporting regimes follow different methodologies for calculating remuneration.

In the UK, disclosure is required for the Board, including the Executive Directors. The Australian legislation requires disclosures in respect of "key management personnel" (KMP), being those persons having authority and responsibility for planning, directing and controlling the activities of the Group. Accordingly, our key management personnel comprise the Board, all product group Chief Executives, the Chief Commercial Officer, and until 18 October 2021, the Group Executive Strategy & Development.

Throughout this Remuneration report, KMP are collectively referred to as "executives". They are listed on page 186, with details of the positions held during the year and dates of appointment to those roles.

The single total figure of remuneration table on page 174 shows remuneration for our Executive Directors, gross of tax and in the relevant currency of award or payment.

In table 1a on pages 191-192, we report information regarding executives in accordance with Australian statutory disclosure requirements. The information is shown gross of tax and in US dollars. The remuneration details in table 1a include accounting values relating to various parts of the remuneration package, most notably LTIP awards, and require a different methodology for calculating the pension value. The figures in the single total figure of remuneration table are therefore not directly comparable with those in table 1a. Where applicable, amounts have been converted using the relevant average exchange rates included in the notes to table 1a.

In table 1b on page 193, we report the remuneration of the Chairman and the Non-Executive Directors. Certain information contained within the Remuneration report is audited, as outlined on page 198.

Shareholder voting

The Implementation report, together with the annual statement by the Remuneration Committee Chair, is subject to an advisory vote each year as required by UK legislation. Under Australian legislation, the Remuneration report as a whole is subject to an advisory vote. All remuneration-related resolutions will be voted on at the AGMs as Joint Decision Matters by Rio Tinto plc and Rio Tinto Limited shareholders.

The differing approaches explained

As well as the difference in methodology for measuring remuneration, there are also key differences in how remuneration is reported in the UK and Australia.

UK

- For reporting purposes, remuneration is divided into fixed and variable elements.
- We report remuneration in the currency it is paid, for example, where a UK executive is paid in pounds sterling, remuneration is reported in pounds sterling.

Australia

- For reporting purposes, remuneration is divided into short and long-term elements.
- All remuneration is reported in US dollars, so using the previous example, the UK executives' remuneration would be converted to US dollars using the average exchange rate for the financial year (except STIP, which is converted at the year-end exchange rate).

The table below summarises the elements of each component of remuneration, as well as the significant differences in the approaches to measurement.

UK	Australia
Fixed	**Short-term**
Base salary	Base salary
+ Benefits	+ STIP – cash element
+ Pension The value of the pension contribution and payment in lieu of pension paid during the year.	+ Cash benefits
	+ Non-monetary benefits
Variable	**Long-term**
STIP – cash element	STIP – deferred share element Based on the amortised IFRS fair value of deferred shares at the time of grant.
+ STIP – deferred share element	+ LTIP Based on the amortised IFRS fair value of the award at time of grant.
+ LTIP Measured at point of vesting.	+ Pension and superannuation Accounting basis.

= Total remuneration

Remuneration Committee responsibilities

The Committee's responsibilities are set out in our terms of reference, which we review each year, and are published in the corporate governance section of riotinto.com. Our responsibilities include:

- Determining the Group's remuneration structure and policies, and assessing their cost, including pension and superannuation arrangements for executives.
- Determining the mix and use of short and long-term incentive plans for executives and ensuring alignment with the company's strategic objectives.
- Overseeing the operation of the Group's short and long-term incentive plans for executives, including approving awards, setting performance criteria, and determining any vesting, and where necessary applying the Consequence Management Framework to current and prior awards.
- Determining contractual notice periods and termination commitments, and setting retention and termination arrangements for executives.
- Determining awards under the Group's all-employee share plan.
- Monitoring gender pay.
- Determining the terms of service upon appointment for the Chair and executives, and any subsequent changes.

We consider the level of pay and conditions for all employees across the Group when determining executive remuneration.

Committee membership

The members of the Committee during the year and to the date of this report were:

Sam Laidlaw (Committee Chair)	Megan Clark
Simon McKeon	Jennifer Nason
Simon Thompson	Ngaire Woods

How we work

The Group Company Secretary (or their delegate) attends meetings as secretary to the Committee. The Chief Executive, Chief People Officer and Head of Reward attend appropriate parts of the meetings at the invitation of the Committee Chair. No individual is in attendance during discussions about their own remuneration.

Independent advisers

The Committee has a protocol for engaging and working with remuneration consultants to ensure that "remuneration recommendations" (being advice relating to the elements of remuneration for KMP, as defined under the Australian Corporations Act) are made free from undue influence by key management personnel to whom they may relate. We monitored compliance with these requirements throughout 2021. Deloitte, the appointed advisers to the Committee, gave declarations to the effect that any remuneration recommendations were made free from undue influence by KMP to whom they related, and the Board has received assurance from the Committee and is satisfied that this was the case.

Deloitte are members of the Remuneration Consultants' Group, and voluntarily operate under its Code of Conduct (the Code) in relation to executive remuneration consulting in the UK. The Code is based upon principles of transparency, integrity, objectivity, competence, due care and confidentiality. Deloitte has confirmed that they adhered to the Code throughout 2021 for all remuneration services provided to Rio Tinto. The Code is available online at remunerationconsultantsgroup.com.

The Committee is satisfied that the Deloitte engagement partners and advisory teams that provided remuneration advice to the Committee do not have any connections with the company or individual directors that may impair their independence. During 2021, Deloitte's services also included attending Committee meetings, support on the new Policy and giving advice in relation to management proposals and shareholder consultations. Deloitte was paid US$365,777 (2020: US$268,394) for these services. Fees were charged on the basis of time and expenses incurred.

Willis Towers Watson provided general and technical executive remuneration services. These services predominantly related to remuneration of employees other than KMP. We received other services and publications relating to remuneration data from a range of sources. During the year, Deloitte also provided internal audit, tax compliance and other non-audit advisory services. These services were provided under separate engagement terms and the Committee is satisfied that there were no conflicts of interest.

How the Committee spent its time in 2021

During 2021, the Committee met ten times. We fulfilled our responsibilities as set out in our terms of reference.

Our work in 2021 included:

January 2021

- Reviewing and determining any base salary adjustments and LTIP grants for executives.
- Approving appointment terms for the new Executive Committee members.

February 2021

- Reviewing and determining "threshold", "target" and "outstanding" targets for the safety, financial and ESG components of the 2021 STIP.
- Reviewing actual performance against the targets for the 2020 STIP and assessing applicable adjustments.

May 2021

- Reviewing and determining the final EBIT margin outcome for PSA with a performance period ending 31 December 2020.
- Considering shareholder feedback on the remuneration-related resolutions for the 2021 AGMs, including the company's response to the voting outcomes.
- Acting in accordance with the terms of the deferral agreement for the former Chief Executive, Sam Walsh.

June 2021

- Determining the terms of appointment for the new Chief Financial Officer.
- Development of the Consequence Management Framework and revision to the leaver provisions in the EIP rules.

July 2021

- Completing scenario testing and further refinement of the Consequence Management Framework and leaver provisions in the EIP rules to discuss with shareholders.

August/September 2021

- Consultation with shareholders and proxy advisers to obtain feedback on specific proposals in relation to the Consequence Management Framework and leaver provisions in the EIP rules.

October 2021

- Discussion and further refinement of the Consequence Management Framework and leaver provisions in the EIP rules to discuss with shareholders.
- Reviewing executives' progress towards the Group's share ownership requirements.
- Reviewing the strategy and annual reports on the Group's global benefit plans.

November 2021

- Further consultations with shareholders on specific proposals in relation to the Consequence Management Framework and leaver positions in the EIP rules.

December 2021

- Preparing the Remuneration report (including this Implementation report).

Performance review process for executives

Rio Tinto conducts annual performance reviews for all its executives. Our key objectives for the performance review process are to:

- Improve organisational effectiveness by creating alignment between the executive's objectives, Rio Tinto's strategy, the individual's leadership behaviours and the Company's values.
- Provide a consistent, transparent and balanced approach to measure, recognise and reward executive performance.

The Chief Executive conducts the review for members of the Executive Committee and recommends the performance outcomes to the Committee. The Chief Executive's performance is assessed by the Chair of the Board and discussed and debated with the Committee and the full Board. Performance reviews for all executives took place in 2021 or early 2022.

Executive Directors

Single total figure of remuneration (£'000)

Executive Director (£'000)	Year	Base salary	Benefits	Pension	Total fixed	Bonus – STIP payment		Value of LTIP awards vesting[a]		Other	Total variable	Single total figure
						Cash	Deferred shares	Face value	Share price appreciation			
Jakob Stausholm (Chief Executive)	**2021**	**1,150**	**67**	**161**	**1,378**	**705**	**705**	**–**	**–**	**–**	**1,410**	**2,788**
Peter Cunningham (Chief Financial Officer)[b]	**2021**	**377**	**33**	**53**	**463**	**216**	**217**	**441**	**450**	**–**	**1,324**	**1,787**
Jakob Stausholm (Chief Financial Officer)	2020	789	83	174	1,046	564	565	–	–		1,129	2,175

(a) Dividend equivalent shares are valued at the grant price for the LTIP award and included in the face value figure, with the impact of share price change included under share price appreciation.

(b) The details for Peter Cunningham reflect remuneration from his appointment as Chief Financial Officer and Executive Director on 17 June 2021 to 31 December 2021. The LTIP granted in 2017 was in relation to his previous role.

At the end of the performance period, LTIP values are based on estimates of both the number of shares that will ultimately vest and the share price. These estimates are restated in the following year, once actual values are known. Refer to page 181 for further detail.

Fixed remuneration

Base salary (2021)

Consistent with prior practice, annual base salary increases for executives are generally in line with the base salary increases applying to the broader employee population. Base salaries are reviewed with a 1 March effective date.

Executive Director	Annual base salary at appointment 1 January 2021 £'000	Annual base salary at appointment 17 June 2021 £'000	Total base salary paid in 2021 £'000	Annual base salary at 1 March 2022 £'000	% change
Jakob Stausholm	**1,150**	**–**	**1,150**	**1,182**	**2.8%**
Peter Cunningham	**–**	**700**	**377**	**700**	**Nil**

Benefits (2021)

Includes healthcare, allowance for professional tax compliance services, and non-performance based awards under the all-employee share plans.

Pension (2021)

Pension benefits can either be paid as contributions to Rio Tinto's company pension fund or as a cash allowance.

Executive Director	Pension contributions paid to the Rio Tinto pension fund £'000	Cash in lieu of pension contributions paid £'000	Total £'000	Pension provision as percentage of base salary
Jakob Stausholm	4	157	161	14%
Peter Cunningham	3	50	53	14%

Peter Cunningham opted out of future accruals in the defined benefit plan following his appointment as Chief Financial Officer.

STIP (2021)

2021 Outcome

For an executive's STIP outcome, the weighted safety, financial, ESG and individual STIP results are added to determine the total result. The resultant STIP is delivered equally in cash and deferred shares.

	Weighted result										Delivered in:		Percentage of:		
Executive Director	Safety (20%)	Financial (50%)	ESG (15%)	Individual (15%)	Total	Total STIP (% of base salary)	Base salary £'000	STIP £'000	Discretion (% of total STIP)[b]	Adjusted STIP £'000	Cash £'000	Deferred shares £'000	Max awarded	Max forfeited	Target awarded
Jakob Stausholm	13.2	31.5	7.9	12	64.6	129.1	1,150	1,485	(5)	1,410	705	705	61.3%	38.7%	122.6%
Peter Cunningham[a]	13.2	31.5	7.9	7.5	60.1	120.1	700	456	(5)	433	216	217	57.0%	43.0%	114.1%

(a) Values for Peter Cunningham only represent his time served as CFO from 17 June 2021 to 31 December 2021.
(b) Downward discretion of 5% applied to total STIP in relation to the findings of the Everyday Respect report.

Maximum STIP is capped at 200% of base salary with awards of:
- 50% of maximum for target
- 100% of maximum for outstanding performance

Half of the STIP award will be paid in cash in March 2022, and the remainder will be delivered in deferred shares as a BDA, vesting in December 2024. On cessation of employment, any unvested deferred shares will lapse unless the Committee decides the executive is an eligible leaver.

2021 STIP measures

Performance categories	Weighting	Commentary
Safety	20%	Our goal is zero harm, including, above all, the elimination of workplace fatalities, and we consider safety as a key performance measure. Safety measures for all executives in 2021 included a standalone binary fatality measure (40%), with the remainder split between all-injury frequency rate (AIFR) (20%) and measures relating to our SMM (40%).
Financial	50%	Our current financial measures are based on two KPIs that are used in managing the business. The first, underlying earnings, gives insight to cost management, production and performance efficiency. A reconciliation of underlying earnings to net earnings is provided in note 2 (Operating segments) on page 239. The second, STIP free cash flow, is also an important measure to the business. It demonstrates how we convert underlying earnings to cash, and provides further insight into how we are managing costs, efficiency and productivity. STIP free cash flow comprises free cash flow (as reported on page 346), adjusted to exclude dividends paid to holders of non-controlling interests in subsidiaries (US$1.1 billion) and development capital expenditure (US$3.9 billion). This adjusted metric excludes the impact of those components of free cash flow which are not directly related to performance in the year and therefore better represents underlying business performance. In 2021, this measure was reduced by US$0.2 billion to include capital expenditure originally included in the STIP target as sustaining capital, but later classified as development capital in the Group's 2021 financial results. When we measure financial performance against the annual plan, half is measured against the original plan, and half is "flexed" to exclude factors that are outside management's control, such as the impact of fluctuations in exchange rates, or quoted metal and other prices. "Flexed" financial targets are typically higher than the "unflexed" targets set by the Board when commodity prices rise and lower when commodity prices fall. Actual underlying earnings and STIP free cash flow results are compared against equally weighted "flexed" and "unflexed" targets.
ESG	15%	A strong focus on ESG is critical to the success of our strategy. 2021 is the first year in which ESG measures have been introduced for all executives and included Environmental measures (5%), Social measures (5%) and Governance measures (5%).
Individual	15%	An assessment of individual performance against key priorities and objectives for the year.

The STIP measures for product group Chief Executive Officers (PGCEOs) include product group financial and safety measures in addition to Group financial measures.

Calculation of 2021 STIP award

The following tables summarise the calculation of STIP award for the Executive Directors. Below threshold payout is nil on the Group safety and financial measures.

Group safety measures

	Weighting (out of 100%)	2021 performance: Threshold	2021 performance: Target	2021 performance: Maximum	Actual	Result (% of maximum)	Weighted result (out of 100%)
Binary fatality	8%		No fatality			100%	8%
All-injury frequency rate	4%	0.4	0.33	0.3	Actual: 0.4	25%	1%
Safety maturity model	8%	5	5.7	6.7	Actual: 5.7	52.5%	4.3%
Total Group safety	20%					66%	13.2%

Commentary on safety measures

For a third consecutive year in 2021, we achieved zero fatalities. Performance against the binary fatality measure was therefore maximum for all executives.

There was a regression in the all-injury frequency rate (AIFR) of 0.40 in 2021 (2020: 0.37) following a strong performance in the previous year. There were no PDI recorded across the Group.

The 2020 end of year SMM scores formed the baseline (threshold) for the 2021 assessments. The 2020 Group baseline score was 5.4. In H1 2021, nine assets were added and five removed which resulted in an adjusted 2020 Group baseline score of 5.0. The 2021 average Group SMM achievement was 5.7. The Group SMM STIP result is the average of the SMM STIP scores achieved by the individual assets included in the programme. The Group performance against the safety targets is 66% of maximum.

Group financial measures

	Weighting (out of 100%)	2021 performance (US$bn): Threshold	2021 performance (US$bn): Target	2021 performance (US$bn): Maximum	Actual	Result (% of maximum)	Weighted result (out of 100%)
Underlying earnings	12.5%	12.2	16.3	21.2	Actual: 21.3	100%	12.5%
Underlying earnings – flexed	12.5%	17.8	23.7	30.7	Actual: 21.3	30%	3.8%
STIP free cash flow	12.5%	13.3	17.8	23.2	Actual: 23	98%	12.3%
STIP free cash flow – flexed	12.5%	19.8	26.5	34.6	Actual: 23	24%	3%
Total Group financial	50%					63%	31.5%

Commentary on financial measures

The Group's unadjusted financial result is 60% (of maximum 100%). The Committee considered whether any adjustments were warranted to ensure the outcome was a fair reflection of underlying performance. The adjustments approved related to tax prepayments and the buyout of the French pension plan which did not reflect current year performance. On its review of the adjustments, the Committee was mindful of the change to the payout slope approved as part of the remuneration policy, which resulted in a minimal number of adjustments approved. Accordingly, the adjusted Group performance against the financial targets is 63% of maximum.

Group ESG measures

		Target	Outstanding	Result	Weighting (out of 100%)	Result (% of maximum)	Weighted result (out of 100%)
Environment	Approve 0.22Mt CO_2e of abatement projects	0.22Mt CO_2e	0.37Mt CO_2e	0.262Mt CO_2e	2.5%	64%	1.6%
	Delivery of goals to progress Scope 3 partnership strategy	3 out of 4	4 out of 4	3 of 4	2.5%	50%	1.3%
Social	Percentage point increase of women in the overall workforce against 2020 baseline	2%	3%	1.5%	5%	0%	0%
Governance	Support delivery of Group CSP improvements and cultural awareness training	See footnote[(a)]	See footnote[(a)]	3 of 3	2.5%	100%	2.5%
	Improved assurance and risk management processes	See footnote[(a)]	See footnote[(a)]	Stretch achieved	2.5%	100%	2.5%
Total Group ESG					15%	52.3%	7.9%

(a) The performance for each metric was verified against detailed deliverables, evaluation criteria and evidence requirements by the CSP Area of Expertise and independently assured. The key performance criteria were based on actions developed through the Trusted Partnership Program (TPP). The TPP was established in response to the Board's Review of Cultural Heritage Management which identified priority actions for the Iron Ore product group, Australia and the overall Group. Progress on TPP was reported to the Board's Sustainability Committee on a regular basis during 2021. The 2021 objectives under the Governance component contributed to the achievement of a number of the priorities identified in the Board review in the Group wide topic areas of social performance, assurance and organisation alignment.

Commentary on ESG measures

Impeccable ESG credentials is one of our four objectives. As part of the policy review, we introduced an ESG component into our STIP scorecard in 2021 to complement our long-standing safety component. Overall, we made good progress against the three dimensions of this component with an outcome of just above target.

On the environment, we took important foundational steps to advance towards our ambitious climate change targets by approving abatement projects and progress our Scope 3 partnership strategy.

On social, our aspiration is to foster an environment where all aspects of diversity are represented, included, and respected. The target related to improving female representation in the workforce by at least 2%. We achieved 1.5% which was the highest increase in the last five years but fell short of target.

In March 2021, we commissioned an independent review into sexual harassment, racism and bullying the findings of which were published 1 February 2022. The findings are deeply disturbing and are a source of enormous regret to have learnt the extent to which bullying, racism and sexual harassment are happening at Rio Tinto. This is not the kind of company we aspire to be. In recognition of the gravity of the findings, the management team recommended that a downward adjustment be made to the individual STIP payments to Executive Committee members. The Committee concluded, after applying the Consequence Management Framework, that a reduction of 5% should be applied to the total STIP payment for current Executive Committee members and an equivalent adjustment be made to the 2020 unvested BDA held by former Executive Committee members.

On governance, our efforts in 2021 were focused on strengthening our CSP frameworks, processes and risk management. This included important work on our Standard and Cultural Heritage Group Procedure for external engagement, the development and delivery of locally and/or regionally appropriate cultural awareness training to the majority of local risk owners and asset/project owners and the development of measurable outcomes-based asset-level CSP metrics and targets across the Group up to 2026.

Individual performance

	Weighting (out of 100%)	Result (% of maximum)	Weighted result (out of 100%)	Commentary on individual measures
Jakob Stausholm	15%	80%	12%	Refer to page 178
Peter Cunningham	15%	50%	7.5%	Refer to page 179

Jakob Stausholm

Priorities	Objectives	Achievements
Performance *Safety, operational and commercial excellence drive superior margins and returns*	Refocus organisation to become best operator	– Third successive fatality free year, with greater focus on non-managed operations and supply chain partners in 2022. – Launch of the Rio Tinto Safe Production System, designed to improve operational performance, which was deployed to the first sites in 2021 and will be significantly ramped up in in 2022. – Achieving record financial results with free cash flow of $17.7 billion and underlying earnings of $21.4 billion, after taxes and government royalties of $13 billion. This enables us to pay our highest total dividend ever of 1,040 US cents per share, including a 247 US cents per share special dividend, representing a 79% payout. However, underlying operational performance and project delivery in 2021 was behind expectation partly due to COVID-19 and other impacts. – Record annual average share price.
Portfolio *Low-cost, long-life assets that deliver attractive returns*	Develop growth pipeline for future optionality	– Setting the Group's objectives: to become the best operator; achieve impeccable ESG credentials; excel in development; and secure a strong licence to operate. – Launch of a new strategy, accelerating the decarbonisation of our assets through a 15% reduction in emissions by 2025 – five years earlier than originally planned. – Further development of the project portfolio, with commitment to Jadar project and Rincon acquisition as part of the Battery Minerals strategy. – Significant engagement with technical teams and external partners on key growth projects, Simandou, Resolution and Oyu Tolgoi (OT).
People *Building capability to drive performance*	Re-set company leadership, culture and values	– Appointment of a new Executive Committee team and intensively working on developing teamwork. – Successful roll-out of new Group values of care, courage and curiosity. – Launch of Voyager, a company-wide leadership programme, focused on development of the extended leadership team. – Transparent disclosure of an external review of workplace culture (Everyday Respect report published in February 2022).
Partners *Working with others for future success*	Re-build trust with stakeholders Prioritise impeccable ESG credentials	– Good progress in restoring reputation in Australia, particularly with Traditional Owners in the Pilbara and with government and other external stakeholders. – Focus and engagement on the world's transition to a low carbon economy as Chair of the ICMM climate sub-group and through attendance at Cop26 in Glasgow. – Publication of an interim report on the Group's CSP commitments. – Re-setting of relations with the Government of Mongolia (leading in early 2022 to the comprehensive agreement on how to take the OT project forward and commencement of underground operations).

Peter Cunningham

Priorities	Objectives	Achievements
Performance *Safety, operational and commercial excellence drive superior margins and returns*	Drive cash performance and functional performance	– Strengthened the balance sheet, including through disciplined focus on cost management in Annual Planning and Budget discussions. – Delivery of key Treasury activity (bond issuance and new revolving credit facility). – Design and implementation of rigorous monthly performance reviews, including quarterly deep-dives on critical topics.
Portfolio *Low-cost, long-life assets that deliver attractive returns*	Contribute to the growth pipeline	– Key contribution in formulating and communicating the new strategy. – Successful re-set of new strategic direction for the Finance leadership team and the Information Systems & Technology (IS&T) function. – Implementation of key organisational changes (Business Development and Strategy teams). – Integral to the evaluating and approval of key growth projects, capital improvement programmes and inorganic growth opportunities through role as Chair of the Evaluation Committee and key member of the Investment Committee.
People *Building capability to drive performance*	Build a capable and engaged function	– Continued to upgrade the capability across the Finance function through several strategic talent appointments and planning the succession pipeline. – Key contribution in successful roll-out of new Group values: care, courage and curiosity. – Strong leadership and commitment to *'The Way We Work'* and our ethics and integrity priorities.
Partners *Working with others for future success*	Re-build trust with key stakeholders	– Continued to strengthen relationships with shareholders. – Led our investor relations engagement strategies to reinforce our presence in key markets.

2022 STIP

This section outlines the operation of the 2022 STIP which is broadly unchanged from 2021 with the safety measures now included within the ESG scorecard.

2022 STIP measures, weightings and targets

Group STIP metrics	Weighting out of 100%
Financial: Underlying earnings	25%
Financial: Free cash flow	25%
ESG scorecard (including safety, climate change, diversity and governance)	35%
Individual	15%

The financial and individual targets that have been set for 2022 are considered by the Board to be commercially sensitive. As such, the specific targets for these measures, and the performance against them, are expected to be described retrospectively in the 2022 Implementation report.

2022 ESG measures, weightings and targets

As safety is clearly linked to sustainability, we have decided to simplify the STIP in 2022 to combine all ESG measures (including safety) into an ESG scorecard. The weighting for safety and other ESG metrics will remain consistent with 2021, however we have updated the ESG metrics to continue to stretch our performance and drive towards achieving impeccable ESG credentials.

As expectations evolve and we improve across the three ESG pillars, we may replace or amend ESG metrics and targets included in the STIP in future years. Other ESG-related objectives outside the STIP will continue to be actively managed and may form part of the executives' individual performance objectives. In selecting the focus areas and metrics for the ESG component, we have been conscious and mindful of the need to set credible stretch targets aligned to our strategic agenda that are transparent and measurable whilst recognising some inevitable limitations of what is possible.

The ESG metrics and targets for 2022 set out below were considered and approved by the Board.

	Threshold	Target	Outstanding	Weighting (out of 100%)
Safety – Fatality prevention (Binary)	n/a	n/a	No fatality	8%
Safety – AIFR	0.44	0.38	0.30 + 0 PDI	4%
Safety – SMM (basic and evolving assets)[a]	Rebased end of 2021 score	Improvement of 0.7 or achieve a total score of 6.0, whichever is less	Improvement of 1.5 or achieve a total score of 7.3, whichever is less	8%
Safety – SMM (advanced assets)[a]	Rebased end of 2021 score	Improvement of 0.5	Improvement of 1.5 or achieve a total score of 7.3, whichever is less	
Progress of Scope 1 and 2 abatement projects: projects >5kt CO_2 approved and delivered in 2022 that reduce 2025 emissions[b][d]		0.8Mt CO_2 reduction	1.65Mt CO_2 reduction	2.5%
Deliver Scope 3 milestones for our highest emission areas: steel decarbonisation, zero-carbon aluminium and shipping[d]		3 of 4 achieved	4 of 4 achieved	2.5%
Improve female representation in workforce[d]		2%	3%	2.5%
Implement actions from Everyday Respect report[d]		See footnote[c]	See footnote[c]	2.5%
Complete actions from the Juukan Senate Inquiry Report and 2020 Board report[d]		90% actions complete	100% actions complete	2.5%
Critical elements of the 2022 plan to implement the Global Industry Standard on Tailings Management[d]		All asset gap analyses complete and no tailings incidents with off-lease impacts	80% completion of asset work plans to close gaps for "very high" and "extreme" consequence facilities	2.5%
Total Group ESG				35.0%

(a) The SMM is now in the third consecutive year of implementation and it will be enhanced in 2022 to support the business through the next phase of safety improvement. The 2022 enhancements to the SMM criteria require a reset of the baseline from the 2021 end of year assessment scores. In Q4 2021, a set of sample assessments was completed across the Group comparing score outcomes against the existing and the enhanced models. The outcomes from these sample assessments have been used to set the criteria for determining 2022 baseline scores. Using the criteria on the site end of year assessments conducted in Q4 2021, the 2022 baseline score is determined to be 4.4. During the course of the year, sites will be added or removed in line with business reorganisations and the project and closure cycles, in which the 2022 baseline score will be updated. Changes will be fully disclosed in the 2022 Director's Remuneration report. Please refer to page 99 for more details of the 2022 enhancements.

(b) Projects that individually reduce 2025 emissions by 5kt CO_2 which may include approved renewable energy, abatement and energy efficiency projects.

(c) There are two equal components to measure the implementation of actions from the Everyday Respect report. The first component is to have all leaders (approximately 6,000 individuals) trained on responsibilities, prevention and response management of harmful behaviours in the workplace. The target and outstanding achievement is to have 80% and 100% of leaders complete the training respectively. The second component is to have safe and inclusive facilities at our workplaces. The target achievement is to complete a facilities review through inclusive on the ground engagement and implement safety critical upgrades of all facilities. The outstanding achievement is to implement all improvements of facilities that address inclusion and respect for all employees and contractors.

(d) No payout below target. With the exception of the binary approach to fatality prevention, payout of 50% of maximum for achieving target, going up in a straight line to outstanding.

LTIP

PSAs granted in 2017 were based on three performance conditions, all measured over a five-year performance period:

- TSR relative to the EMIX Global Mining Index – one-third.
- TSR relative to the MSCI World Index – one-third.
- Improvements in EBIT margin relative to global mining comparators – one-third.

Performance against the improvement in the EBIT margin measure cannot be finalised until May in the year following the end of the five-year performance period. This is due to the reporting timeframes for companies in the EBIT margin comparator group and the time taken for the external source (currently S&P Capital IQ) to report the relevant data. The EBIT margin comparator group includes Alcoa, Anglo American, Antofagasta, Barrick Gold, BHP, Fortescue, Freeport, Glencore, Teck Resources and Vale.

Accordingly, the value of the shares vesting included in the single total figure of remuneration table for 2021 is an estimate, which is finalised once the actual figures are known. The original estimate is based on:

- The TSR portion of the award (with estimated associated dividend equivalent shares) which vest in February following the end of the five-year performance period.
- An estimate of vesting of the EBIT margin portion of the award (with estimated associated dividend equivalent shares) based on the analysis of the latest available EBIT margin ranking prior to publication of this report.
- The average share prices for Rio Tinto plc and Rio Tinto Limited over the last quarter of the relevant year, as the share price on the date on which all shares vest is not ascertainable by the date on which the Remuneration report is approved by the Board.

The actual values associated with the PSA vesting are determined following the vesting of the EBIT margin portion of the award at the end of the following May, based on the actual share prices on the date of vesting. The estimated LTIP values are then restated, if applicable, in the following Remuneration report.

Calculation of 2017 PSA vesting

Our remuneration consultants, Deloitte, calculated performance against the TSR measures. The dual TSR measures recognise that the company competes in the global market for investors as well as within the mining sector, and rewards executives for returns over the long term that outperform both the broader market and the mining sector.

	Performance	Vesting	Weighting	Weighted achievement
TSR relative to EMIX Global Mining Index				
Threshold	Equal to index	22.5%	One-third	
Maximum	Outperformance of the index by 6% per annum	100%		
Actual	16.7% per annum	100%		One-third
TSR relative to MSCI World Index				
Threshold	Equal to index	22.5%	One-third	
Maximum	Outperformance of the index by 6% per annum	100%		
Actual	21.2% per annum	100%		One-third
Improvement in EBIT margin				
Threshold	Above the sixth ranked company	22.5%	One-third	
Maximum	Rank of 1^{st} or 2^{nd}	100%		
Estimate	6^{th}	0%		Nil
Overall vesting				**Two-thirds**

				Estimated					Actual			
Executive Director	Year included in single figure	Award	EBIT margin rank out of 11	Overall vesting %	Dividend equivalents (% of face value)	Shares (including dividend equivalents)	Share price	PSA outcome (£'000)	EBIT margin rank out of 11	Overall vesting %	Share price	PSA outcome (£'000)
Peter Cunningham	2021	2017 PSA	6^{th} rank	66.7%	5,200 (38%)	**18,892**	£47.18	891	**Will be determined in May 2022**			

The TSR component of the 2016 PSA vested in full on 18 February 2021 with Rio Tinto plc and Rio Tinto Limited share prices of £62.35 and A$127.47 respectively. Final rank for the EBIT margin component was 6^{th} which resulted in vesting of nil. Overall vesting outcome for the 2016 PSA was therefore 66.7%. Dividend equivalents were equal to 20% of the vested awards.

Jakob Stausholm's first LTIP award was granted in September 2018, with a performance period ending 31 December 2022.

LTIP awards granted in 2021

These awards are subject to TSR performance relative to the EMIX Global Mining Index and MSCI World Index (equal weighting). Targets for threshold and maximum performance are unchanged from prior years.

Executive Director	Type of award	Grant date	Face value of award (% of base salary)	Face value of award (£'000)	% of vesting at threshold performance	Grant price[a]	Conditional shares awarded	Vesting month	End of the period over which the performance conditions have to be fulfilled
Jakob Stausholm	PSA	18 March 2021	400%	4,600	22.5%	£44.44	103,510	Feb 2026	31 Dec 2025

Peter Cunningham's 2021 LTIP grant detailed in Table 3 (page 195) was granted prior to his appointment as Chief Financial Officer. No top-up grant was made in 2021 following his appointment.

LTIP to be granted in March 2022

Executive Director	Type of award	Face value of award (% of base salary)	Face value of award (£'000)	% of vesting at threshold performance	Grant price[a]	Conditional shares awarded	Vesting month	End of the period over which the performance conditions have to be fulfilled
Jakob Stausholm	PSA	400%	4,728	22.5%	£55.55	85,126	Feb 2027	31 Dec 2026
Peter Cunningham	PSA	400%	2,800	22.5%	£55.55	50,405	Feb 2027	31 Dec 2026

(a) In line with Policy, the grant price for PSA is determined by reference to the average share price for the calendar year prior to year of grant.

Performance measures

Performance measure (weighting)	**Vesting schedule**	**Weighting**
TSR vs EMIX Global Mining	Targets for threshold and maximum performance are unchanged from prior years.	50%
TSR vs MSCI World Index	Targets for threshold and maximum performance are unchanged from prior years.	50%

Executive Directors' shareholding

In line with our share ownership policy, Executive Directors' shareholdings are calculated using the closing price of Rio Tinto shares on 31 December 2021.

	Multiple of base salary			Holding of ordinary shares	
Executive Director	31 December 2021	Guidelines	Year requirement needs to be met	31 December 2021	31 December 2020
Jakob Stausholm	1.9	4.0	2024	33,832	30,280
Peter Cunningham	2.6	3.0	2026	35,631	–

The multiple of base salary shown above includes the value of 50% unvested BDA held.

All past directors subject to post-employment shareholding requirements continue to meet their requirements.

Service contracts

Executive Director	Position held during 2021	Date of appointment to position	Notice period
Jakob Stausholm	Chief Executive	1 January 2021	12 months
Peter Cunningham	Chief Financial Officer	17 June 2021	12 months

Either party can terminate their contract with notice in writing, or immediately by the company by paying the base salary only in lieu of any unexpired notice.

Executives' external and other appointments

Neither of the Executive Directors currently has an external directorship.

Chief Executive's remuneration over time: summary

Year	Chief Executive	Single total figure of remuneration ('000)	Annual STIP award against maximum opportunity	Long-term incentive vesting against maximum opportunity (SOP)[a]	Long-term incentive vesting against maximum opportunity (PSA)[a]
2012	Tom Albanese	£4,040	0.0%	100.0%	61.7%
2013	Tom Albanese	£53	0.0%		-
	Sam Walsh	A$9,993	72.1%		50.0%
2014	Sam Walsh	A$10,476	88.4%		49.0%
2015	Sam Walsh	A$9,141	81.9%		43.6%
2016	Sam Walsh[b]	A$5,772	68.2%		50.5%
	Jean-Sébastien Jacques	£3,116	82.4%		50.5%
2017	Jean-Sébastien Jacques	£3,821	73.4%		66.7%
2018	Jean-Sébastien Jacques	£4,551	70.1%		43.0%
2019	Jean-Sébastien Jacques	£5,999	74.8%		76.0%
2020	Jean-Sébastien Jacques[c]	£8,670	0.0%		66.7%
2021	Jakob Stausholm[d]	£2,788	61.3%		-

(a) All outstanding but unvested LTIP awards earned in previous years lapsed and were forfeited when Tom Albanese left the Group. No LTIP award is due to vest for Jakob Stausholm until the end of 2022, subject to the respective performance conditions being satisfied.

(b) STIP award and PSA vesting percentages restated following release from the deed of deferral.

(c) The 2020 single total figure of remuneration for Jean-Sébastien Jacques reported is based on the estimated vesting of the 2016 PSA of 66.7%. The 2020 single total figure of remuneration for Jean-Sébastien Jacques reported in the 2020 Annual Report was £7,224 based on the estimated and final vesting of the 2016 PSA of 66.7%. The restated 2020 single total figure of remuneration is £8,670 based on the actual vesting share price of £62.35.

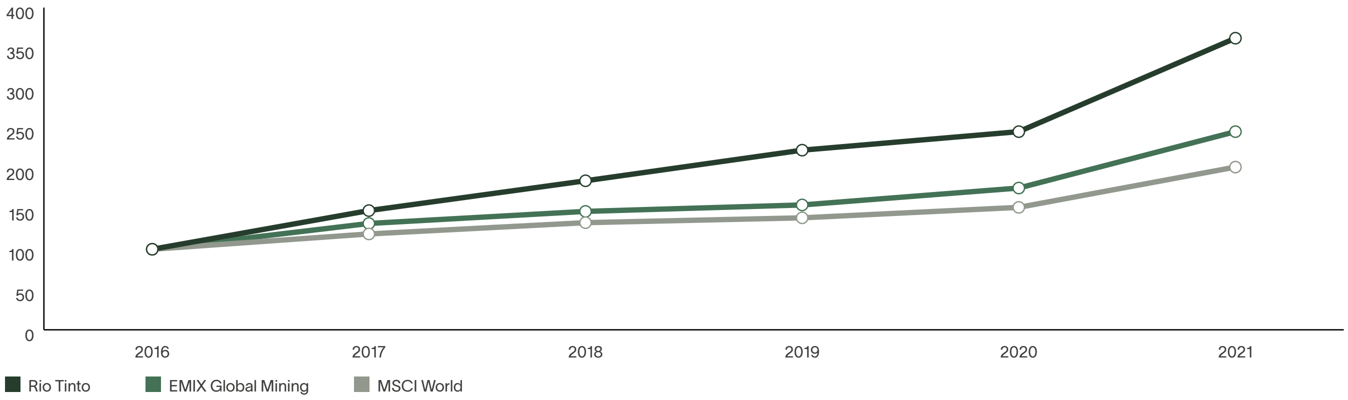
(d) Jakob Stausholm joined Rio Tinto in September 2018 and became CEO on 1 January 2021. He therefore did not participate in the 2017 LTIP.

TSR

We use relative TSR against the EMIX Global Mining Index and the MSCI World Index as two-thirds of our performance measures when we determine the vesting of PSA granted in 2017. The remaining third is based on the improvement in EBIT margin relative to the comparator group.

The graph below shows Rio Tinto's TSR performance for the 2017 PSA. It uses the same methodology as that used to calculate the vesting for the PSA granted in 2017 with a performance period that ended on 31 December 2021.

Total shareholder return



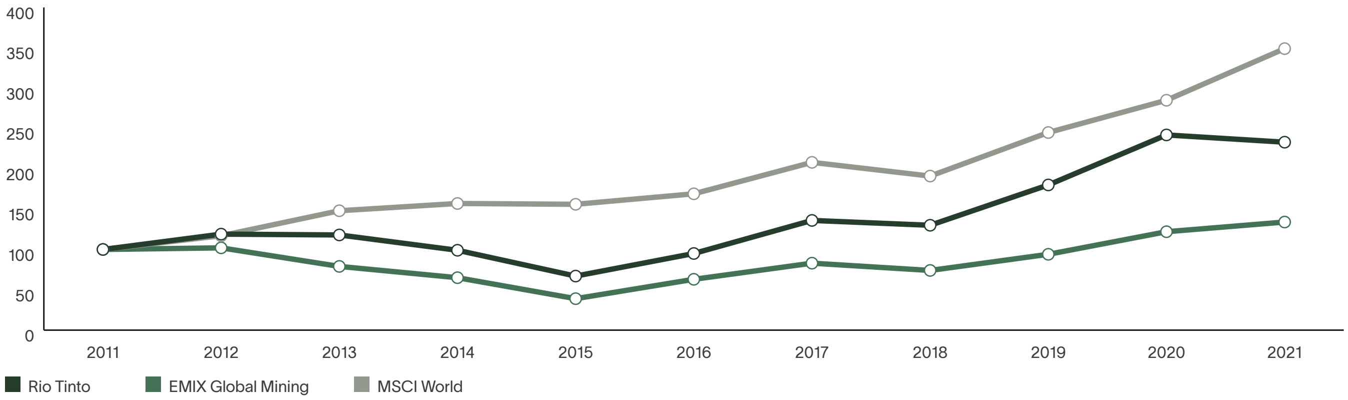
(a) TSR for the MSCI and EMIX indices has been calculated using 12-month average Return Index data for the year sourced from DataStream.

(b) Rio Tinto's Group TSR has been calculated using a weighted average for Rio Tinto plc and Rio Tinto Limited. The weighting is based on the free-float market capitalisation of each entity as at the start of the period.

The following graph illustrates the TSR performance of the Group against the EMIX Global Mining Index and the MSCI World Index over the ten years to the end of 2021.

The graph meets the requirements of Schedule 8 of the UK Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (as amended) and is not an indication of the likely vesting of PSA granted in 2017.

Total shareholder return



(a) TSR has been calculated using spot return index data as at the last trading day for the year sourced from DataStream. The indices chosen are those used for measuring PSA performance.

(b) Rio Tinto's Group TSR has been calculated using a weighted average for Rio Tinto plc and Rio Tinto Limited. The weighting is based on the free-float market capitalisation of each entity as at the start of the period.

Incoming director remuneration

Peter Cunningham was appointed as interim Chief Financial Officer effective 1 January 2021, and subsequently, Chief Financial Officer effective 17 June 2021.

The remuneration package offered to the new Chief Financial Officer is aligned with our Remuneration Policy and is comprised of base salary of £700,000; target STIP opportunity of 100% of base salary (with a maximum opportunity of 200% of base salary); an LTIP award of up to 400% of base salary; a company pension contribution of 14% of base salary; and other benefits such as company provided healthcare coverage, and continued eligibility to participate in the all-employee share plans.

A minimum shareholding requirement of 300% of base salary (including a two-year post-employment holding requirement) applies to his appointment.

Past-director payments

As previously disclosed, in light of the decision taken under the binding dispute resolution, combined with no further material information having emerged, the Board concluded that Sam Walsh should receive the third and final stage of the deferral, together with associated dividends and interest. Accordingly, he received a final payment of A$1,446,136, less statutory deductions, on 31 May 2021.

For payments to past directors that have not been previously disclosed the Remuneration Committee has adopted a de-minimis threshold of £15,000 under UK requirements.

Discretion

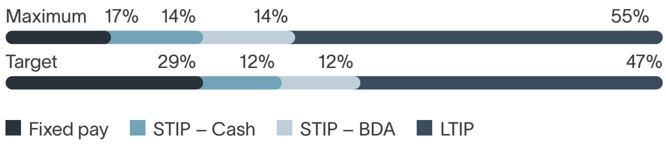
In response to the findings of the Everyday Respect report, the Committee will apply discretion to reduce the number of shares that are due to vest on 1 December 2022 for former Executive Director Jean-Sébastien Jacques in respect of his 2020 BDA award by 2,623 Rio Tinto plc shares.

Other executive KMP

This section sets out remuneration information pertaining to KMP excluding the Chief Executive and Chief Financial Officer. The Remuneration Policy applicable to the Executive Directors is also applicable to the other executive KMP with variances specified in this section.

The remuneration mix for other executive KMP under this Policy is set out in the chart below.

Remuneration mix



Assumptions

The value of benefits is estimated at 11% of base salary.

Performance-related (At risk)	
Target STIP and LTIP performance	– STIP award of 50% of the maximum award (equates to 100% of base salary) – PSA expected value of 50% of face value, calculated as 200% of base salary
Maximum STIP and LTIP performance	– A maximum STIP award of 200% of base salary – Maximum PSA face value of 400% of base salary

No assumption has been made for growth in share price and payment of dividends.

The table below outlines the positions held by the other executive KMP and the respective dates of appointment:

Name	Position(s) held during 2021	Date of appointment to position
Other executives		
Bold Baatar	Chief Executive Energy & Minerals	1 December 2016
Bold Baatar	Chief Executive Copper	1 February 2021
Alfredo Barrios	Chief Executive Aluminium	1 June 2014
Alfredo Barrios	Chief Commercial Officer	1 March 2021
Sinead Kaufman	Chief Executive Minerals	1 March 2021
Arnaud Soirat[a]	Chief Executive Copper & Diamonds	2 July 2016
Peter Toth[b]	Group Executive Strategy & Development	1 October 2020
Simon Trott	Chief Commercial Officer	1 January 2018
Simon Trott	Chief Executive Iron Ore	1 March 2021
Ivan Vella	Interim Chief Executive Iron Ore	15 September 2020
Ivan Vella	Chief Executive Aluminium	1 March 2021

(a) Arnaud Soirat ceased to be a KMP on 1 February 2021 following his appointment as Chief Operating Officer.
(b) Peter Toth stepped down from the Executive Committee on 18 October 2021.

STIP

Overview of 2021 STIP weightings and measures

The following table shows the measures and weightings used to determine STIP awards for executives in 2021.

	Weighting for Executive Directors and Group executives	Weighting for PGCEOs
Safety – split between standalone binary measure for fatality, AIFR and SMM	20%	20%
Financial measures split equally between underlying earnings and STIP free cash flow for the Group	50%	20%
Financial measures split equally between underlying earnings and STIP free cash flow for the relevant product group	0%	30%
ESG	15%	15%
Individual measures based on key strategic initiatives of each role and contribution to overall company performance	15%	15%

The 2021 STIP awards are detailed in the table below.

				Percentage of:	
(000's)	2021 STIP award (% of salary)	Adjusted 2021 STIP award (% of salary)[a]	2021 STIP award ('000)	Maximum STIP awarded	Maximum STIP forfeited
Bold Baatar	132.9%	126.3%	£754	63.1%	36.9%
Alfredo Barrios	119.4%	113.4%	S$1,248	56.7%	43.3%
Peter Cunningham[b]	120.1%	114.1%	£694	57.0%	43.0%
Sinead Kaufman[c]	123.1%	116.9%	A$980	58.5%	41.5%
Arnaud Soirat[d]	130.5%	124.0%	£59	62.0%	38.0%
Peter Toth[e]	60.1%	57.0%	£200	28.5%	71.5%
Simon Trott	120.5%	114.5%	A$1,198	57.3%	42.7%
Ivan Vella[f]	117.1%	111.2%	C$1,004	55.6%	44.4%

(a) Awards incorporating a downward discretion of 5% in relation to the findings of the Everyday Respect report. The values also represent the percentage of Target STIP awarded.
(b) STIP award pro-rated for the period of Interim Chief Financial Officer from 1 January to 16 June 2021 and Chief Financial Officer from 17 June to 31 December 2021. This full year amount is therefore different to the Chief Financial Officer disclosure in the single total figure of remuneration.
(c) STIP award for the period 1 March to 31 December 2021.
(d) STIP award for the period 1 January to 31 January 2021.
(e) STIP award for the period 1 January to 18 October 2021.
(f) STIP award pro-rated for the period of Interim Chief Executive Iron Ore from 1 January to 28 February 2021 and Chief Executive Aluminium from 1 March to 31 December 2021.

Share ownership

The following table shows the share ownership level for other KMP as a multiple of base salary.

	Share ownership level at 31 December 2021 as a multiple of base salary
Bold Baatar	3.1
Alfredo Barrios	3.6
Sinead Kaufman	2.3
Simon Trott	3.7
Ivan Vella	1.1

Share ownership level is calculated using the market price of Rio Tinto shares on 31 December 2021, and we define "share ownership" in our Remuneration Policy.

Service contracts

All executives have service contracts which can be terminated by the company with 12 months' notice in writing, or by the employee with six months' notice in writing, or immediately by the company by paying base salary only in lieu of any unexpired notice.

Other KMP appointments

All newly appointed executives have received a remuneration package that is aligned with our Remuneration Policy and is comprised of base salary in line with market benchmarks; target STIP opportunities of 100% of base salary (with maximum opportunities of 200% of base salary); LTIP awards of up to 400% of base salary; company pension contributions of 14% of base salary; and other benefits such as company-provided healthcare coverage, and continued eligibility to participate in the all-employee share plans. A minimum shareholding requirement of 300% of base salary applies on appointment.

Departures from the Executive Committee

Peter Toth

Peter Toth resigned and stepped down from the Executive Committee on 18 October 2021. He remained in an advisory role until the end of 2021.

He will continue to receive his normal base salary and other contractual benefits until 5 April 2022. He remained eligible to receive 50% of the STIP award for the period 1 January 2021 to 31 December 2021, which will be calculated on actual business and individual performance and will be paid in cash in March 2022. The remaining 50% deferred into the BDA will be forfeited. Outstanding LTIP awards were lapsed from resignation. Unused and accrued vacation amounting to £24,251 will be paid at his termination date in line with UK policy.

Broader employee disclosures

Chief Executive pay ratio

The ratio of the single total figure of remuneration for the Chief Executive to the lower quartile, median and upper quartile Rio Tinto Australian employee population for 2021 is set out in the table below.

	Lower quartile	Median	Upper quartile
2021	49	32	26
2020[a]	131	94	77

(a) 2020 pay ratio data has been restated based on actual pay outcomes for the CEO in 2020.

The median CEO pay ratio of 32:1 is materially lower than last year, primarily because Jakob joined the Group after the award of the 2017 LTIP that vested this year. The first LTIP award for which he was eligible is due to vest at the end of the 2022 performance year. The Committee continues to be mindful of the relationship between executive remuneration and that of our broader workforce. The Committee's decision making will continue to be supported by regular and detailed reporting on these matters.

As the company employs fewer than 250 employees in the UK, this analysis has been provided on a voluntary basis.

Relative spend on remuneration

The table below shows our relative spend on remuneration across our global employee population and distributions to shareholders in the year. We have also shown other significant disbursements of the company's funds for comparison.

Stated in US$m	2021	2020	Difference in spend
Remuneration paid[a]	**5,513**	4,770	743
Distributions to shareholders[b]	**15,385**	6,340	9,045
Purchase of property, plant and equipment and intangible assets[c]	**7,384**	6,189	1,195
Corporate income tax paid[c]	**8,494**	5,289	3,205

(a) Total employment costs for the financial year as per note 5 to the financial statements.

(b) Distributions to shareholders include equity dividends paid to owners of Rio Tinto and own shares purchased from owners of Rio Tinto as per the Group cash flow statement.

(c) Purchase of property, plant and equipment and intangible assets, and corporate income tax paid during the financial year are as per the Group cash flow statement and are calculated as per note 1 to the financial statements.

Change in director and employee pay

In the table below, we compare the changes annual from in salary, benefits and annual incentives of the Directors for the past two years, to that of the Australian employee population. The 2021 changes for Jakob Stausholm reflect his promotion to Chief Executive Officer at the start of the year.

	2019 to 2020			2020 to 2021		
	Percentage change in salary/ fees paid[a]	Percentage change in other benefits paid	Percentage change in annual incentive	**Percentage change in salary/ fees paid[a]**	**Percentage change in other benefits paid[b]**	**Percentage change in annual incentive[c]**
Executive Directors						
Jakob Stausholm	2%	34%	29%	46%	(19%)	25%
Peter Cunningham[d]	–	–	–	–	–	–
Non-Executive Directors						
Simon Thompson	0%	3%	–	0%	260%	–
Megan Clark	1%	(54%)	–	(3%)	(93%)	–
Hinda Gharbi	–	–	–	0%	174%	–
Simon Henry	3%	(88%)	–	0%	64%	–
Sam Laidlaw	8%	(87%)	–	0%	(51%)	–
Michael L'Estrange[e]	46%	(71%)	–	(33%)	(88%)	–
Simon McKeon	9%	(72%)	–	15%	(91%)	–
Jennifer Nason[e]	–	–	–	0%	–	–
Ngaire Woods[e]	–	–	–	0%	–	–
Ben Wyatt[d]	–	–	–	–	–	–
Australian workforce[f]	4%	5%	19	4%	0%	(18%)

(a) Change in salary and fees compared on an annualised basis to smooth the impact of part year appointments.
(b) There was no change in the benefit entitlement for directors in the year. Percentage changes are reflective of year on year variability in benefits for travel or tax support.
(c) The percentage change in annual incentive compares the incentive outcomes for the 2020 performance year to those for the 2021 performance year.
(d) No prior year data as appointed as a director in 2021.
(e) Fees compared on an annualised basis.
(f) Since Rio Tinto plc, the statutory entity for which this disclosure is required, does not have any employees, we have included voluntary disclosure of the change in employee pay for our Australian employees who make up more than 40% of our employee population.

'–' in the table signifies no reported change as a result of the absence of comparable data.

Non-Executive Directors

What we paid our Chairman and Non-Executive Directors

Positions held

We list the Non-Executive Directors who held office during 2021 below. Each held office for the whole of 2021 unless otherwise indicated. Their years of appointment are reported in "Board of Directors" on pages 134-135.

Name	Title
Simon Thompson	Chairman
Megan Clark	Non-Executive Director
Hinda Gharbi	Non-Executive Director
Simon Henry	Non-Executive Director
Sam Laidlaw	Non-Executive Director
Michael L'Estrange	Non-Executive Director (to 6 May 2021)
Simon McKeon	Non-Executive Director
Jennifer Nason	Non-Executive Director
Ngaire Woods	Non-Executive Director
Ben Wyatt	Non-Executive Director (from 1 September 2021)

Service contracts

The Chair and Non-Executive Directors' letters of appointment from the company stipulate their terms of appointment, including their duties and responsibilities as directors. Each Non-Executive Director is appointed subject to their election and annual re-election by shareholders. The Chair's appointment may be terminated by either party giving 12 months' notice and Non-Executive Directors' appointments may be terminated by either party giving three months' notice.

Annual fees payable

The table below shows the annual fees paid in 2021 and payable in 2022, to the Chair and Non-Executive Directors.

	2022	2021
Director fees		
Chair's fee	**£730,000**	£730,000
Non-Executive Director base fee	**£95,000**	£95,000
Non-Executive Director base fee for Australian residents	**£105,000**	£105,000
Senior Independent Director	**£45,000**	£45,000
Committee fees		
Audit Committee Chair	**£40,000**	£40,000
Audit Committee member	**£25,000**	£25,000
Remuneration Committee Chair	**£35,000**	£35,000
Remuneration Committee member	**£20,000**	£20,000
Sustainability Committee Chair	**£35,000**	£35,000
Sustainability Committee member	**£20,000**	£20,000
Nominations Committee member	**£7,500**	£7,500
Meeting allowances		
Long distance (flights over 10 hours per journey)	**£10,000**	£10,000
Medium distance (flights of 5-10 hours per journey)	**£5,000**	£5,000

The Chair's fee is determined by the Committee and was last increased on 1 July 2013. All other fees are subject to review by the Board on the recommendation of the Chair's Committee.

The Chair's Committee conducted a review of Non-Executive Director fees in November 2021. Following this review, it was determined that all fees and travel allowances should remain unchanged.

The additional £10,000 allowance for eligible Australian directors is to compensate them for additional UK National Insurance contributions which, unlike directors based in other jurisdictions, they are not able to offset against their local tax payments.

We set out details of each element of remuneration, and the single total figure of remuneration, paid to the Chairman and Non-Executive Directors during 2021 and 2020 in US dollars in table 1b on page 193. No post-employment, termination or share-based payments were made. Statutory minimum superannuation contributions for Non-Executive Directors are deducted from the director's overall fee entitlements when these are required by Australian superannuation law.

The total fee and allowance payments made to the Chairman and Non-Executive Directors in 2021 are within the maximum aggregate annual amount of £3 million set out in the Group's constitutional documents, approved by shareholders at the 2009 AGMs.

Terms of appointment of the incoming Chair

Dominic Barton will join the Board with effect from 4 April 2022 and be appointed to the role of Chair at the conclusion of the Rio Tinto Limited annual general meeting on 5 May 2022. On his appointment to Chair, he will receive the same base fee as his predecessor, Simon Thompson. Relocation benefits will be provided in accordance with our Policy to include flights, shipping, short-term accommodation, tax filing and immigration support.

Share ownership policy for Non-Executive Directors

Rio Tinto has a policy that encourages Non-Executive Directors to build up a shareholding equal in value to one year's base fee within three years of their appointment. Details of Non-Executive Directors' share interests in the Group, including total holdings, are set out in table 2 on page 194.

Non-Executive Directors' share ownership

The Non-Executive Directors' shareholdings are calculated using the market price of Rio Tinto shares on 31 December 2021:

Director	Share ownership level at 31 December 2021 as a multiple of base fee (or Chair's fee)[a]	Share ownership level at 31 December 2020 as a multiple of base fee (or Chair's fee)
Simon Thompson	**3.8 (0.5)**	4.4 (0.6)
Megan Clark	**3.3**	3.9
Hinda Gharbi	**0.7**	0.9
Simon Henry	**0.8**	0.9
Sam Laidlaw	**3.9**	4.4
Simon McKeon	**5.2**	6.1
Jennifer Nason	**0.9**	1.1
Ben Wyatt[b]	**–**	–
Ngaire Woods	**0.3**	–

(a) The fee multiple as at 31 December 2021 is lower than the multiple reported as at 31 December 2020 as a result of lower share prices.
(b) Ben Wyatt joined the Board on 1 September 2021.

Other statutory disclosures

Other share plans

All-employee share plans

The Committee believes that all employees should be given the opportunity to become shareholders in our business, and that share plans help engage, retain and motivate employees over the long term. Rio Tinto's share plans are therefore part of its standard remuneration practice, to encourage employee share ownership and create alignment with the shareholder experience. Executives may participate in broad-based share plans that are available to Group employees generally and to which performance conditions do not apply.

A global employee share purchase plan is normally offered to all eligible employees unless there are local jurisdictional restrictions. Under the plan, employees may acquire shares up to the value of US$5,250 (or equivalent in other currencies) per year, or capped at 15% of their base salary if lower. Each share purchased will be matched by the company, providing the participant holds the shares, and is still employed, at the end of the three-year vesting period.

Over 25,000 (54%) of our employees are shareholders as a result of participating in these plans. In the UK, these arrangements are partially delivered through the UK Share Plan which is a UK tax approved arrangement. Under this plan, eligible participants may also receive an annual award of Free Shares up to the limits prescribed under UK tax legislation.

Management Share Awards (MSA)

The MSA are designed to help the Group attract the best staff in a competitive labour market, and to retain key individuals as we deliver our long-term strategy. MSA are conditional awards that are not subject to a performance condition. They vest at the end of three years subject to continued employment. Shares to satisfy the awards are bought in the market or re-issued from treasury. Executive Committee members are not eligible for the MSA after appointment.

Shareholder voting

In the table below, we set out the results of the remuneration-related resolutions voted on at the Group's 2021 AGMs. Our meetings with shareholders in 2021 provided an opportunity for the Committee Chair to consult with shareholders on the voting outcomes and next steps.

Resolution	Votes for	Votes against	Votes withheld[(a)]
Approval of the Directors' Remuneration report: Implementation report	38.4%	61.6%	16,456,963
Approval of the Remuneration Policy	96.8%	3.2%	22,272,424
Approval of the Directors' Remuneration report	39.2%	60.8%	16,222,350

(a) A vote "withheld" is not a vote in law and is not counted in the calculation of the proportion of votes for and against the resolution.

Table 1a – Executives' remuneration

Stated in US$'000[a]		Short-term benefits Base salary	Cash bonus[b]	Other cash-based benefits[c]	Non-monetary benefits[d][e]	Total short-term benefits
Executive Directors						
Jakob Stausholm	**2021**	1,582	952	216	84	2,834
	2020	1,012	768	235	79	2,094
Peter Cunningham[f]	**2021**	711	557	239	41	1,548
Other executives						
Bold Baatar	**2021**	821	509	139	22	1,491
	2020	719	522	162	36	1,439
Alfredo Barrios	**2021**	822	462	819	189	2,292
	2020	777	601	249	106	1,733
Sinead Kaufman[g]	**2021**	626	356	92	28	1,102
Arnaud Soirat[h]	**2021**	65	40	12	1	118
	2020	719	553	162	60	1,494
Peter Toth[i]	**2021**	483	270	81	22	856
	2020	141	103	17	7	268
Simon Trott	**2021**	781	434	78	108	1,401
	2020	704	525	26	53	1,308
Ivan Vella	**2021**	719	411	806	278	2,214
	2020	117	129	49	12	307

Notes to table 1a – Executives' remuneration

(a) "Table 1a – Executives' remuneration" is reported in US$ using A$1 = US$0.75153; £1 = US$1.37580; C$1 = US$0.79781; S$1 = US$0.74430 (2021 average rates), except for cash bonuses which use A$1 = US$0.72535; £1 = US$1.34965; C$1 = US$0.78201; S$1 = US$0.73954 (2021 year-end rates).

(b) "Cash bonus" relates to the cash portion of the 2021 STIP award to be paid in March 2022.

(c) "Other cash-based benefits" typically includes cash in lieu of company pension or superannuation contributions.

(d) "Non-monetary benefits" for executives include healthcare coverage, professional tax compliance services/advice and flexible perquisites.

(e) "Non-monetary benefits" for executives living outside their home country include international assignment benefits comprising, where applicable, housing, relocation expenses, tax equalisation and related compliance services, assignee and family home leave trips and international assignment payments made to and on their behalf.

(f) The details for 2021 reflect remuneration for the period 1 January to 31 December 2021 which includes both KMP roles as Acting Chief Financial Officer and Chief Financial Officer.

(g) The details for 2021 reflect remuneration for the period 1 March to 31 December 2021.

(h) The details for 2021 reflect remuneration for the period 1 January to 31 January 2021.

(i) The details for 2021 reflect remuneration for the period 1 January to 18 October 2021.

Stated in US$'000[(a)]		Long-term benefits: Value of shared-based awards[(j)] BDA[(k)]	PSA	MSA	Others[(l)]	Post-employment benefits[(m)] Pension and superannuation	Other post-employment benefits	Termination benefits	Total remuneration[(n)]	Currency of actual payment
Executive Directors										
Jakob Stausholm	**2021**	606	1,551	–	5	5	–	–	5,001	£
	2020	362	808	–	3	7	–	–	3,274	£
Peter Cunningham	**2021**	158	205	335	5	101	–	–	2,352	£
Other executives										
Bold Baatar	**2021**	428	1,556	–	7	5	–	–	3,487	£
	2020	396	1,549	–	4	7	–	–	3,395	£
Alfredo Barrios	**2021**	449	1,475	–	4	54	–	–	4,274	C$ & S$
	2020	466	2,209	–	3	21	–	–	4,432	C$
Sinead Kaufman[(o)]	**2021**	155	410	262	3	15	–	–	1,947	A$
Arnaud Soirat[(h)]	**2021**	39	193	–	–	–	–	–	350	£
	2020	457	1,597	–	1	7	–	–	3,556	£
Peter Toth	**2021**	–	–	–	7	4	–	–	867	£
	2020	42	105	51	1	1	–	–	468	£
Simon Trott	**2021**	424	1,247	–	2	80	–	–	3,154	S$ & A$
	2020	328	969	6	3	168	–	–	2,782	S$
Ivan Vella	**2021**	153	494	126	3	36	–	–	3,026	A$ & C$
	2020	26	79	50	1	4	–	–	467	A$

(j) The value of share-based awards has been determined in accordance with the recognition and measurement requirements of IFRS 2 "Share-based Payment". The fair value of awards granted as MSA, BDA and PSA have been calculated at their dates of grant using valuation models provided by external consultants, Lane Clark and Peacock LLP, including an independent lattice-based option valuation model and a Monte Carlo valuation model which take into account the constraints on vesting attached to these awards. Further details of the valuation methods and assumptions used for these awards are included in note 41 (Share-based Payments) in the financial statements. The fair value of other share-based awards is measured at the purchase cost of the shares from the market. The share based values disclosed in this table do not reflect amounts actually paid in 2021 or the value of shares that will ultimately vest.

(k) "BDA" represents the portion of the 2018 – 2021 STIP awards deferred into Rio Tinto shares.

(l) "Others" includes the Global Employee Share Plan (myShare) and the UK Share Plan.

(m) The costs shown for defined benefit pension plans and post-retirement medical benefits are the service costs attributable to the individual, calculated in accordance with IAS 19. The cost for defined contribution plans is the amount contributed in the year by the company.

(n) "Total remuneration" represents the disclosure of total emoluments and compensation required under the Australian Corporations Act 2001 and applicable accounting standards.

(o) Sinead Kaufman's total remuneration for the year ending 31 December 2021 including the period 1 January to 28 February prior to appointment as KMP was US$2,245,000.

Further details in relation to aggregate compensation for executives, including directors, are included in note 37 (Directors' and key management remuneration).

Table 1b – Non-Executive Directors' remuneration

Stated in US$'000[a]		Fees and allowances[b]	Non-monetary benefits[c]	Post-employment benefits	Single total figure of remuneration[d]	Currency of actual payment
Chairman						
Simon Thompson	**2021**	1,010	9	–	1,019	£
	2020	937	2	–	939	£
Non-Executive Directors						
Megan Clark	**2021**	211	2	21	234	A$
	2020	210	10	20	240	A$
Hinda Gharbi	**2021**	204	15	–	219	£
	2020	157	5	–	162	£
Simon Henry	**2021**	225	8	–	233	£
	2020	209	5	–	214	£
Sam Laidlaw	**2021**	280	2	–	282	£
	2020	260	4	–	264	£
Michael L'Estrange[e]	**2021**	56	3	5	64	A$
	2020	208	4	15	227	A$
Simon McKeon	**2021**	276	2	4	282	A$
	2020	233	5	1	239	A$
Jennifer Nason	**2021**	204	15	–	219	£
	2020	152	1	–	153	£
Ngaire Woods	**2021**	197	4	–	201	£
	2020	60	–	–	60	£
Ben Wyatt[f]	**2021**	56	1	6	63	A$

(a) The remuneration is reported in US$. The amounts have been converted using the relevant 2020 average exchange rates of £1 = US$1.38361 and A$1 = US$0.75734 (1 January to 31 December 2021 average).

(b) "Fees and allowances" comprises the total fees for the Chairman and all Non-Executive Directors, and travel allowances for the Non-Executive Directors (other than the Chairman). The payment of statutory minimum superannuation contributions for Australian Non-Executive Directors is required by Australian superannuation law. These contributions are included in the "Fees and allowances" amount disclosed for Australian Non-Executive Directors.

(c) "Non-monetary benefits" include, as in previous years, amounts which are deemed by the UK tax authorities to be benefits in kind relating largely to the costs of Non-Executive Directors' expenses in attending Board meetings held at the company's UK registered office (including associated hotel and subsistence expenses) and professional tax compliance services/advice. Given these expenses are incurred by directors in the fulfilment of their duties, the company pays the tax on them.

(d) Represents disclosure of the single total figure of remuneration under Schedule 8 of the Large- and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (as amended) and total remuneration under the Australian Corporations Act 2001 and applicable accounting standards.

(e) The amounts reported for Michael L'Estrange reflect the period of active Board membership from 1 January 2021 to 5 May 2021.

(f) The amounts reported for Ben Wyatt reflect the period of active Board membership from 1 September 2021 to 31 December 2021.

Further details in relation to aggregate compensation for executives, including directors, are included in note 37 (Directors' and key management remuneration).

Table 2 – Directors' and executives' beneficial interests in Rio Tinto shares

	Rio Tinto plc[a]			Rio Tinto Limited			Movements	
	1 Jan 2021[b]	31 Dec 2021[c]	8 Feb 2022[d]	1 Jan 2021[b]	31 Dec 2021[c]	8 Feb 2022[d]	Compensation[e]	Other[f]
Directors								
Megan Clark	–	–	–	6,370	6,370	6,370	–	–
Peter Cunningham	23,648	35,631	35,645	–	–	–	18,293	(6,296)
Hinda Gharbi	1,400	1,400	1,400	–	–	–	–	–
Simon Henry	1,500	1,500	1,500	–	–	–	–	–
Sam Laidlaw	7,500	7,500	7,500	–	–	–	–	–
Michael L'Estrange[g]	–	–		3,103	3,103		–	–
Simon McKeon	–	–	–	10,000	10,000	10,000	–	–
Jennifer Nason	1,765	1,765	1,765	–	–	–	–	–
Jakob Stausholm	30,280	33,832	33,853	–	–	–	3,937	(364)
Simon Thompson	7,458	7,458	7,458	–	–	–	–	–
Ngaire Woods	–	572	572	–	–	–	–	572
Ben Wyatt[g]	–	–	–	–	–	–	–	–
Executives								
Bold Baatar	34,096	30,507	30,542	–	–	–	20,626	(24,180)
Alfredo Barrios	78,137	36,171	36,204	–	–	–	67,202	(109,135)
Sinead Kaufman	–	–	–	15,563	20,963	20,997	3,506	1,928
Arnaud Soirat	6,798	6,816		14,875	14,875		18	–
Peter Toth	21,624	27,620		–	–		16,586	(10,590)
Simon Trott	1,731	7,973	7,998	24,730	24,864	24,864	15,248	(8,847)
Ivan Vella	–	24	38	5,222	9,847	9,857	7,646	(2,973)

(a) Rio Tinto plc ordinary shares or American Depositary Receipts.

(b) Or date of appointment, if later.

(c) Or date of retirement/date stepped down from the Executive Committee, if earlier.

(d) Latest practicable date prior to the publication of the 2021 Annual Report, in accordance with LR 9.8.6 R(1).

(e) Shares obtained through awards under the Rio Tinto UK Share Plan, the Global Employee Share Plan and/or vesting of the PSA, MSA and BDA granted under the Group's LTIP arrangements.

(f) Share movements due to the sale or purchase of shares, or shares received under dividend reinvestment plans.

(g) Peter Cunningham was appointed as an Executive Director on 17 June 2021 and Ben Wyatt joined as Non-Executive Director on 1 September 2021. Michael L'Estrange retired as a Non-Executive Director on 6 May 2021. Arnaud Soirat and Peter Toth were no longer considered persons discharging managerial responsibilities (PDMR) on 31 January 2021 and 18 October 2021 respectively. Sinead Kaufman joined the Executive Committee on 1 March 2021.

Interests in outstanding BDA, MSA and PSA are set out in table 3 (see pages 195-197).

Table 3 – Plan interests (awards of shares under long-term incentive plans)

Name	Award/grant date	Market price at award[a][b]	1 January 2021	Awarded	Lapsed/ cancelled	Dividend units	Vested	31 December 2021	8 February 2022	Vesting period concludes	Date of release	Market price at release	Market value of award at release US$[c]
Bold Baatar													
Bonus Deferral Awards	18 Mar 2019	£42.67	5,205	–	–	1,306	6,511	–	–	1 Dec 2021	1 Dec 2021	£46.67	418,062
	16 Mar 2020	£33.58	9,329	–	–	–	–	9,329	9,329	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	6,583	–	–	–	6,583	6,583	1 Dec 2023	–	–	–
Performance Share Awards[d]	11 Mar 2016	£20.00	17,270	–	(5,756)	2,326	13,840	–	–	31 Dec 2020	18 Feb 2021	£62.61	1,192,161
	9 Mar 2017	£32.03	85,174	–	–	–	–	85,174	85,174	31 Dec 2021	–	–	–
	15 May 2018	£42.30	63,039	–	–	–	–	63,039	63,039	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	51,752	–	–	–	–	51,752	51,752	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	53,272	–	–	–	–	53,272	53,272	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	54,005	–	–	–	54,005	54,005	31 Dec 2025	–	–	–
Alfredo Barrios													
Bonus Deferral Awards	18 Mar 2019	£42.67	6,715	–	–	1,685	8,400	–	–	1 Dec 2021	1 Dec 2021	£46.67	539,352
	16 Mar 2020	£33.58	8,724	–	–	–	–	8,724	8,724	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	7,497	–	–	–	7,497	7,497	1 Dec 2023	–	–	–
Performance Share Awards[d]	11 Mar 2016	£20.00	73,140	–	(24,379)	9,852	58,613	–		31 Dec 2020	18 Feb 2021	£62.61	5,048,855
	9 Mar 2017	£32.03	91,721	–	–	–	–	91,721	91,721	31 Dec 2021	–	–	–
	15 May 2018	£42.30	66,050	–	–	–	–	66,050	66,050	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	57,011	–	–	–	–	57,011	57,011	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	53,236	–	–	–	–	53,236	53,236	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	54,652	–	–	–	54,652	54,652	31 Dec 2025	–	–	–
Peter Cunningham													
Bonus Deferral Awards	18 Mar 2019	£42.67	1,447	–	–	363	1,810	–	–	1 Dec 2021	1 Dec 2021	£46.67	116,218
	16 Mar 2020	£33.58	1,802	–	–	–	–	1,802	1,802	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	1,402	–	–	–	1,402	1,402	1 Dec 2023	–	–	–
Management Share Awards	15 May 2018	£42.30	3,614	–	–	524	4,138	–	–	15 Feb 2021	18 Feb 2021	£62.61	356,442
	18 Mar 2019	£42.67	3,244	–	–	–	–	3,244	3,244	21 Feb 2022	–	–	–
	16 Mar 2020	£33.58	3,713	–	–	–	–	3,713	3,713	20 Feb 2023	–	–	–
	29 Oct 2020	£43.34	1,325	–	–	195	1,520	–	–	29 Oct 2021	29 Oct 2021	£45.96	96,112
	29 Oct 2020	£43.34	1,325	–	–	–	–	1,325	1,325	16 May 2022	–	–	–
	18 Mar 2021	£55.58	–	4,781	–	–	–	4,781	4,781	19 Feb 2024	–	–	–
Performance Share Awards[d]	11 Mar 2016	£20.00	13,320	–	(4,439)	1,794	10,675	–	–	31 Dec 2020	18 Feb 2021	£62.61	919,532
	9 Mar 2017	£32.03	20,538	–	–	–	–	20,538	20,538	31 Dec 2021	–	–	–
	15 May 2018	£42.30	7,229	–	–	–	–	7,229	7,229	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	6,489	–	–	–	–	6,489	6,489	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	7,426	–	–	–	–	7,426	7,426	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	9,564	–	–	–	9,564	9,564	31 Dec 2025	–	–	–

Name	Award/grant date	Market price at award[(a)(b)]	1 January 2021	Awarded	Lapsed/ cancelled	Dividend units	Vested	31 December 2021	8 February 2022	Vesting period concludes	Date of release	Market price at release	Market value of award at release US$[(c)]
Sinead Kaufman													
Bonus Deferral Awards	18 Mar 2019	A$93.17	1,519	–	–	343	1,862	–	–	1 Dec 2021	1 Dec 2021	A$95.81	134,072
	16 Mar 2020	A$77.65	1,645	–	–	–	–	1,645	1,645	1 Dec 2022	–	–	–
	18 Mar 2021	A$110.80	–	1,408	–	–	–	1,408	1,408	1 Dec 2023	–	–	–
Management Share Awards	15 May 2018	A$83.61	2,107	–	–	284	2,391	–	–	15 Feb 2021	18 Feb 2021	A$127.40	228,926
	18 Mar 2019	A$93.17	3,145	–	–	–	–	3,145	3,145	21 Feb 2022	–	–	–
	16 Mar 2020	A$77.65	4,289	–	–	–	–	4,289	4,289	20 Feb 2023	–	–	–
	29 Oct 2020	A$90.96	1,330	–	–	179	1,509	–	–	29 Oct 2021	29 Oct 2021	A$92.76	105,195
	29 Oct 2020	A$90.96	1,330	–	–	–	–	1,330	1,330	16 May 2022	–	–	–
Performance Share Awards[(d)]	11 Mar 2016	A$44.57	4,124	–	(1,374)	504	3,254	–	–	31 Dec 2020	18 Feb 2021	A$127.40	311,554
	9 Mar 2017	A$60.14	10,989	–	–	–	–	10,989	10,989	31 Dec 2021	–	–	–
	15 May 2018	A$83.61	4,848	–	–	–	–	4,848	4,848	31 Dec 2021	–	–	–
	15 May 2018	A$83.61	6,322	–	–	–	–	6,322	6,322	31 Dec 2022	–	–	–
	18 Mar 2019	A$93.17	6,291	–	–	–	–	6,291	6,291	31 Dec 2023	–	–	–
	16 Mar 2020	A$77.65	8,579	–	–	–	–	8,579	8,579	31 Dec 2024	–	–	–
	18 Mar 2021	A$110.80	–	41,207	–	–	–	41,207	41,207	31 Dec 2025	–	–	–
Arnaud Soirat													
Bonus Deferral Awards	18 Mar 2019	£42.67	8,913	–	–	2,237	11,150	–	–	1 Dec 2021	1 Dec 2021	£46.67	715,926
	16 Mar 2020	£33.58	10,920	–	–	–	–	10,920	10,920	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	6,979	–	–	–	6,979	6,979	1 Dec 2023	–	–	–
Performance Share Awards[(d)]	11 Mar 2016	A$44.57	20,230	–	(6,743)	2,473	15,960	–	–	31 Dec 2020	18 Feb 2021	A$127.40	1,528,088
	9 Mar 2017	£32.03	85,174	–	–	–	–	85,174	85,174	31 Dec 2021	–	–	–
	15 May 2018	£42.30	57,657	–	–	–	–	57,657	57,657	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	56,582	–	–	–	–	56,582	56,582	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	53,272	–	–	–	–	53,272	53,272	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	51,602	–	–	–	51,602	51,602	31 Dec 2025	–	–	–
Jakob Stausholm													
Bonus Deferral Awards	18 Mar 2019	£42.67	3,022	–	–	758	3,780	–	–	1 Dec 2021	1 Dec 2021	£46.67	242,708
	16 Mar 2020	£33.58	13,454	–	–	–	–	13,454	13,454	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	9,680	–	–	–	9,680	9,680	1 Dec 2023	–	–	–
Performance Share Awards[(d)]	10 Sep 2018	£35.16	29,886	–	–	–	–	29,886	29,886	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	79,609	–	–	–	–	79,609	79,609	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	74,711	–	–	–	–	74,711	74,711	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	103,510	–	–	–	103,510	103,510	31 Dec 2025	–	–	–

Name	Award/grant date	Market price at award[a][b]	1 January 2021	Awarded	Lapsed/ cancelled	Dividend units	Vested	31 December 2021	8 February 2022	Vesting period concludes	Date of release	Market price at release	Market value of award at release US$[c]
Peter Toth													
Bonus Deferral Awards	18 Mar 2019	£42.67	1,759	–	(1,759)	–	–	–	–	1 Dec 2021	–	–	–
	16 Mar 2020	£33.58	2,096	–	(2,096)	–	–	–	–	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	2,412	(2,412)	–	–	–	–	1 Dec 2023	–	–	–
Management Share Awards	15 May 2018	£42.30	3,991	–	–	579	4,570	–		15 Feb 2021	18 Feb 2021	£62.61	393,654
	18 Mar 2019	£42.67	3,582	–	(3,582)	–	–	–	–	21 Feb 2022	–	–	–
	16 Mar 2020	£33.58	4,099	–	(4,099)	–	–	–	–	20 Feb 2023	–	–	–
Performance Share Awards[d]	11 Mar 2016	£20.00	14,808	–	(4,935)	1,994	11,867	–	–	31 Dec 2020	18 Feb 2021	£62.61	1,022,209
	9 Mar 2017	£32.03	22,677	–	(22,677)	–	–	–	–	31 Dec 2021	–	–	–
	15 May 2018	£42.30	7,982	–	(7,982)	–	–	–	–	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	10,747	–	(10,747)	–	–	–	–	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	8,199	–	(8,199)	–	–	–	–	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	39,603	(39,603)	–	–	–	–	31 Dec 2025	–	–	–
Simon Trott													
Bonus Deferral Awards	18 Mar 2019	£42.67	6,140	–	–	1,541	7,681	–	–	1 Dec 2021	1 Dec 2021	£46.67	493,186
	16 Mar 2020	£33.58	9,615	–	–	–	–	9,615	9,615	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	6,392	–	–	–	6,392	6,392	1 Dec 2023	–	–	–
Performance Share Awards[d]	11 Mar 2016	A$44.57	9,412	–	(3,137)	1,150	7,425	–	–	31 Dec 2020	18 Feb 2021	A$127.40	710,905
	9 Mar 2017	A$60.14	8,085	–	–	–	–	8,085	8,085	31 Dec 2021	–	–	–
	15 May 2018	£42.30	57,188	–	–	–	–	57,188	57,188	31 Dec 2022	–	–	–
	18 Mar 2019	£42.67	50,598	–	–	–	–	50,598	50,598	31 Dec 2023	–	–	–
	16 Mar 2020	£33.58	52,838	–	–	–	–	52,838	52,838	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	49,571	–	–	–	49,571	49,571	31 Dec 2025	–	–	–
Ivan Vella													
Bonus Deferral Awards	18 Mar 2019	A$93.17	1,046	–	–	236	1,282	–	–	1 Dec 2021	1 Dec 2021	A$95.81	92,309
	16 Mar 2020	A$77.65	1,201	–	–	–	–	1,201	1,201	1 Dec 2022	–	–	–
	18 Mar 2021	£55.58	–	1,525	–	–	–	1,525	1,525	1 Dec 2023	–	–	–
Management Share Awards	15 May 2018	A$83.61	3,344	–	–	450	3,794	–		15 Feb 2021	18 Feb 2021	A$127.40	363,256
	18 Mar 2019	A$93.17	2,856	–	–	–	–	2,856	2,856	21 Feb 2022	–	–	–
	16 Mar 2020	A$77.65	1,931	–	–	–	–	1,931	1,931	20 Feb 2023	–	–	–
Performance Share Awards[d]	11 Mar 2016	A$44.57	3,072	–	(1,023)	375	2,424	–	–	31 Dec 2020	18 Feb 2021	A$127.40	232,085
	9 Mar 2017	A$60.14	8,149	–	–	–	–	8,149	8,149	31 Dec 2021	–	–	–
	15 May 2018	A$83.61	13,376	–	–	–	–	13,376	13,376	31 Dec 2022	–	–	–
	18 Mar 2019	A$93.17	8,570	–	–	–	–	8,570	8,570	31 Dec 2023	–	–	–
	16 Mar 2020	A$77.65	3,862	–	–	–	–	3,862	3,862	31 Dec 2024	–	–	–
	18 Mar 2021	£55.58	–	51,025	–	–	–	51,025	51,025	31 Dec 2025	–	–	–

(a) Awards denominated in pounds sterling were for Rio Tinto plc ordinary shares of 10 pence each and awards denominated in Australian dollars were for Rio Tinto Limited shares. All awards are granted over ordinary shares.

(b) The weighted fair value per share of BDA and MSA granted in March 2021 was £54.60 for Rio Tinto plc and A$111.79 for Rio Tinto Limited and for PSA was £29.62 for Rio Tinto plc and A$60.68 for Rio Tinto Limited. Conditional awards are awarded at no cost to the recipient and no amount remains unpaid on any shares awarded.

(c) The amount in US dollars has been converted at the rate of US$1.3758 = £1 and US$0.75153 = A$1, being the average exchange rates for 2021.

(d) For the PSA granted on 9 March 2017 with a performance period that concluded on 31 December 2021, 100% of the award vested in relation to the TSR portion of the award. The remaining performance condition of relative EBIT margin will be assessed later in 2022.

(e) The closing price at 31 December 2021 was £48.92 for Rio Tinto plc ordinary shares and was A$100.11 for Rio Tinto Limited ordinary shares. The high and low prices during 2021 of Rio Tinto plc and Rio Tinto Limited shares were £67.88 and £43.54 and A$137.33 and A$87.28 respectively.

(f) As of 8 February 2022, the above members of the Executive Committee held 1,779,429 shares awarded and not vested under long-term incentive plans. No Executive Committee member held any options.

Table 3a – Plan interests (award of shares under all-employee share arrangements)

		myShare		UK Share Plan				Total activity in 2021		
	Plan interests at 1 January 2021[a]	Value of Matching shares awarded in year[b] ('000)	Value of Matching shares vested in year[c] ('000)	Value of Matching shares awarded in year[b] ('000)	Value of Matching shares vested in year[c] ('000)	Value of Free shares awarded in year[d] ('000)	Value of Free shares vested in year[d] ('000)	Grants in year ('000)	Vesting in year ('000)	Plan interests at 31 December 2021[a]
Bold Baatar	472.90	2	7	2	0	5	8	9	15	416.65
Alfredo Barrios	212.15	4	7	0	0	0	0	4	7	191.37
Peter Cunningham	366.71	2	4	0	0	5	8	7	12	322.79
Sinead Kaufman	188.76	4	7	0	0	0	0	4	7	166.08
Arnaud Soirat	350.36	2	0	2	0	5	8	9	8	371.76
Jakob Stausholm	217.50	2	0	2	0	5	0	9	0	327.89
Peter Toth	473.71	2	4	2	3	5	8	9	15	324.00
Simon Trott	173.27	0	9	0	0	0	0	0	9	82.86
Ivan Vella	162.02	3	6	0	0	0	0	3	6	141.74

(a) All shares shown are Rio Tinto plc shares except in the cases of Sinead Kaufman and Ivan Vella which are Rio Tinto Limited shares. Simon Trott holds a combination of Rio Tinto plc and Rio Tinto Limited shares.

(b) myShare and UK Share Plan Matching share awards are granted on a quarterly basis (January, April, July and October) throughout the year.

(c) The vesting of a Matching share is dependent on continued employment with Rio Tinto and the retention of the associated Investment share purchased by the participant for three years.

(d) UK Share Plan Free shares vest after three years.

(e) UK Share Plan awards shown above and the vested Matching shares under myShare are included, where relevant, in the executive's share interests in table 2.

(f) All currency figures are shown in US$ and rounded.

Audited information

Under Schedule 8 of the Large- and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (as amended), the following information is auditable:

- The 2021 performance for the purposes of the STIP on pages 175-177.
- The single total figure of remuneration for each director, as set out on page 174 and table 1b on page 193.
- Details of the directors' total pension entitlements, as set out on page 174.
- Details of taxable benefits on page 174.
- Details of scheme interests awarded to the directors during the financial year, as set out on page 182 and table 3 and 3a on pages 195-198.
- Details of payments to past directors as set out on page 185.
- Details of shareholding ownership policy and directors' share ownership on pages 183 and 189.
- Statement of the directors' shareholdings and share interests, as set out in tables 2, 3 and 3a on pages 194-198 of the Implementation report.
- STIP objectives and outcomes for 2021 as set out on pages 175-177 and LTIP outcome and award granted for 2021 as set out on pages 181-182.

The Australian Securities and Investments Commission issued an order dated 16 July 2021, under which the Remuneration report must be prepared and audited in accordance with the requirements of the Australian Corporations Act 2001 applied on the basis of certain modifications set out in the order (as detailed on page 321). The information provided in the Remuneration report has been audited as required by section 308 (3C) of the Australian Corporations Act 2001.

Directors' approval statement

This Directors' Remuneration report is delivered in accordance with a resolution of the Board, and has been signed on behalf of the Board by:

Sam Laidlaw
Remuneration Committee Chair

23 February 2022

Additional statutory disclosure

The Directors present their report and audited consolidated financial statements for the year ended 31 December 2021.

Scope of this report

For the purposes of UK company law and the Australian Corporations Act 2001:

- the additional disclosures under the heading 'Shareholder information' on pages 410-417 are hereby incorporated by reference to, and form part of, this Directors' report;
- the Strategic report on pages 3-131 provides a comprehensive review of Rio Tinto's operations, its financial position and its business strategies and prospects, and is incorporated by reference into, and forms part of this Directors' report;
- certain items that would ordinarily need to be included in this Directors' report (including an indication of likely future developments in the business of the company and the Group) have, as permitted, instead been discussed in the Strategic report, while details of the Group's policy on addressing financial risks and details about financial instruments are shown in note 29 to the Group financial statements;
- taken together, the Strategic report and this Directors' report are intended to provide a fair, balanced and understandable assessment of: the development and performance of the Group's business during the year and its position at the end of the year; its strategy; likely developments; and any principal or emerging risks and uncertainties associated with the Group's business; and
- The Directors' declaration on page 322 is also incorporated into this Directors' report.

For the purposes of compliance with DTR 4.1.5R(2) and DTR 4.1.8R, the required content of the 'Management report' can be found in the Strategic report or this Directors' report, including the material incorporated by reference.

A full report on Director and executive remuneration and shareholdings can be found in the Remuneration report on pages 160-198, which, for the purposes of the Australian Corporations Act 2001, forms part of this Directors' report.

Dual listed structure and constitutional documents

The dual listed companies (DLC) structure of Rio Tinto plc and Rio Tinto Limited, and their constitutional provisions and voting arrangements – including restrictions that may apply to the shares of either company under specified circumstances – are described on pages 410-417.

Operating and financial review

Rio Tinto's principal activities during 2021 were mining minerals and metals throughout the lifecycle from exploration, development, mining and processing, marketing and repurposing and renewing our assets to create a positive legacy.

Subsidiary and associated undertakings, principally affecting the profits or net assets of the Group in the year, are listed in notes 32-35 to the financial statements.

The following significant changes and events affected the Group during 2021 and up to the date of this report:

- In January 2021, we announced that the Board had agreed a change to the classification of executives designated as Key Management Personnel (KMP) under the Australian corporations legislation.
- In January 2021, we announced that we had reached an agreement on a new electricity agreement with Meridian Energy that allows New Zealand's Aluminium Smelter (NZAS) to continue operating the Tiwai Point aluminium smelter until 31 December 2024.
- In January 2021, we unveiled a new Executive team.
- In February 2021, we announced the release of 'Our Approach to Climate Change 2020'.
- In February 2021, we announced changes to the estimates of Mineral Resources and Ore Reserves at our iron ore operations in the Pilbara, our aluminium operations at Weipa and Gove and our Kennecott Copper operation in Utah.
- In March 2021, we announced that The Australian Taxation Office (ATO) had issued Rio Tinto Limited with amended assessments of A$359.4million ($279.8million) primary tax and A$47.1million ($36.7million) of interest. The assessments relate to the denial of interest deductions on an isolated borrowing used to pay an intragroup dividend in 2015.
- In March 2021, we announced that Simon Thompson would not seek re-election at the 2022 annual general meetings (AGMs) of Rio Tinto plc and Rio Tinto Limited. In addition, it was announced that Michael L'Estrange, a Non-Executive Director, would retire from the Board at the conclusion of the 2021 AGMs.
- In March 2021, we announced how we were working in partnership with Traditional Owners, host communities and independent groups to strengthen and improve our approach to cultural heritage and community relations.
- In April 2021, we announced that we had entered into a binding Heads of Agreement (HoA) with Turquoise Hill Resources (TRQ) for an updated funding plan for the completion of the Oyu Tolgoi (OT) Underground Project in Mongolia.
- In April 2021, we announced that Barbara Levi, Chief Legal Officer & External Affairs, had accepted the position of Group General Counsel at UBS and would leave Rio Tinto by the end of October 2021.
- In May 2021, we announced that we had published our report on payments to governments made by Rio Tinto plc and its subsidiary undertakings for the year ended 31 December 2020 as required under the UK's Report on Payments to Governments Regulations 2014 (as amended in December 2015). We paid $8.4 billion of taxes and royalties and a further $1.4 billion on behalf of our employees during 2020.
- In June 2021, we announced that we had appointed Ben Wyatt as a Non-Executive Director. Mr Wyatt, an Australian citizen, joined the Board on 1 September 2021.
- In June 2021, we announced that we had appointed Peter Cunningham as Chief Financial Officer with immediate effect.
- In June 2021, we declared force majeure on customer contracts at Richards Bay Minerals (RBM) in South Africa due to an escalation in the security situation at the operations.
- In June 2021, we announced that we had appointed Isabelle Deschamps to succeed Barbara Levi as Chief Legal Officer & External Affairs.
- In July 2021, we announced that we had reached an agreement to identify and assess legacy impacts of the former Panguna copper mine in Bougainville with the Bougainville community members, represented by the Human Rights Law Centre.
- In July 2021, we announced that the Richards Bay Minerals (RBM) operation in South Africa would shut one of its four furnaces due to the depletion of available feedstock at the plant. This was the result of mining operations being halted following an escalation in the security situation at the operations which significantly hampered the mine's ability to operate safely.
- In July 2021, we announced that we had committed $2.4 billion to the Jadar lithium-borates project in Serbia, one of the world's largest greenfield lithium projects. This project remains subject to receiving all relevant approvals, permits and licences.
- In August 2021, we announced that we had commenced the process of restarting operations at Richards Bay Minerals (RBM) in South Africa.

- In September 2021, we announced that the Australian Taxation Office (ATO) had issued further assessments in relation to the denial of interest deductions on an isolated borrowing used to pay an intragroup dividend in 2015, levying penalties of A$352 million ($257.9 million) and reducing the original interest assessment from A$47 million to A$27 million ($19.8 million).
- In September 2021 we announced that we had published our first report on progress in improving Communities and Social Performance (CSP) practices, as the company works to rebuild trust and relationships with Traditional Owners following the destruction of the Juukan Gorge rock shelters in Western Australia.
- In October 2021 we announced that Peter Toth, Group executive, Strategy and Development, had accepted a new position outside Rio Tinto.
- In October 2021 we announced our new strategy to strengthen performance, decarbonise and grow.
- In December 2021 we announced that the Board had selected Dominic Barton to succeed Simon Thompson as the company's new Chair.
- In December 2021 we announced that we had entered into a binding agreement to acquire the Rincon lithium project in Argentina from Rincon mining, a company owned by funds managed by the private equity group Sentient Equity Partners, for $825 million.
- In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We remain committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.
- In January 2022 we announced that we had reached an agreement with Turquoise Hill Resources and the Government of Mongolia that would move the Oyu Tolgoi project forward, resetting the relationship between the partners and increasing the value the project delivers for Mongolia.
- In February 2022 we announced that we were reviewing the preliminary findings that Energy Resources of Australia Ltd released from its forecast of the cost and schedule for the Ranger rehabilitation project in Australia's Northern Territory, which have been subject to independent review.

In 2021 and 2020, the Group did not receive any public takeover offers by third parties in respect of Rio Tinto plc shares or Rio Tinto Limited shares or make any public takeover offers in respect of other companies' shares. No significant trading suspensions have occurred during the three years prior to 31 December 2021 and the subsequent interim period through the date of this filing.

Details of events that took place after the balance sheet date are further described in note 45 to the financial statements.

Risk identification, assessment and management

The Group's principal risks and uncertainties are listed on pages 117-130. The Group's approach to risk management is discussed on pages 112-116.

Share capital

Details of the Group's share capital as at 31 December 2021 are described in notes 26 and 27 to the financial statements. Details of the rights and obligations attached to each class of shares are covered on page 411, under the heading 'Voting arrangements'.

In situations where an employee share plan is operated by the company and plan participants are the beneficial owners of shares but not the registered owners, voting rights are normally exercised by the registered owner at the direction of the participant.

Details of certain restrictions on holding shares in Rio Tinto and certain consequences triggered by a change of control are described on page 412 under the heading 'Limitations on ownership of shares and merger obligations'. There are no other restrictions on the transfer of ordinary Rio Tinto shares save for:

- restrictions that may from time to time be imposed by laws, regulations or Rio Tinto policy (for example relating to market abuse, insider dealing, share trading or an Australian foreign investment);
- restrictions on the transfer of shares that may be imposed following a failure to supply information required to be disclosed, or where registration of the transfer may breach a court order or a law, or in relation to unmarketable parcels of shares; and
- restrictions on the transfer of shares held under certain employee share plans while they remain subject to the plan.

At the AGMs held in 2021, shareholders authorised:

- the on-market purchase by Rio Tinto plc or Rio Tinto Limited or its subsidiaries, of up to 124,768,190 Rio Tinto plc shares (representing approximately 10% of Rio Tinto plc's issued share capital, excluding Rio Tinto plc shares held in Treasury at that time);
- the off-market purchase by Rio Tinto plc of up to 124,768,190 Rio Tinto plc shares acquired by Rio Tinto Limited or its subsidiaries under the above authority; and
- the off-market and/or on-market buy-back by Rio Tinto Limited of up to 55.6 million Rio Tinto Limited shares (representing approximately 15% of Rio Tinto Limited's issued share capital at that time).

Substantial shareholders

Details of substantial shareholders are included on page 413.

Dividends

Details of dividends paid and declared for payment, together with the company's shareholder returns policy, can be found on page 38.

Directors and executives

The names of Directors and their periods of appointment are listed on pages 134-135, together with details of each Director's qualifications, experience and responsibilities, and current directorships.

There are no family relationships between any of our Directors or executives. None of our Directors or Executive Committee members are elected or appointed under any arrangement or understanding with any major shareholder, customer, supplier or otherwise.

A table of Directors' attendance at Board and committee meetings during 2021 is on page 147.

Simon Thompson is the only Director who will not stand for re-election at the 2022 AGMs.

Previous listed directorships

Details of each Director's previous directorships of other listed companies (where relevant) held in the past three years are set out below:

- **Simon Henry:** Lloyds Banking Group plc (June 2014 to September 2020).

Directors' and executives' beneficial interests

A table of Directors' and executives' beneficial interests in Rio Tinto shares is on page 194.

Secretaries

Steve Allen is Company Secretary of Rio Tinto plc and Joint Company Secretary, together with Tim Paine, of Rio Tinto Limited. Steve's and Tim's qualifications and experience are described on page 135.

Indemnities and insurance

The Articles of Association of Rio Tinto plc and the Constitution of Rio Tinto Limited provide for them to indemnify, to the extent permitted by law, Directors and officers of the companies, including officers of certain subsidiaries, against liabilities arising from the conduct of the Group's business. The Directors, Group company secretary and joint company secretary of Rio Tinto Limited, together with employees serving as Directors of eligible subsidiaries at the Group's request, have also received similar direct indemnities. Former Directors also received indemnities for the period in which they were Directors. These are qualifying third-party indemnity provisions for the purposes of the UK Companies Act 2006, in force during the financial year ended 31 December 2021 and up to the date of this report. During 2021, Rio Tinto paid legal costs under the terms of those indemnities for certain former Directors and officers totalling $9,032,915.

Qualifying pension scheme indemnity provisions (as defined by section 235 of the UK Companies Act 2006) were in force during the course of the financial year ended 31 December 2021 and up to the date of this Directors' report, for the benefit of trustees of the Rio Tinto Group pension and superannuation funds across various jurisdictions. No amount has been paid under any of these indemnities during the year.

The Group purchased Directors' and officers' insurance during the year. In broad terms, this cover indemnifies individual Directors and officers against certain personal legal liability and legal defence costs for claims arising out of actions connected with Group business. During 2021, the Group paid premiums totalling $39,819,792 net of statutory taxes and other local charges for this Directors' and officers' insurance.

Employment of people with a disability

We acknowledge the systemic barriers facing people with disabilities in attaining meaningful employment. We further acknowledge the efforts necessary to fully support people who acquire a disability and we seek to implement the accommodations they need to fulfil their role, or an alternative role if required.

Our inclusion & diversity policy sets out our expectations around the behaviours needed for an inclusive and diverse workplace, where we embrace different perspectives, valuing diversity as a strength.

Our employment policy outlines how we are committed to preventing discrimination and that we consider applications based on the job requirements without discriminating on grounds of disability. It also explains how we ensure our people are trained to perform their role. More information can be found on our website riotinto.com.

In 2021, we joined the IncludeAbility Employer network, which was set up by the Australian Human Rights Commission and aims to increase access to meaningful employment opportunities for people with a disability. We will continue to seek opportunities to improve how we provide meaningful opportunities for people with a disability.

Engagement with UK employees

Our statement on engagement with UK employees is on page 140.

Engagement with suppliers, customers and others in a business relationship with the company

Our statement on engagement with suppliers, customers and others in a business relationship with the company is on page 142.

Statutory Audit Services Order

The Group has fully complied with the Statutory Audit Services Order.

Purchases

Rio Tinto plc shares of 10p each and Rio Tinto plc American Depositary Receipts (ADRs)

	Total number of shares purchased[1]	Average price per share $[2]	Total number of shares purchased to satisfy company dividend reinvestment plans	Total number of shares purchased to satisfy employee share plans	Total number of shares purchased as part of publicly announced plans or programmes[3]	Maximum number of shares that may be purchased under plans or programmes
2021						
1 to 31 Jan	0	0	0	0	0	124,667,622[5]
1 to 28 Feb	0	0	0	0	0	124,667,622[5]
1 to 31 Mar	0	0	0	0	0	124,667,622[5]
1 to 30 Apr	952,879	83.58	675,423	277,456	0	124,768,190[6]
1 to 31 May	0	0	0	0	0	124,768,190[6]
1 to 30 Jun	12,845	85.37	0	12,845	0	124,768,190[6]
1 to 31 Jul	0	0	0	0	0	124,768,190[6]
1 to 31 Aug	0	0	0	0	0	124,768,190[6]
1 to 30 Sep	1,341,952	66.57	891,934	450,018	0	124,768,190[6]
1 to 31 Oct	0	0	0	0	0	124,768,190[6]
1 to 30 Nov	15,711	62.63	0	15,711	0	124,768,190[6]
1 to 31 Dec	146,617	65.84	0	146,617	0	124,768,190[6]
Total	2,470,004[4]	**73.16**	**1,567,357**	**902,647**	**0**	–
2022						
1 to 31 Jan	0	0	0	0	0	124,768,190[6]
1 to 04 Feb	0	0	0	0	0	124,768,190[6]

Rio Tinto Limited shares

	Total number of shares purchased[1]	Average price per share $[2]	Total number of shares purchased to satisfy company dividend reinvestment plans	Total number of shares purchased to satisfy employee share plans[7]	Total number of shares purchased as part of publicly announced plans or programmes[3]	Maximum number of shares that may be purchased under plans or programmes
2021						
1 to 31 Jan	0	0	0	0	0	55,600,000[8]
1 to 28 Feb	0	0	0	0	0	55,600,000[8]
1 to 31 Mar	0	0	0	0	0	55,600,000[8]
1 to 30 Apr	1,626,660	92.19	1,398,026	228,634	0	55,600,000[8]
1 to 31 May	0	0	0	0	0	55,600,000[9]
1 to 30 Jun	87,000	93.71	0	87,000	0	55,600,000[9]
1 to 31 Jul	0	0	0	0	0	55,600,000[9]
1 to 31 Aug	0	0	0	0	0	55,600,000[9]
1 to 30 Sep	2,853,399	71.50	2,341,500	511,899	0	55,600,000[9]
1 to 31 Oct	0	0	0	0	0	55,600,000[9]
1 to 30 Nov	14,417	67.97	0	14,417	0	55,600,000[9]
1 to 31 Dec	896,338	72.92	0	896,338	0	55,600,000[9]
Total	**5,477,814**	**78.22**	**3,739,526**	**1,738,288**	**0**	**–**
2022						
1 to 31 Jan	0	0	0	0	0	55,600,000[9]
1 to 04 Feb	0	0	0	0	0	55,600,000[9]

1. Monthly totals of purchases are based on the settlement date.
2. The shares were purchased in the currency of the stock exchange on which the purchases took place and the sale price has been converted into US dollars at the exchange rate on the date of settlement.
3. Shares purchased in connection with the dividend reinvestment plans and employee share plans are not deemed to form any part of any publicly announced plan or programme.
4. This figure represents 0.197% of Rio Tinto plc issued share capital at 31 December 2021.
5. At the Rio Tinto plc AGM held in 2020, shareholders authorised the on-market purchase by Rio Tinto plc, and Rio Tinto Limited and its subsidiaries of up to 124,667,622 Rio Tinto plc shares. This authorisation expired at the 2021 AGM on 9 April 2021.
6. At the Rio Tinto plc AGM held in 2021, shareholders authorised the on-market purchase by Rio Tinto plc, and Rio Tinto Limited and its subsidiaries of up to 124,768,190 Rio Tinto plc shares. This authorisation will expire on the later of 8 July 2022 or the date of the 2022 AGM.
7. The average price of shares purchased on-market by the trustee of Rio Tinto Limited's employee share trust during 2021 was $75.86.
8. At the Rio Tinto Limited AGM held in 2020 shareholders authorised the off-market and/or on-market buy-back of up to 55.6 million Rio Tinto Limited shares.
9. At the Rio Tinto Limited AGM held in 2021 shareholders authorised the off-market and/or on-market buy-back of up to 55.6 million Rio Tinto Limited shares.

Political donations

Rio Tinto prohibits the use of its funds to support political candidates or parties. No political donations were made by the Group for political purposes during the year. In the US, in accordance with the United States Federal Election Campaign Act, we provide administrative support for the Rio Tinto America Political Action Committee (PAC), which was created in 1990 and encourages voluntary employee participation in the political process. All Rio Tinto America PAC employee contributions are reviewed for compliance with federal and state law and are publicly reported in accordance with US election laws. The PAC is controlled by neither Rio Tinto nor any of its subsidiaries, but instead by a governing board of five employee members on a voluntary basis. In 2021, contributions to Rio Tinto America PAC by 11 employees amounted to $8,310.60, and Rio Tinto America PAC donated $37,000 in political contributions in 2021.

Government regulations

Our operations around the world are subject to extensive laws and regulations imposed by local, state, provincial and federal governments. These regulations govern many aspects of our work – from how we explore, mine and process ore, to conditions of land tenure and health, safety and environmental requirements. They also govern how we operate as a company in relation to securities, taxation, intellectual property, competition and foreign investment, provisions to protect data privacy, conditions of trade and export and infrastructure access. In addition to these laws, several of our operations are governed by specific agreements made with governments, some of which are enshrined in legislation.

The geographic and product diversity of our operations reduces the likelihood of any single law or government regulation having a material effect on the Group's business as a whole.

Environmental regulations

Rio Tinto is subject to various environmental laws and regulations in the countries where it has operations. Rio Tinto measures its performance against environmental regulation by tracking and rating incidents according to their actual environmental and compliance impacts using five severity categories (minor, medium, serious, major or catastrophic). Incidents with a consequence rating of major or catastrophic are of a severity that require notification to the relevant product group Chief Executive and the Rio Tinto Chief Executive immediately after the incident occurring. In 2021, there were three environmental incidents at managed operations with a major impact. There were no environmental incidents with catastrophic impact.

During 2021, three managed operations incurred fines amounting to $7,414 (2020: $27,387). Details of these fines are reported in the Sustainability section of this report on page 88.

Australian corporations that exceed specific greenhouse gas emissions or energy use thresholds have obligations under the Australian National Greenhouse and Energy Reporting Act 2007 (NGER). All Rio Tinto entities covered under this Act have submitted their annual NGER reports by the required 31 October 2021 deadline.

Further information on the Group's environmental performance is included in the Sustainability section of this Annual Report, on pages 72-97, and at riotinto.com.

Energy efficiency action

Details of the measures taken to increase the company's energy efficiency are reported on pages 78, 80-81 and 119 of this report.

Energy consumption[1, 2, 3]

Energy consumption in GWh	2021	2020
From activities including the combustion of fuel and the operation of facilities	**80,016**	86,389
From the purchase of electricity, heat, steam or cooling	**22,121**	22,778
Total energy consumed[4]	**102,137**	111,667

1. Rio Tinto does not report on the proportion of energy consumption associated with the UK and offshore area since it has no producing assets in the UK, only offices, and consequently falls below Rio Tinto's threshold level of reporting.
2. Our approach and methodology used for the determination of measuring energy consumption is available at: riotinto.com.
3. Data reported is for all managed operations, without adjustment for equity interest.
4. Rio Tinto exports electricity and steam to others.

Greenhouse gas emissions (in million tCO_2e)[5, 6, 7]

	2021	2020
Scope 1[8]	**16.9**	17.1
Scope 2[9]	**9.3**	9.5
Net greenhouse gas emissions[10]	**25.9**	26.3[11]
Ratios		
Greenhouse gas emissions intensity (tCO_2e/t of product)	**0.062**	0.060

5. Rio Tinto's greenhouse gas emissions for managed operations are reported in accordance with the requirements under Part 7 of the UK Companies Act 2006 (Strategic report and Directors' report) Regulations 2013. Our approach and methodology used for the determination of these emissions are available at riotinto.com.
6. Rio Tinto's greenhouse gas emissions inventory is based on definitions provided by The World Resource Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol: A Carbon Reporting and Accounting Standard, March 2004.
7. Rio Tinto does not report on the proportion of CO_2 emissions associated with the UK and offshore area since it has no producing assets in the UK, only offices, and consequently falls below Rio Tinto's threshold level of reporting.
8. Scope 1 emissions include emissions from combustion of fuel and operation of managed facilities. These include emissions from land management and livestock management at those facilities.
9. Scope 2 emissions include emissions from the purchase of electricity, heat, steam or cooling.
10. Total emissions is the sum of Scope 1 and Scope 2 emissions, minus emissions that are associated with the generation of electricity, heat, steam or cooling supplied to others. These emissions exclude indirect emissions associated with transportation and use of our products reported at riotinto.com.

Exploration, research and development

The Group carries out exploration, research and development, described in the Innovation section on pages 70-71. Exploration and evaluation costs, net of any gains and losses on disposal, generated a net loss before tax of $719 million (2020: $624 million). Research and development costs were $65 million (2020: $45 million).

Financial instruments

Details of the Group's financial risk management objectives and policies, and exposure to risk, are described in note 29 to the financial statements.

Dealing in Rio Tinto securities

Rio Tinto securities dealing policy restricts dealing in Rio Tinto securities by Directors and employees who may be in possession of inside information. These individuals must seek clearance before any proposed dealing takes place.

Our policy also prohibits such persons from engaging in hedging or other arrangements which limit the economic risk in connection to Rio Tinto securities issued, or otherwise allocated, as remuneration that are either unvested, or that have vested, but remain subject to a holding period. We also impose restrictions on a broader group of employees, requiring them to seek clearance before engaging in similar arrangements over any Rio Tinto securities.

Financial reporting

Financial statements

The Directors are required to prepare financial statements for each financial period that give a true and fair view of the state of the Group at the end of the financial period, together with profit or loss and cash flows for that period. This includes preparing financial statements in accordance with UK company law and preparing a Remuneration report that includes the information required by Regulation 11, Schedule 8 of the Large- and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (as amended) and the Australian Corporations Act 2001.

In addition, the UK Corporate Governance Code recommends that the Board provides a fair, balanced and understandable assessment of the company's position and prospects in its external reporting.

Rio Tinto's management conducts extensive review and challenge in support of the Board's obligations, aiming to strike a balance between positive and negative statements and provide good linkages throughout the Annual Report.

The Directors were responsible for the preparation and approval of the Annual Report for the year ended 31 December 2021. They consider the Annual Report, taken as a whole, to be fair, balanced and understandable, and that it provides the information necessary for shareholders to assess the Group's position, performance, business model and strategy.

The Directors are responsible for maintaining proper accounting records, in accordance with UK and Australian legislation. They have a general responsibility to safeguard the assets of the Group, and to prevent and detect fraud and other irregularities. The Directors are also responsible for ensuring that appropriate systems are in place to maintain and preserve the integrity of the Group's website.

Legislation in the UK governing the preparation and dissemination of financial statements may differ from current and future legislation in other jurisdictions. The work carried out by the Group's external auditors does not take into account such legislation and, accordingly, the external auditors accept no responsibility for any changes to the financial statements after they are made available on the Group's website.

The Directors, senior executives, senior financial managers and other members of staff who are required to exercise judgement while preparing the Group's financial statements, are required to conduct themselves with integrity and honesty and in accordance with the highest ethical standards, as are all Group employees.

The Directors consider that the 2021 Annual Report presents a true and fair view and has been prepared in accordance with applicable accounting standards, using the most appropriate accounting policies for Rio Tinto's business, and supported by reasonable judgements and estimates. The accounting policies have been consistently applied as described on pages 218-237, and Directors have received a written statement from the Chief Executive and the Chief Financial Officer to this effect. In accordance with the internal control requirements of the Code and the ASX Principles, this written statement confirms that the declarations in the statement are founded on a sound system of risk management and internal controls, and that the system is operating effectively in all material respects in relation to financial reporting risks. Further information on Directors' responsibilities is included on page 322.

Disclosure controls and procedures

The Group maintains disclosure controls and procedures, as defined in US Exchange Act Rule 13a-15(e). Management, with the participation of the Chief Executive and Chief Financial Officer, has evaluated the effectiveness of the Group's disclosure controls and procedures in relation to US Exchange Act Rule 13a-15(b), as of the end of the period covered by this report, and has concluded that the Group's disclosure controls and procedures were effective at a reasonable assurance level.

Management's report on internal control over financial reporting

Management is responsible for establishing and maintaining adequate internal controls over financial reporting. These controls, designed under the supervision of the Chief Executive and Chief Financial Officer, provide reasonable assurance regarding the reliability of the Group's financial reporting and the preparation and presentation of financial statements for external reporting purposes, in accordance with International Financial Reporting Standards (IFRS) as defined on page 218.

The Group's internal controls over financial reporting include policies and procedures designed to ensure the maintenance of records that:

- accurately and fairly reflect transactions and dispositions of assets;
- provide reasonable assurances that transactions are recorded as necessary, enabling the preparation of financial statements in accordance with IFRS, and that receipts and expenditures are made with the authorisation of management and Directors of each of the companies; and
- provide reasonable assurance regarding the prevention or timely detection of unauthorised acquisition, use or disposition of the Group's assets that could have a material effect on its financial statements.

Due to inherent limitations, internal controls over financial reporting cannot provide absolute assurance. Similarly, these controls may not prevent or detect all misstatements, whether caused by error or fraud, within each of Rio Tinto plc and Rio Tinto Limited.

There were no changes to internal controls over financial reporting during the relevant period that have materially affected, or were reasonably likely to materially affect, the internal control over financial reporting of Rio Tinto plc and Rio Tinto Limited.

Management's evaluation of the effectiveness of the company's internal controls over financial reporting was based on criteria established in the Internal Control-Integrated Framework (2013), issued by the Committee of Sponsoring Organisations of the Treadway Commission. Following this evaluation, management concluded that our internal controls over financial reporting were effective as at 31 December 2021.

Directors' declaration

The Directors' statement of responsibilities in relation to the Group's financial statements is set out on page 322.

Non-audit services and auditor independence

Details of the non-audit services and a statement of independence regarding the provision of non-audit services undertaken by our external auditor, including the amounts paid for non-audit services, are set out on page 154 of the Directors' report.

A copy of the Auditor's Independence Declaration as required under section 307C of the Corporations Act 2001 is set out on page 342.

Going concern

The Directors, having made appropriate enquiries, have satisfied themselves that it is appropriate to adopt the going concern basis of accounting in preparing the financial statements. Additionally, the Directors have considered longer-term viability, as described in their statement on pages 115-116.

2022 AGMs

The 2022 AGMs will be held on 8 April in London, UK and 5 May in Melbourne, Australia. Separate notices of the 2022 AGMs will be produced for the shareholders of each company.

Directors' approval statement

The Directors' report is delivered in accordance with a resolution of the Board.

S.R. Thompson

Simon Thompson
Chairman

23 February 2022

Compliance with governance codes and standards

Application of and compliance with governance codes and standards

This section sets out our compliance with the applicable governance codes and standards. As our shares are listed on both the Australian Securities Exchange and the London Stock Exchange, we set out how we have complied with the codes and standards of those bodies on the following pages:

- London Stock Exchange – UK Corporate Governance Code (2018 version) (the UK Code), see pages 205-207.
- Australian Securities Exchange – ASX Corporate Governance Council's Corporate Governance Principles and Recommendations (4th edition) (the ASX Principles), see pages 208-210.

In addition, as explained below, as a foreign private issuer (FPI) with American Depository Receipts (ADRs) listed on the New York Stock Exchange (NYSE), we need to report any significant corporate governance differences from the NYSE listing standards (NYSE Standards) followed by US companies.

Statement of compliance with the Code and ASX Principles

Throughout 2021 and as at the date of this report, the Group has applied the Principles of the UK Code and the ASX Principles. The UK Code is available at www.frc.org.uk, and the ASX Principles at www.asx.com/au. For the purposes of ASX Listing Rule 4.10.3 and the ASX Principles, pages 133-159 of this report form our 'Corporate Governance Statement'. This statement is current as at 23 February 2022, unless otherwise indicated, and has been approved by the Board. Corporate governance documents and policies referenced can be found at riotinto.com/invest/corporate-governance.

We have complied with all relevant provisions of the UK Code throughout 2021.

Difference from NYSE Standards

We have reviewed the NYSE Standards and consider that our practices are broadly consistent with them, with the following exceptions where the literal requirements of the NYSE Standards are not met due to differences in corporate governance between the US, UK and Australia:

- The NYSE Standards state that US companies must have a nominating/corporate governance committee which, in addition to identifying individuals qualified to become board members, develops and recommends to the board a set of corporate governance principles applicable to the company. Our Nominations Committee does not develop corporate governance principles for the Board's approval. The Board itself develops such principles.
- Under US securities law and the NYSE Standards, the company is required to have an audit committee that is directly responsible for the appointment, compensation, retention and oversight of the work of external auditors. While our Audit Committee makes recommendations to the Board on these matters, and is subject to legal and regulatory requirements on oversight of audit tenders, the ultimate responsibility for the appointment and retention of the external auditors of Rio Tinto rests with the shareholders.
- Under US securities law and the NYSE Standards, an audit committee is required to establish procedures for the receipt, retention and treatment of complaints regarding accounting, internal accounting controls and audit matters. The whistleblowing programme (myVoice) enables employees to raise any concerns confidentially or anonymously. The Board has responsibility to ensure that the programme is in place and to review the reports arising from its operations.

The UK Code

Board leadership and company purpose

A. Making the board effective

Our Board provides effective and entrepreneurial leadership. It is collectively responsible for the stewardship and long-term success of the Group. There is a framework of prudent and effective controls that enable risk to be assessed and managed. The Sustainability section on pages 72-111 sets out how we assess our impact on wider society. See pages 143-144 for the key activities undertaken by the Board during the year and the factors that were considered when making decisions. In 2021, the Board undertook an internally facilitated effectiveness review and details of this are provided on page 146 of the Governance section.

B. The company's purpose, values and strategy and alignment with culture

Through our *The Way We Work* framework, the Board sets the company's purpose, values, and standards for the Group's employees. In 2021, the Board approved a new set of values, set out on pages 18-19. The Board is committed to acting in accordance with these values, championing and embedding these in the organisation. The Board also seeks to ensure that the culture of the company is aligned with these values and standards.

C. Company performance and risk management

The Board leads the development of long-term investment plans for the company. It aims to make good quality decisions at the right time, to achieve the company's objectives, in alignment with our purpose, values and strategy. The role of the Board in establishing and monitoring the internal control environment is set out in the Audit Committee report on pages 151-155. The way in which the company manages risk is set out on pages 112-130. For information on the delegation of business to management please refer to pages 136-137.

The formal schedule of matters reserved for the Board's decision, available at riotinto.com, covers areas including: setting the Group's purpose and strategic vision; monitoring performance of the delivery of the approved strategy; approving major investments, acquisitions and divestments; the oversight of risk and the setting of the Group's risk appetite; and reviewing the Group's governance framework.

D. Stakeholder engagement

The Chairman undertakes regular engagement with our major shareholders, in addition to that carried out by the Chief Executive, the Chief Financial Officer and the investor relations team. The committee chairs also engage with their relevant stakeholders and details of this engagement is provided in each of the committee reports. We have mapped our key stakeholders and continually work to understand their views and we take account of our responsibilities to our stakeholders when making business decisions. We explain more about this in our section 172 (1) statement, set out on pages 140-142. We also discuss stakeholders in the Strategic report on pages 20-22 and in the Sustainability section.

In January 2021, the Board appointed Simon McKeon as the designated Non-Executive Director for workforce engagement. An overview of workforce engagement during 2021 is set out on page 140.

At Rio Tinto plc's AGM on 9 April 2021, Resolution 21 ('Authority to purchase Rio Tinto plc shares') was passed with less than 80% of votes in favour and Shining Prospect (a subsidiary of the Aluminium Corporation of China ('Chinalco')) voted against. Chinalco has not sold any Rio Tinto plc shares and now has a holding of over 14% given its non-participation in Rio Tinto's significant share buy-back programmes over the last four years. This places Chinalco close to the 14.99% threshold agreed with the Australian Government at the time of Chinalco's original investment in 2008.

Following the AGMs of Rio Tinto plc and Rio Tinto Limited, on 9 April 2021 and 6 May 2021 respectively, the advisory vote on Resolution 3 ('Approval of the Directors' Remuneration report: Implementation report') and Resolution 4 ('Approval of the Directors' Remuneration report') were not passed as ordinary resolutions. Page 163 of the Remuneration report set out the actions taken by the Remuneration Committee to engage with shareholders on this matter during 2021.

Resolution 5 ('Re-election of Dr Megan Clark AC') was passed with less than 80% of votes in favour. Rio Tinto acknowledges that the reduced vote for Dr Clark's re-election compared to previous years reflected the fact that, as Chair of the Sustainability Committee at the time that the rock shelters at Juukan Gorge were destroyed, Dr Clark shares accountability for the failings in the areas of communities and social performance that led to those events occurring. In light of the support provided by almost 75% of shareholders, Dr Clark and the Board carefully weighed the need for accountability for the events at Juukan Gorge against the significant contribution, experience and continuity that Dr Clark brings to the Board and the Group's relationship with Traditional Owners, and concluded that she should remain on the Board in order to provide stability at this important time for Rio Tinto. Dr Clark plays an active and important role on behalf of the Board in engaging with the Traditional Owners of the lands where the company operates in Western Australia, including attending engagements with stakeholders.

E. Our workforce policies and practices

Group workforce policies are approved by the Board. All the policies relating to our workforce take account of the global nature of our company. Our whistleblowing process is overseen by the Board and every member of the workforce has access to the whistleblower programme (myVoice) and details of this programme are on page 107.

Division of responsibilities

F. The role of the Chairman

The Chairman leads the Board and is responsible for its overall effectiveness. He was independent on the date of his appointment and we consider he remains independent for the purposes of the Code. This is also the case for the Chair-designate, Dominic Barton, who will be appointed with effect from 5 May 2022. The Chairman recognises the importance of creating a boardroom culture which encourages openness and debate and ensures constructive relations between executive and Non-Executive Directors.

The Chairman is responsible for: the management of the Board and its committees; Director performance; induction; training and development; succession planning; engagement with external stakeholders; and attendance by the Board at shareholder meetings.

The Chairman is supported by the Senior Independent Directors, the Group Company Secretary and the Chief Executive. In line with the UK Code the Senior Independent Director, Rio Tinto plc is responsible for acting as a sounding board for the Chairman and engages with shareholders to develop a balanced understanding of their interests and concerns. For further details, please see our Board Charter on riotinto.com, which sets out the role, responsibilities, structure, compositions and conduct of the Board, as well as the role of the Chairman, the Senior Independent Director, Rio Tinto plc and the Senior Independent Director, Rio Tinto Limited.

G. Composition of the board

As at the date of this report, the Board comprises 11 members: 8 independent Non-Executive Directors, the Chairman, the Chief Executive, and the Chief Financial Officer.

As detailed in the Nominations Committee report, we engaged Spencer Stuart to support the search for a new Chair and the Committee is satisfied that Spencer Stuart does not have any connections with the company or individual Directors that may impair their independence. The recruitment of Ben Wyatt as a Non-Executive Director was not supported by an external agency.

The Board is satisfied that it has the appropriate balance of skills, experience, independence, and knowledge of the company to enable its members to discharge their respective duties and responsibilities effectively, and that no individual or group can dominate the Board's decision making.

There is a clear division of responsibilities between the leadership of the Board and the executive leadership of our business. The Chief Executive is responsible for the day-to-day management of the business and, under a Group delegation of authority framework, delegates to other members of the Executive Committee.

H. Role of Non-Executive Directors

We list all of the Non-Executive Directors that we consider to be independent on pages 134-135 of this report. Over 50% of the Board (excluding the Chairman) are Non-Executive Directors. The Non-Executive Directors constructively challenge and help develop proposals on strategy. They are also responsible for scrutinising management performance and ensuring that financial information, risks and controls, and systems of risk management are robust. In order to enhance Board engagement in Australia, the role of Senior Independent Director Rio Tinto Limited was established in 2021. Simon McKeon was appointed to this position and the terms of this appointment were agreed by the Board.

The Board held an internally facilitated Board evaluation this year and as part of this process, the Board met without the Chairman present and a full assessment of the Chairman's capability was carried out. Details of this review are on pages 146-147. Each Director has undertaken to allocate sufficient time to the Group in order to discharge their responsibilities effectively, and this is kept under review by the Nominations Committee. The Directors' other appointments are listed on pages 134-135.

I. Board processes and role of the Company Secretary

The governance framework on page 145 explains the governance structure of the Board and sets out the relationship with the Chief Executive. The roles and responsibilities of each committee are explained. The Board insights section provides some examples of the decision-making process of the Board and the steps it takes to function effectively, including how it considers stakeholders in this process.

The Group Company Secretary is the trusted interlocutor within the Board and its committees, and between senior leadership and the Non-Executive Directors. He is responsible for advising the Board, through the Chairman, on all governance matters. He supports the Chairman in ensuring that the information provided to the Board is of sufficient quality and appropriate detail in order for the Board to function effectively and efficiently. Composition, succession and evaluation

J. Appointments to the board

The Nominations Committee ensures a formal, rigorous and transparent procedure for the appointment of new Directors. It is also responsible for Board succession planning, regularly assessing the balance of skills, experience, diversity and capacity required to oversee the delivery of Rio Tinto's strategy. It reviews proposals for appointments to the Executive Committee, and monitors executive succession planning. This year the Nominations Committee oversaw the succession of the Chairman and Chief Financial Officer and details of this process are provided in the Nominations Committee report on pages 148-150.

All Non-Executive Directors are members of the Nominations Committee. The committee is chaired by the Chairman, apart from when the committee is dealing with the appointment of his or her successor. Only the Chairman and committee members have the right to attend the meetings of the Nominations Committee; attendance by all other individuals is by invitation only. The Nominations Committee report sets out the Board's approach to succession planning and how this supports the development of a diverse pipeline, at all levels. All Directors are subject to annual re-election at the AGMs.

Details of external search consultancies used for Board appointments can be found in the Nominations Committee report.

K. Skills, experience and knowledge of the board and its committees

In our succession planning, we aim to bring a diverse and complementary range of skills, knowledge and experience to the Board, so that we are equipped to navigate the operational, social, regulatory and geopolitical complexity in which our business operates. Achieving the right blend of skills and diversity to support effective decision making is a continuing process. Further details on tenure and experience of the Board are set out in the Nominations Committee report on page 149. The Board biographies set out the specific skills and experience which each Director brings to the Board (pages 134-135).

L. Board evaluation

A Board and committee effectiveness evaluation is carried out each year. The evaluation considers (but is not limited to): the balance of Board members' skills and experience; independence; diversity; the running of the Board; and Directors' knowledge of the company. Every third year, the Board evaluation is externally facilitated. An internally facilitated Board and committee evaluation was carried out in 2021. The terms of reference for this review and the outcomes are discussed on pages 146-147. An externally facilitated Board and committee evaluation will be carried out in 2022.

Audit, risk and internal control

M. Internal and external audit

The Audit Committee monitors the independence and effectiveness of the Internal Audit function and external auditors. The Audit Committee is responsible for reviewing key judgments within the Group's financial statements and narrative reporting, with the aim of maintaining the integrity of the Group's financial reporting. For further detail, please refer to the Audit Committee report on pages 151-155.

The appointment of KPMG as external auditor for the 2021 financial year was approved by shareholders at our AGMs in 2021.

N. Fair, balanced and understandable assessment

The Board is responsible for the presentation of a fair, balanced and understandable assessment of the company's position and prospects, not only in the Annual Report. We have a robust process in place including through the Disclosure Committee, to ensure that this is the case.

O. Risk management and internal control framework

The Board is ultimately responsible for aligning our long-term strategic objectives with the risk appetite of the company, taking into account the principal and emerging risks faced by the company. Please refer to pages 112-130 for further details on our business planning cycle and risk management framework and how these support our longer-term viability statement. For further details on our approach to risk, please refer to the risk section on page 112.

Remuneration

P. Remuneration policies and practices

The Remuneration Committee supports the Board by setting our Remuneration Policy. Through long-term and short-term incentives, our Remuneration Policy is designed to help drive a performance culture which incentivises executives to deliver the Group's long-term strategy and create superior shareholder value over the short, medium and long term. The overarching aim is to ensure our remuneration structure and policies reward fairly and responsibly with a clear link to corporate and individual performance, and to the company's long-term strategy and values. We have worked to ensure that we have a clear policy that can be understood by shareholders and stakeholders.

Q. Procedure for developing remuneration policy

We have a formal and transparent procedure for developing our Remuneration Policy, and no Director is involved in deciding their own remuneration. Executive remuneration is set with regard to the wider workforce and through market benchmarking. For further detail, please refer to the Remuneration Committee report on pages 160-198. The Remuneration Committee is supported by remuneration consultant Deloitte. The Board received assurance from the Remuneration Committee and from Deloitte that Deloitte did not have any connections with Rio Tinto or the Board that would have impaired its independence. Please refer to page 172 of this Annual Report for further detail.

R. Exercising independent judgement

The Remuneration Committee comprises 6 Non-Executive Directors to ensure independent judgment with regard to remuneration outcomes. The Remuneration Committee considers remuneration on an annual basis and determines outcomes by assessing executive performance against performance criteria, details of which can be found in the Remuneration Committee report on pages 160-198 of this Annual Report. This states how our Remuneration Policy has been applied and sets out details of any adjustments made or discretions exercised.

ASX Principles

Principle 1: Lay solid foundations for management and oversight

Recommendation 1.1

Rio Tinto plc and Rio Tinto Limited have a common Board of Directors. The principal role of the Board is to set the Group's strategy and to review its strategic direction regularly. The Board also has responsibility for corporate governance. A Board Charter setting out the role of the Board and management and matters reserved for the Board is available at riotinto.com.

The Board delegates responsibility for day-to-day management of the business to the Chief Executive and other members of the Executive Committee. A number of management committees support the Chief Executive and the Executive Committee. The structure of these committees is set out on page 145.

Recommendation 1.2

The Nominations Committee, on behalf of the Board, ensures a formal, rigorous and transparent procedure for the appointment of new Directors. A similar process is followed with the Executive Committee and senior executive appointments, including a formal and rigorous process to source strong candidates from diverse backgrounds and conducting appropriate background and reference checks on the shortlisted candidates. This year the Nominations Committee oversaw the succession of the Chairman and Chief Financial Officer and details of these processes are provided in the Nominations Committee report on pages 148-150.

The notice of annual general meeting provides all material information in Rio Tinto's possession relevant to decisions on election and re-election of Directors, including a statement from the Board that it considers all Directors continue to perform effectively and demonstrate appropriate levels of commitment. It also provides reasons why each Director is recommended for re-election, highlighting their relevant skills and experience. Further information on the skills and experience of each Director is set out on pages 134-135 of the Annual Report.

Recommendation 1.3

The company has written agreements setting out the terms of appointment for each Director and senior executive. Non-Executive Directors are appointed by letters of appointment. Executive Directors and other senior executives are employed through employment service contracts. Further information is set out on pages 187-188 in the Remuneration report.

Recommendation 1.4

The Group Company Secretary is accountable to the Board and advises the Chairman, and, through the Chairman, the Board on all governance matters. The appointment and removal of the Group Company Secretary is a matter reserved for the Board.

Recommendation 1.5

Rio Tinto has a Group-wide, Board-endorsed inclusion and diversity policy. The policy is available at riotinto.com. The Board sets objectives for achieving diversity for the Board, senior executives and the workforce, and annually reviews the Group's performance against them. Page 78 of the Annual Report sets out the measurable objectives and our performance against them. The respective proportions of men and women on the Board, in senior executive positions and across the whole organisation, are reported on pages 78 and 149 of the Annual Report.

Recommendation 1.6

The performance of the Board, and of each of its committees and individual Directors, was reviewed in 2021, as it is each year. Detailed information on the Board and committee evaluation and the evaluation of the Chairman and the Non-Executive Directors is set out on page 146 of the Annual Report.

Recommendation 1.7

The performance of Executive Committee members, including Directors, is continually evaluated as part of the Group's performance evaluation cycle. Further details are set out in the Remuneration report on pages 160-198.

Principle 2: Structure the board to be effective and add value

Recommendation 2.1

The Nominations Committee includes all Non-Executive Directors and is chaired by the Chairman of the Board. The Board is satisfied that all Non-Executive Directors, including the Chairman, continue to meet the test for independence under the ASX Principles. The Nominations Committee's terms of reference are available at riotinto.com. The Nominations Committee report on pages 148-150 provides further details on its role and responsibilities. Details on membership, the number of times the Committee met, and the attendance of members are set out on page 147.

Recommendation 2.2

A Board skills matrix showing key attributes in terms of skills, experience and diversity that are relevant to the Board is set out on page 150 of the Annual Report.

Recommendations 2.3, 2.4, 2.5

The Nominations Committee is responsible for assessing the independence of each Non-Executive Director against an independence framework which combines the requirements of the Code, the ASX Principles and the NYSE Standards. The Nominations Committee reviews and approves this framework each year.

The Board is satisfied that all of its Non-Executive Directors are independent in character and judgment and are free from any relationships (material or otherwise) or circumstances that could create a conflict of interest.

The Chairman was considered independent upon his appointment and, in the Board's view, he continues to satisfy the tests for independence under the ASX Principles and the NYSE Standards.

The name, skills and experience of each Director, together with their terms in office, are shown in the biographical details on pages 134-135.

Recommendation 2.6

On joining Rio Tinto, all Directors receive a full, formal induction programme. It is delivered over a number of months, and tailored to their specific requirements, taking into account their prospective committee responsibilities. Details of the induction programme for the Chair-designate are set out on page 150 of the Annual Report.

The annual Board evaluation process identifies training and development needs for the Board and individual Directors. All Directors are expected to commit to continuing their development during their tenure. This is supported through a combination of: site visits, teach-ins, deep dives and internal business and operational briefings provided in or around scheduled Board and committee meetings. In addition, the Group Company Secretary provides regular updates on corporate governance developments in the UK, Australia and the US. Further details are set out on pages 146-147 of the Annual Report.

Principle 3: Instil a culture of acting lawfully, ethically and responsibly

Recommendations 3.1, 3.2, 3.3, 3.4

Through our *The Way We Work* framework, the Board sets the company's purpose, values, and standards for the Group's employees. In 2021, the Board approved a new set of values as set out on page 18. The Board is committed to acting in accordance with these values, championing, and embedding these in the organisation. *The Way We Work* is available at riotinto.com/ethics.

Rio Tinto's confidential and independently operated whistleblowing programme (myVoice) offers an avenue through which our employees, contractors, suppliers and customers can report concerns anonymously, subject to local law. These may include concerns about the business, or behaviour of individuals, including suspicion of violations of financial reporting, safety or environmental procedures or other business integrity issues. The programme features telephone and web submissions, a case management tool, and a reporting tool to allow for improved analysis of case statistics.

The myVoice procedure explains how concerns regarding matters relating to Rio Tinto, its business and its people can be raised, in confidence and without fear of retaliation. The procedure also sets out who can make a report and what they can expect from Rio Tinto if they do report a concern. The procedure is available at riotinto.com. Further details on myVoice are set out on page 107. Rio Tinto's business integrity standard sets out the Group's position on issues relating to bribery and corruption. This is available at riotinto.com. Further information is set out on page 107.

Oversight of the Group's ethics, integrity and compliance programme now falls within the remit of the Board.

Principle 4: Safeguard integrity in corporate reports

Recommendation 4.1

The Audit Committee report on pages 151-155 provides details of the role and responsibilities of the Committee. The Audit Committee's terms of reference are available at riotinto.com. Further details on membership, the number of times the Committee met during 2021 and the attendance of members are set out on pages 134-135 and 147.

Recommendation 4.2

Details on compliance with the financial reporting requirements contemplated under this recommendation are set out on pages 203-204 of the Annual Report.

Recommendation 4.3

We have a thorough and rigorous review process in place to ensure integrity of the periodic reports we release to the market. Rio Tinto communicates with the market through accurate, clear, concise and effective reporting, and contents of periodic reports are verified by the subject matter experts and reviewed by the relevant Group functions. Such reports are then reviewed and considered by the Group Disclosure Committee for release to the market.

Principle 5: Make timely and balanced disclosure

Recommendation 5.1

Rio Tinto recognises the importance of effective and timely communication with shareholders and the wider investment community.

It is our policy to make sure that all information disclosed or released by the Group is accurate, complete and timely and complies with all continuous and other disclosure obligations under applicable listing rules and other relevant legislation.

To ensure that trading in our securities takes place in an informed and orderly market, we have established a Disclosure Committee to oversee compliance with our continuous disclosure obligations. The Group disclosure and communications policy, and the terms of reference of our Disclosure Committee, together with our adopted procedures in relation to disclosure and management of relevant information, support compliance with our disclosure obligations. A copy of the Group disclosure and communications policy is available at riotinto.com.

The Group's Disclosure Committee is responsible for determining whether information relating to Rio Tinto may require disclosure to the markets under the continuous disclosure requirements in the jurisdictions in which Rio Tinto is listed. In accordance with its terms of reference, the specific focus of the Disclosure Committee is to consider and determine on a timely basis whether information would, to the extent that the information is not public and relates directly or indirectly to Rio Tinto, be likely to have a material effect on the price of Rio Tinto securities if that information was generally available.

The members of the Committee are the Chief Executive; the Chief Financial Officer; the Group Company Secretary; the Chief Legal Officer & External Affairs; the Head of Investor Relations; and the Chief Executive Australia.

Recommendation 5.2

Consistent with the Group's disclosure protocols, the Board is provided with copies of all material market announcements promptly after their being released to the market.

Recommendation 5.3

As a matter of practice, all our new or substantive investor presentations are released to the market via ASX and LSE market announcement platforms.

Principle 6: Respect the rights of security holders

Recommendation 6.1

Riotinto.com includes pages dedicated to corporate governance, providing information on compliance with governance codes and standards (the Code, the ASX Principles and the NYSE Standards); the terms of reference of the committees; risk management and financial reporting; and Board governance including selection, appointment and re-election of Directors, Directors' independence and Board performance evaluation.

All information released to the markets is posted in the media section of riotinto.com. Riotinto.com also provides general investor information. Annual and half-year results, as well as any major presentations, are webcast and the materials are available at riotinto.com, which also contains presentation material from investor seminars.

Recommendation 6.2

Our main channels of communication with the investment community are through the Chairman, Chief Executive and Chief Financial Officer, who have regular meetings with the Group's major shareholders. The Senior Independent Director, Rio Tinto plc, and the Senior Independent Director, Rio Tinto Limited, have a specific responsibility under the UK Code and the Board Charter to be available to shareholders who have concerns which have not been resolved through contact with the Chairman, Chief Executive or Chief Financial Officer, or for whom such contact is inappropriate. We have a number of processes and initiatives to ensure that members of the Board understand the views of major shareholders. The Chief Financial Officer reports to the Board at each meeting, and provides regular investor updates. In addition, the Head of Investor Relations reports regularly to the Board, and an annual survey of major shareholders' opinions is presented to the Board by the Group's investor relations advisers. Further information on engagement with shareholders and investors during 2021 is set out on page 142 of the Annual Report.

Recommendations 6.3, 6.4

The AGMs present an opportunity to provide a summary business presentation, to inform shareholders of recent developments, and to give them the opportunity to ask questions. Generally, the chairs of all Board committees are available to answer questions raised by shareholders, and all Directors are expected to attend where possible. The AGMs are generally webcast and transcripts of the Chairman's and Chief Executive's speeches are made available at riotinto.com. A summary of the proceedings at the meetings, and the results of voting on resolutions, are made available as soon as practicable after the meetings. At Rio Tinto AGMs, all resolutions are decided by poll and not by show of hands.

In 2021, due to the pandemic, the Rio Tinto Limited AGM was held in Perth as a hybrid meeting. With the use of technology, shareholders who could not attend in person were offered the opportunity to virtually participate at the AGM, ask questions and vote on the resolutions.

Recommendation 6.5

Shareholders can choose to communicate electronically with the companies and the share registrars. The contact details for the registrars is set out on page 419 and at riotinto.com.

Principle 7: Recognise and manage risk

Recommendations 7.1, 7.2

The Board is ultimately responsible for risk management and internal controls and for ensuring that the systems in place are robust and take into account the principal risks faced by the Group. The Board delegates certain matters relating to the Group's risk management framework to the Audit Committee, and the Audit Committee provides updates to the Board on matters discussed at each meeting. The Sustainability Committee advises the Board on risk appetite tolerance and strategy with respect to sustainable development risks. Further information about the Sustainability Committee is set out on pages 156-158 of the Annual Report. Terms of reference for the Sustainability Committee are available at riotinto.com. Further details on the Group's governance framework for risk management and internal control are set out on pages 112-116, 152 and 154-155 of the Annual Report.

Recommendation 7.3

Further information on Rio Tinto's Group Internal Audit function is set out on page 155 of the Annual Report.

Recommendation 7.4

A description of the principal risks and uncertainties that could affect Rio Tinto (including economic, environmental and social sustainability risks), and of the Group's governance framework for risk management and internal control, is set on pages 117-130 of the Annual Report. Further information on sustainability is available on pages 72-111 of the Annual Report.

Principle 8: Remunerate fairly and responsibly

Recommendation 8.1

The Remuneration report on pages 160-198 provides details on the role and responsibilities of the Committee. The Remuneration Committee's terms of reference are available at riotinto.com. Further details on membership, the number of times the Committee met during 2021, and the attendance of members are set out on pages 134-135 and 147.

Recommendation 8.2

Rio Tinto's policies and practices regarding remuneration of Non-Executive Directors, Directors and senior executives are set out on pages 160-198 in the Remuneration report.

Recommendation 8.3

Rio Tinto's approach on participating in equity-based remuneration schemes is set out on page 203 of the Annual Report. This is also addressed in the Rio Tinto securities dealing policy which is available at riotinto.com.

2021 Financial Statements

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Group Income Statement

Years ended 31 December

	Note	2021 US$m	2020 US$m	2019 US$m
Consolidated operations				
Consolidated sales revenue	2,3	**63,495**	44,611	43,165
Net operating costs (excluding items shown separately)	4	**(32,690)**	(26,254)	(27,307)
Impairment charges net of reversals	6	**(269)**	(904)	(3,487)
Losses on disposal of interest in business	2,36	**—**	—	(291)
Exploration and evaluation costs	13	**(726)**	(625)	(624)
Profit relating to interests in undeveloped projects	13	**7**	1	10
Operating profit		**29,817**	16,829	11,466
Share of profit after tax of equity accounted units	7	**1,042**	652	301
Impairment of investments in equity accounted units	6	**—**	(339)	—
Profit before finance items and taxation		**30,859**	17,142	11,767
Finance items				
Net exchange gains/(losses) on net external and intragroup debt balances		**802**	(1,124)	58
Net losses on derivatives not qualifying for hedge accounting		**(231)**	(123)	(68)
Finance income	8	**64**	141	300
Finance costs	8	**(243)**	(268)	(554)
Amortisation of discount on provisions		**(418)**	(377)	(384)
		(26)	(1,751)	(648)
Profit before taxation		**30,833**	15,391	11,119
Taxation	9	**(8,258)**	(4,991)	(4,147)
Profit after tax for the year		**22,575**	10,400	6,972
– attributable to owners of Rio Tinto (net earnings)		**21,094**	9,769	8,010
– attributable to non-controlling interests		**1,481**	631	(1,038)
Basic earnings per share	10	**1,303.4 c**	604.0 c	491.4 c
Diluted earnings per share	10	**1,295.0 c**	599.8 c	487.8 c

The notes on pages 218 to 311 are an integral part of these consolidated financial statements.

Group Statement of Comprehensive Income

Years ended 31 December

	Note	2021 US$m	2020 US$m	2019 US$m
Profit after tax for the year		**22,575**	10,400	6,972
Other comprehensive (loss)/income				
Items that will not be reclassified to the income statement:				
Re-measurement gains/(losses) on pension and post-retirement healthcare plans	42	**1,026**	(474)	(262)
Changes in the fair value of equity investments held at fair value through other comprehensive income (FVOCI)		**5**	10	(5)
Tax relating to these components of other comprehensive income	9	**(305)**	112	83
Share of other comprehensive income/(losses) of equity accounted units, net of tax		**12**	(6)	(6)
		738	(358)	(190)
Items that have been/may be subsequently reclassified to the income statement:				
Currency translation adjustment[(a)]		**(1,843)**	2,967	343
Currency translation on companies disposed of, transferred to the income statement		**—**	—	215
Fair value movements:				
– Cash flow hedge (losses)/gains		**(211)**	24	12
– Cash flow hedge losses/(gains) transferred to the income statement		**14**	(63)	(41)
Net change in costs of hedging reserve	28	**(18)**	7	3
Tax relating to these components of other comprehensive loss/(income)	9	**62**	3	(6)
Share of other comprehensive (losses)/income of equity accounted units, net of tax		**(12)**	4	10
Other comprehensive (loss)/income for the year, net of tax		**(1,270)**	2,584	346
Total comprehensive income for the year		**21,305**	12,984	7,318
– attributable to owners of Rio Tinto		**19,896**	12,201	8,351
– attributable to non-controlling interests		**1,409**	783	(1,033)

(a) Excludes a currency translation charge of US$211 million (2020: gain of US$333 million; 2019: charge of US$29 million) arising on Rio Tinto Limited's share capital for the year ended 31 December 2021, which is recognised in the Group statement of changes in equity. Refer to the Group statement of changes in equity on page 216.

The notes on pages 218 to 311 are an integral part of these consolidated financial statements.

Group Cash Flow Statement

Years ended 31 December

	Note	2021 US$m	2020 US$m	2019 US$m
Cash flows from consolidated operations[(a)]		**33,936**	21,822	19,705
Dividends from equity accounted units		**1,431**	594	669
Cash flows from operations		**35,367**	22,416	20,374
Net interest paid		**(438)**	(569)	(537)
Dividends paid to holders of non-controlling interests in subsidiaries		**(1,090)**	(683)	(376)
Tax paid		**(8,494)**	(5,289)	(4,549)
Net cash generated from operating activities		**25,345**	15,875	14,912
Cash flows from investing activities				
Purchases of property, plant and equipment and intangible assets	2	**(7,384)**	(6,189)	(5,488)
Disposals of subsidiaries, joint ventures, unincorporated joint operations and associates	36	**4**	10	(80)
Purchases of financial assets		**(45)**	(5)	(43)
Sales of financial assets[(b)]		**114**	63	83
Sales of property, plant and equipment and intangible assets		**61**	45	49
Net receipts/(funding) from/of equity accounted units		**6**	(43)	(33)
Other investing cash flows[(c)]		**85**	(437)	11
Net cash used in investing activities		**(7,159)**	(6,556)	(5,501)
Cash flows before financing activities		**18,186**	9,319	9,411
Cash flows from financing activities				
Equity dividends paid to owners of Rio Tinto	11	**(15,357)**	(6,132)	(10,334)
Proceeds from additional borrowings[(d)]	21	**1,488**	125	80
Repayment of borrowings and associated derivatives[(e)(f)]	21	**(1,707)**	(721)	(203)
Lease principal payments	22	**(358)**	(324)	(315)
Proceeds from issue of equity to non-controlling interests		**66**	129	101
Own shares purchased from owners of Rio Tinto		**—**	(208)	(1,552)
Other financing cash flows		**6**	1	4
Net cash flows used in financing activities		**(15,862)**	(7,130)	(12,219)
Effects of exchange rates on cash and cash equivalents		**100**	165	(54)
Net increase/(decrease) in cash and cash equivalents		**2,424**	2,354	(2,862)
Opening cash and cash equivalents less overdrafts		**10,381**	8,027	10,889
Closing cash and cash equivalents less overdrafts	20	**12,805**	10,381	8,027
(a) Cash flows from consolidated operations				
Profit after tax for the year		**22,575**	10,400	6,972
Adjustments for:				
– Taxation		**8,258**	4,991	4,147
– Finance items		**26**	1,751	648
– Share of profit after tax of equity accounted units		**(1,042)**	(652)	(301)
– Losses on disposal of interest in business	36	**—**	—	291
– Impairment charges of investments in equity accounted units after tax	6	**—**	339	—
– Impairment charges net of reversals	6	**269**	904	3,487
– Depreciation and amortisation		**4,697**	4,279	4,384
– Provisions (including exchange differences on provisions)		**1,903**	894	753
– Pension settlement	25	**(291)**	—	—
Utilisation of provisions		**(771)**	(582)	(539)
Utilisation of provision for post-retirement benefits	25	**(129)**	(192)	(205)
Change in inventories		**(1,397)**	(281)	28
Change in receivables and other assets[(g)]		**(367)**	(562)	163
Change in trade and other payables		**685**	558	(191)
Other items[(h)]		**(480)**	(25)	68
		33,936	21,822	19,705

(b) In 2021, the Group received net proceeds of US$107 million (2020: net proceeds of US$58 million and 2019: net purchase of US$28 million) from its sales and purchases of investments within a separately managed portfolio of fixed income instruments. Purchases and sales of these securities are reported on a net cash flow basis within "Sales of financial assets" or "Purchases of financial assets" depending on the overall net position at each reporting date.

(c) In 2021 other investing cash flows includes inflows relating to net settlement upon completion of a transaction increasing the Group's 60% share in the Diavik Diamond Mine to sole ownership, refer to note 36. In 2020, other investing cash flows included US$299 million cash outflow relating to payments made by Energy Resources Australia into a trust fund controlled by the Government of Australia. At 31 December 2021 the total amount held in the trust fund was US$388 million (31 December 2020: US$410 million).

(d) On 28 October 2021, we issued US$1.25 billion 30-years fixed rate SEC-registered debt securities with a coupon of 2.75%. We received the funds net of issuance fees and discount.

(e) During the last quarter of 2021, we completed a US$1.2 billion (nominal value) bond buy-back programme. The notes purchased and redeemed have been cancelled. The net cash outflow of US$1.27 billion represents the repayment of the bond at a premium offset by the monetisation of the gain from the derivatives that hedged the bond.

(f) During 2020, we repaid our €402 million (nominal value) Rio Tinto Finance plc Euro Bonds on their maturity. The total cash outflow of US$526 million included the cash outflow of the bond and the realised loss from the derivatives that hedged the bonds.

(g) In 2021, the Mongolian Tax Authority required payment by Oyu Tolgoi of US$356 million in relation to disputed tax matters. Oyu Tolgoi continues to dispute the matters and has classified amounts subject to international arbitration as prepayments pending resolution.

(h) At 31 December 2021, other items include US$336 million related to a gain on recognition of a new wharf at Kitimat, Canada with no associated cash flow.

The notes on pages 218 to 311 are an integral part of these consolidated financial statements.

Group Balance Sheet

At 31 December

	Note	2021 US$m	2020 US$m
Non-current assets			
Goodwill	12	**879**	946
Intangible assets	13	**2,832**	2,755
Property, plant and equipment	14	**64,927**	62,882
Investments in equity accounted units	15	**3,504**	3,764
Inventories	16	**196**	174
Deferred tax assets	17	**3,375**	3,385
Receivables and other assets	18	**2,194**	1,796
Tax recoverable		**29**	4
Other financial assets	19	**528**	829
		78,464	76,535
Current assets			
Inventories	16	**5,436**	3,917
Receivables and other assets	18	**3,574**	3,644
Tax recoverable		**72**	62
Other financial assets	19	**2,543**	2,851
Cash and cash equivalents	20	**12,807**	10,381
		24,432	20,855
Total assets		**102,896**	97,390
Current liabilities			
Borrowings and other financial liabilities	21	**(1,381)**	(607)
Trade and other payables	24	**(7,733)**	(7,421)
Tax payable		**(1,407)**	(1,850)
Provisions including post-retirement benefits	25	**(2,106)**	(1,729)
		(12,627)	(11,607)
Non-current liabilities			
Borrowings and other financial liabilities	21	**(12,788)**	(13,408)
Trade and other payables	24	**(798)**	(820)
Tax payable		**(660)**	(477)
Deferred tax liabilities	17	**(3,503)**	(3,239)
Provisions including post-retirement benefits	25	**(15,930)**	(15,936)
		(33,679)	(33,880)
Total liabilities		**(46,306)**	(45,487)
Net assets		**56,590**	51,903
Capital and reserves			
Share capital			
– Rio Tinto plc	26	**207**	207
– Rio Tinto Limited	27	**3,570**	3,781
Share premium account		**4,320**	4,314
Other reserves	28	**9,998**	11,960
Retained earnings	28	**33,337**	26,792
Equity attributable to owners of Rio Tinto		**51,432**	47,054
Attributable to non-controlling interests		**5,158**	4,849
Total equity		**56,590**	51,903

The notes on pages 218 to 311 are an integral part of these consolidated financial statements.

The financial statements on pages 212 to 311 were approved by the directors on 23 February 2022 and signed on their behalf by

Simon Thompson
Chairman

Jakob Stausholm
Chief Executive

Peter Cunningham
Chief Financial Officer

Group Statement of Changes in Equity

Year ended 31 December 2021	Attributable to owners of Rio Tinto: Share capital (notes 26 and 27) US$m	Share premium account US$m	Other reserves (note 28) US$m	Retained earnings (note 28) US$m	Total US$m	Non-controlling interests US$m	Total equity US$m
Opening balance	**3,988**	**4,314**	**11,960**	**26,792**	**47,054**	**4,849**	**51,903**
Total comprehensive income for the year[a]	**—**	**—**	**(1,916)**	**21,812**	**19,896**	**1,409**	**21,305**
Currency translation arising on Rio Tinto Limited's share capital[b]	**(211)**	**—**	**—**	**—**	**(211)**	**—**	**(211)**
Dividends (note 11)	**—**	**—**	**—**	**(15,385)**	**(15,385)**	**(1,090)**	**(16,475)**
Own shares purchased from Rio Tinto shareholders to satisfy share awards to employees[c]	**—**	**—**	**(95)**	**(18)**	**(113)**	**—**	**(113)**
Change in equity interest held by Rio Tinto[d]	**—**	**—**	**—**	**76**	**76**	**(76)**	**—**
Treasury shares reissued and other movements	**—**	**6**	**—**	**—**	**6**	**—**	**6**
Equity issued to holders of non-controlling interests	**—**	**—**	**—**	**—**	**—**	**66**	**66**
Employee share awards charged to the income statement	**—**	**—**	**49**	**60**	**109**	**—**	**109**
Closing balance	**3,777**	**4,320**	**9,998**	**33,337**	**51,432**	**5,158**	**56,590**

Year ended 31 December 2020	Attributable to owners of Rio Tinto: Share capital (notes 26 and 27) US$m	Share premium account US$m	Other reserves (note 28) US$m	Retained earnings (note 28) US$m	Total US$m	Non-controlling interests US$m	Total equity US$m
Opening balance	3,655	4,313	9,177	23,387	40,532	4,710	45,242
Total comprehensive income for the year[a]	—	—	2,798	9,403	12,201	783	12,984
Currency translation arising on Rio Tinto Limited's share capital[b]	333	—	—	—	333	—	333
Dividends (note 11)	—	—	—	(6,132)	(6,132)	(689)	(6,821)
Share buy-back[e]	—	—	—	(1)	(1)	—	(1)
Own shares purchased from Rio Tinto shareholders to satisfy share awards to employees[c]	—	—	(76)	(31)	(107)	—	(107)
Change in equity interest held by Rio Tinto[d]	—	—	—	84	84	(84)	—
Treasury shares reissued and other movements	—	1	—	—	1	—	1
Equity issued to holders of non-controlling interests	—	—	—	—	—	129	129
Employee share awards charged to the income statement	—	—	61	82	143	—	143
Closing balance	3,988	4,314	11,960	26,792	47,054	4,849	51,903

Year ended 31 December 2019	Attributable to owners of Rio Tinto: Share capital (notes 26 and 27) US$m	Share premium account US$m	Other reserves (note 28) US$m	Retained earnings (note 28) US$m	Total US$m	Non-controlling interests US$m	Total equity US$m
Opening balance	3,688	4,312	8,661	27,025	43,686	6,137	49,823
Adjustment for transition to new accounting pronouncements[f]	—	—	—	(113)	(113)	(2)	(115)
Restated opening balance	3,688	4,312	8,661	26,912	43,573	6,135	49,708
Total comprehensive income for the year[a]	—	—	519	7,832	8,351	(1,033)	7,318
Currency translation arising on Rio Tinto Limited's share capital[b]	(29)	—	—	—	(29)	—	(29)
Dividends (note 11)	—	—	—	(10,334)	(10,334)	(376)	(10,710)
Share buy-back[e]	(4)	—	4	(1,135)	(1,135)	—	(1,135)
Companies no longer consolidated	—	—	—	—	—	(32)	(32)
Own shares purchased from Rio Tinto shareholders to satisfy share options[c]	—	—	(63)	(43)	(106)	—	(106)
Change in equity interest held by Rio Tinto[d]	—	—	—	85	85	(85)	—
Treasury shares reissued and other movements	—	1	—	—	1	—	1
Equity issued to holders of non-controlling interests	—	—	—	—	—	101	101
Employee share awards charged to the income statement	—	—	56	70	126	—	126
Closing balance	3,655	4,313	9,177	23,387	40,532	4,710	45,242

The notes on pages 218 to 311 are an integral part of these consolidated financial statements.

(a) Refer to Group statement of comprehensive income for further details. Adjustments to other reserves include currency translation attributable to owners of Rio Tinto, other than that arising on Rio Tinto Limited's share capital.
(b) Refer to note 1(d).
(c) Net of contributions received from employees for share awards.
(d) Includes accrual of interest on funding balances with holders of non-controlling interests in Oyu Tolgoi. Refer to note 1(xii) and note 32(l). On 25 January 2022, Turquoise Hill agreed to waive the full amount of funding balances and interest; refer to note 45.
(e) In 2021, we did not undertake a share buy-back programme. In 2020, the total amount of US$1 million related to own shares purchased that were previously not recognised as a financial liability in the previous year. The total cash outflow in 2020 relating to own shares purchased was US$208 million. In 2019 US$1,135 million shown above relates to own shares purchased from the owners of Rio Tinto as per the cash flow statement of US$1,552 million and a financial liability recognised in respect of an irrevocable contract in place at the reporting date to cover the share buy-back programme, less amounts paid during the year in respect of a similar irrevocable contract in place at the beginning of the year.
(f) Impact of the transition to new accounting pronouncements; IFRS 16 "Leases" and IFRIC 23 "Uncertainty over Income Tax Treatments" on 1 January 2019.

Reconciliation with Australian Accounting Standards

The Group's financial statements have been prepared in accordance with IFRS, as defined in note 1, which differs in certain respects from the version of International Financial Reporting Standards that is applicable in Australia, referred to as Australian Accounting Standards (AAS).

Prior to 1 January 2004, the Group's financial statements were prepared in accordance with UK GAAP. Under IFRS, as defined in note 1, goodwill on acquisitions prior to 1998, which was eliminated directly against equity in the Group's UK GAAP financial statements, has not been reinstated. This was permitted under the rules governing the transition to IFRS set out in IFRS 1. The equivalent Australian Standard, AASB 1, does not provide for the netting of goodwill against equity. As a consequence, shareholders' funds under AAS include the residue of such goodwill, which amounted to US$377 million at 31 December 2021 (2020: US$374 million).

Save for the exception described above, the Group's financial statements drawn up in accordance with IFRS are consistent with the requirements of AAS.

Outline of dual listed companies structure and basis of financial statements

The Rio Tinto Group

These are the financial statements of the Group formed through the merger of economic interests of Rio Tinto plc and Rio Tinto Limited (Merger), and presented by both Rio Tinto plc and Rio Tinto Limited as their consolidated financial statements in accordance with both UK and Australian legislation and regulations.

Merger terms

On 21 December 1995, Rio Tinto plc and Rio Tinto Limited entered into a dual listed companies (DLC) merger. Rio Tinto plc is incorporated in the UK and listed on the London and New York Stock Exchanges and Rio Tinto Limited is incorporated in Australia and listed on the Australian Securities Exchange. The Merger was affected by contractual arrangements between the companies and amendments to Rio Tinto plc's Memorandum and Articles of Association and Rio Tinto Limited's Constitution.

As a result, Rio Tinto plc and Rio Tinto Limited and their respective groups operate together as a single economic enterprise, with neither assuming a dominant role. In particular, the arrangements:

- Confer upon the shareholders of Rio Tinto plc and Rio Tinto Limited a common economic interest in both groups;
- Provide for common boards of directors and a unified management structure;
- Provide for equalised dividends and capital distributions; and
- Provide for the shareholders of Rio Tinto plc and Rio Tinto Limited to take key decisions, including the election of directors, through an electoral procedure in which the public shareholders of the two companies in effect vote on a joint basis.

The Merger involved no change in the legal ownership of any assets of Rio Tinto plc or Rio Tinto Limited, nor any change in the ownership of any existing shares or securities of Rio Tinto plc or Rio Tinto Limited, nor the issue of any shares, securities or payment by way of consideration, save for the issue by each company of one special voting share to a trustee company which facilitates the joint electoral procedure for public shareholders. During 2002, each of the parent companies issued a DLC Dividend Share to facilitate the efficient management of funds within the DLC structure.

Accounting standards

The financial statements have been drawn up in accordance with IFRS as defined in note 1. The Merger was accounted for as a merger under UK GAAP. As permitted under the rules governing the transition to IFRS, which are set out in IFRS 1, the Group did not restate business combinations that occurred before the transition date of 1 January 2004. As a result, the DLC Merger of economic interests described above continues to be accounted for as a merger under IFRS as defined in note 1.

The main consequence of adopting merger rather than acquisition accounting is that the balance sheet of the merged Group includes the assets and liabilities of Rio Tinto plc and Rio Tinto Limited at their carrying values prior to the Merger, subject to adjustments to achieve uniformity of accounting policies, rather than at their fair values at the date of the Merger. For accounting purposes Rio Tinto plc and Rio Tinto Limited are viewed as a single public parent company (with their respective public shareholders being the shareholders in that single company). As a result, the amounts attributable to both Rio Tinto plc and Rio Tinto Limited public shareholders are included in the amounts attributed to owners of Rio Tinto on the balance sheet, income statement and statement of comprehensive income.

Australian Corporations Act

The financial statements are drawn up in accordance with an order, under section 340 of the Australian Corporations Act 2001, issued by the Australian Securities and Investments Commission (ASIC) on 16 July 2021. The main effect of the order is that the financial statements are prepared on the basis that Rio Tinto Limited, Rio Tinto plc and their respective controlled entities are treated as a single economic entity, and in accordance with the principles and requirements of International Financial Reporting Standards which have been endorsed by the United Kingdom as adopted by the European Union (EU) before 1 January 2021 and as adopted for use in the United Kingdom ('UK') thereafter under the European Union (Withdrawal) Act 2018 and include a reconciliation from UK IFRS to the Australian equivalent of IFRS (see above).

For further details of the ASIC Class Order relief see page 321.

Notes to the 2021 financial statements

1 Principal accounting policies

Corporate information

Rio Tinto's business is finding, mining and processing mineral resources. Major products are aluminium, copper, diamonds, gold, industrial minerals (borates, titanium dioxide and salt) and iron ore. Activities span the world and are strongly represented in Australia and North America, with significant businesses also in Asia, Europe, Africa and South America.

Rio Tinto plc is incorporated in the UK and listed on the London and New York Stock Exchanges and Rio Tinto Limited is incorporated in Australia and listed on the Australian Stock Exchange. Rio Tinto plc's registered office is at 6 St James's Square, London SW1Y 4AD, UK. Rio Tinto Limited's registered office is at Level 7, 360 Collins Street, Melbourne, Victoria 3000, Australia.

As described in the "Outline of dual listed companies structure and basis of financial statements" on page 217, for the purposes of preparing the IFRS compliant consolidated financial statements of the Rio Tinto Group, both the DLC companies, Rio Tinto plc and Rio Tinto Limited, are viewed as a single economic entity, and the interests of shareholders of both companies are presented as the equity interests of shareholders in the Rio Tinto Group.

These financial statements consolidate the accounts of Rio Tinto plc and Rio Tinto Limited (together "the Companies") and their respective subsidiaries (together "the Group") and include the Group's share of joint arrangements and associates as explained in note 1(b) below. The Group's financial statements for the year ended 31 December 2021 were authorised for issue in accordance with a directors' resolution on 16 February 2022.

Notes 32 to 35 provide more information on the Group's subsidiaries, joint arrangements and associates and note 39 provides information on the Group's transactions with other related parties.

The 2021 Annual Report satisfies the obligations of Rio Tinto Limited to prepare consolidated accounts under Australian company law, as amended by an order issued by the Australian Securities and Investments Commission on 16 July 2021. The 2021 financial statements disclose on page 217 the effect of the adjustments to the Group's consolidated profit/(loss), consolidated total comprehensive income/(loss) and consolidated shareholders' funds as prepared under IFRS as defined below that would be required under the version of IFRS that is applicable in Australia, referred to as Australian Accounting Standards (AAS).

The US dollar is the presentation currency used in these financial statements, as it most reliably reflects the Group's global business performance.

Basis of preparation of the financial statements

The basis of preparation and the accounting policies used in preparing the Group's 2021 financial statements are set out below.

The financial statements have been prepared on a going concern basis in accordance with UK-adopted international accounting standards, applicable UK law, and applicable Australian law as amended by the Australian Securities and Investments Commission Order dated 16 July 2021 and also with:

– International Financial Reporting Standards as issued by the International Accounting Standards Board (IASB) and interpretations issued from time to time by the IFRS Interpretations Committee (IFRS IC) which are mandatory at 31 December 2021.

The above accounting standards and interpretations are collectively referred to as "IFRS" in this report. The Group has not early adopted any amendments, standards or interpretations that have been issued but are not yet mandatory.

COVID-19 impact

The Group has demonstrated resilience in dealing with ongoing COVID-19 challenges with continued prioritisation of the safety of our people and communities. Rio Tinto continues to proactively manage COVID-19 impacts and prioritises work across critical projects, as challenges associated with interstate and international border access continue, impacting the availability and movement of people, most notably in Australia and Mongolia. Plans to mitigate labour shortages are in place.

Despite this, we progressed a number of our projects, including the Pilbara replacement mines. Mining and operational readiness activities are progressing at the Gudai-Darri mine and the railway is operational. Production from the new greenfield mine at Gudai-Darri and the Robe Valley brownfield mine replacement project is delayed due to the tight labour market in Western Australia. First production from the main plant at Gudai-Darri is now expected in the second quarter of 2022, subject to the continuing impacts of COVID-19. The Oyu Tolgoi underground project in Mongolia was technically and operationally ready for undercut, which commenced in January 2022, despite continued COVID-19 constraints in Mongolia. The delay to the commissioning of shafts 3 and 4 is still expected to be approximately nine months based on known COVID-19 impacts to date, contributing to delays in first sustainable production expected in the first half of 2023.

In addition, Escondida's mined copper production was lower than 2020 mostly as a result of the prolonged impact of COVID-19. The Group continues to monitor government-imposed restrictions related to COVID-19, and any other potential COVID-19 related disruptions, such as shipment delays. Recognising the broad and complex impacts of the pandemic on our markets, operations and financial performance, we have chosen not to segregate COVID-19 related costs from our underlying performance metrics.

Going concern

Management has prepared detailed cash flow forecasts for the next 12 months and has updated life-of-mine plan models with longer-term cash flow projections. These forecasts demonstrate that the Group has sufficient cash, other liquid resources and undrawn credit facilities to enable it to meet its obligations as they fall due. As such, the directors considered it appropriate to adopt the going concern basis of accounting in preparing the full-year financial information. Further detail on the going concern basis of accounting is included on page 204.

Climate change

We have put the net zero transition at the heart of our business strategy: combining investments in commodities that enable the energy transition with actions to decarbonise our operations and value chains. As a result of this, our strategy and approach to climate change are supported by strong governance, processes and capabilities. In 2021, we updated our Scope 1 and 2 emissions targets and now aim to reduce emissions by 15% in 2025, by 50% in 2030 (relative to our 2018 equity baseline) and to achieve net zero emissions by 2050. These targets are aligned with efforts to limit global warming to 1.5°C, which is aligned with the stretch goal of the Paris Agreement. The goals of the Paris Agreement are set out in Article 2, which includes holding the increase in global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C.

We frame the strategic context for the Group through the lens of three scenarios, developed by the Strategy and Economics teams, structured around our analysis of the interplay of three global forces: geopolitics, society and technology.

- In a geopolitics-led scenario, strong nationalistic tendencies hold back global action on climate change, carbon prices remain low (in the range US$0-30/t CO_2e) and warming exceeds 3°C by 2100.
- In a society-led scenario, strong global co-ordination of climate policies, supported by high and rising carbon prices (reaching US$130/t CO_2e in 2050), accelerates the energy transition and we believe achieves the goal of the Paris Agreement by limiting warming to well below 2°C by 2100.
- In a technology-led scenario, innovation boosts economic productivity and decarbonisation efforts; however, carbon prices remain modest (ranging US$10 to US$75/t CO_2e by 2030) and action to limit emissions is insufficient, so warming exceeds 2°C by 2100.

We recognise that the pace of decarbonisation across the global economy is uncertain and that current climate policies in many countries are not yet aligned with stated ambitions. These policy uncertainties are captured in our scenario analysis, which in turn informs the central case carbon price assumptions. We continue to monitor alternative scenarios including ones that limit warming to 1.5°C. For example, the IEA NZE50 assumes higher carbon prices and a much faster energy transition than our scenarios; they also require a higher level of co-ordination in climate policies across sectors and countries. The IEA's scenario also assumes stronger demand for commodities such as copper or battery minerals that are critical to the accelerated deployment of solar and wind renewables or electric vehicles.

Portfolio strategy

Our scenarios above inform our portfolio strategy, the internal commodity price setting process and strongly influence our critical accounting judgements and estimates. Through our strategy process we test the resilience of our portfolio against each of these three scenarios and conclude that overall, our portfolio is expected to perform more strongly in scenarios with proactive climate action, particularly in relation to aluminium and copper. Our strategy to focus our growth capital expenditure on materials that enable the energy transition is informed by these scenarios. Our ambition is to increase our growth capital expenditure to up to US$3 billion per year in 2023 and 2024, developing new options and finding innovative ways of bringing projects on-stream faster. This includes investment in lithium production at Rincon and Jadar, copper at Oyu Tolgoi and Winu, as well as high-grade iron ore from Simandou.

Accounting judgements

The forecast commodity prices (including carbon prices) are informed by a blend of our three scenarios and are used pervasively in our financial processes from budgeting, forecasting, capital allocation and project evaluation to the determination of ore reserves. In turn, these prices are used to derive critical accounting estimates including as inputs to impairment testing, estimation of remaining economic life for units of production depreciation and discounting closure and rehabilitation provisions. As only one of our scenarios represents the Group's view of the goals of the Paris Agreement, and because of the policy uncertainties described above, our commodity price assumptions are not consistent with the expectation of climate policies required to accelerate the global transition to meet these goals.

In addition to prices, given the significant investment we are making to abate our carbon emissions, we have also considered the potential for asset obsolescence, with a particular focus on our Pilbara operations where we are prioritising investment in renewables to switch away from natural gas power generation, but no material changes to accounting estimates have been necessary. The closure date and cost of closure is also sensitive to climate assumptions but no material changes have been made in the year specific to climate change.

The Group has identified impairment triggers during the year for cash-generating units in the aluminium and copper segments. The Group considers the long-term pricing outlook for aluminium and copper is positive as these metals are critical to the global transition to a low-carbon future. The outlook for iron ore pricing is less certain and depends on the development of low-emissions steel technology. However, considering the high return on capital generated by our existing iron ore asset base, none of our three scenarios would give rise to an impairment today. When measuring the recoverable amount for these cash-generating units, a blend of the three strategic scenarios has been used to forecast the cash flows. As only one of the strategic scenarios represents the Group's view of the goals of the Paris Agreement, the impairment outcome cannot be described as Paris-aligned. However, in these circumstances, we have also disclosed sensitivity information based on cash flows flexed for sales prices and carbon taxes in the society-led scenario, which has a well below 2°C outcome. These sensitivities indicate that higher recoverable amounts would have been determined if the accounting was aligned with the society-led scenario.

Notes to the 2021 financial statements

1 Principal accounting policies continued

Using a carbon price to accelerate our mitigation action

We are committed to align our future capital expenditure with our 2025 and 2030 Scope 1 and 2 emissions reduction targets. As noted above, we conclude that our targets are aligned with efforts to limit warming to 1.5°C and the stretch goal of the Paris Agreement. To deliver our climate targets, the Group expects to make incremental capital investment of US$7.5 billion over the period to 2030 (approximately US$1.5 billion over the period 2022 to 2024). We also expect our incremental operating expenditure to support the Climate Action Plan to be in the order of US$200 million per year, including research and development initiatives.

For internal approval purposes, a notional carbon price of US$75/t CO_2e is now used to drive improvements in energy efficiency across our assets, help to identify new abatement projects as well as incentivise and accelerate the delivery of capital investment in abatement projects and operational improvements. The US$75/t CO_2e price is derived from our analysis of carbon mitigation options across our assets (summarised in our Marginal Abatement Cost Curve) – it is unrelated to the prices in our scenarios.

New standards issued

The Group's financial statements have been prepared on the basis of accounting policies consistent with those applied in the financial statements for the year ended 31 December 2020, except for the accounting requirements set out below, effective as at 1 January 2021, which did not have a significant impact on the Group's financial statements.

The Group adopted Interest Rate Benchmark Reform - Phase 2 (Amendments to IFRS 9, IAS 39, IFRS 7, IFRS 4 and IFRS 16) at 1 January 2021. The amendments address the financial reporting impact from reform of the London Interbank Offered Rate (LIBOR) and other benchmark interest rates (collectively "IBOR reform"). The Group applied the Phase 2 amendments retrospectively. However, in accordance with the exceptions permitted in the Phase 2 amendments, it has elected not to restate comparatives for the prior periods to reflect the application of these amendments. Since the Group had no transactions for which the benchmark rate had been replaced with an alternative benchmark rate as at 31 December 2020, there is no impact on opening equity balances as a result of retrospective application.

On 5 March 2021 LIBOR's administrator, ICE Benchmarks Administration (IBA) and its supervisor, the UK Financial Conduct Authority (FCA), issued statements which provide the dates that all LIBOR settings will either cease to be provided by any administrator or will no longer be representative. This will occur: immediately after 31 December 2021, for all GBP, Euro, CHF and JPY LIBOR settings, and for 1-week and 2-month USD LIBOR settings; and immediately after 30 June 2023, for the remaining USD LIBOR settings. The Group has taken relevant Phase 2 practical reliefs from certain requirements in IFRS 9, IFRS 7, IFRS 4 and IFRS 16 relating to changes in the basis for determining contractual cash flows of financial assets, financial liabilities and hedge accounting.

Our hedging arrangements impacted by the reform of US LIBOR are part of the International Swaps and Derivatives Association (ISDA) Fallbacks Protocol, which provides a global standardised mechanism for replacement of the current benchmark. At 31 December 2021, the Group has interest rate risk exposure including US$6.1 billion nominal values of fixed-rate borrowings swapped to US dollar rates in fair value hedge relationships impacted by the reform, described further in note 29 A (b) (v).

We expect the application of the Phase 2 reliefs to result in continuation of the Group's pre-existing hedge accounting upon amendment of designated arrangements in response to the replacement of IBOR with new benchmarks (refer to note 1 q (iv)).

In addition, the Group has a number of arrangements which reference IBOR benchmarks and extend beyond 2021. These include third-party borrowings relating to the Oyu Tolgoi LLC project finance (refer to note 21), other secured loans, a number of intragroup balances and certain commercial contracts. Other arrangements, which currently reference IBOR benchmarks include shareholder loan facilities. Phase 2 amendments will require the Group to account for a change in the basis for determining the cash flows of a financial asset or a financial liability measured at amortised cost, by updating their respective effective interest rates as required by IBOR reform. As a result of the Phase 2 relief the Group expects that no material gain or loss will arise from these updates (refer to note 1 q (ii)). The accessible revolving lines of credit have been replaced with a new facility, which now refers to the SOFR and SONIA rates (refer to note 29 A (b)). Most intragroup balances transitioned to alternative benchmarks by 31 December 2021.

Standards issued, but not yet effective

Proceeds before Intended Use (Amendments to IAS 16 "Property, Plant and Equipment", mandatory in 2022 and not yet endorsed by the UK)

The amendments prohibit the deduction, from the cost of major project construction work in progress, of proceeds (net of additional processing costs) from selling items before the related item of property, plant and equipment is available for use. Under the amendment such proceeds are recognised in the income statement together with the costs of producing those items. The amendments will result in higher reported revenue, operating costs, inventory and property plant and equipment balances (capital works in progress) relating to major development projects completed after 1 January 2020. IAS 2 "Inventories" will apply to the measurement of pre-production inventory and identifying the related cost may require significant estimation and judgment in the selection of an appropriate method for allocating development expenditure to such inventory. During 2021, the Group completed a review of the impact of these amendments and concluded that adjustments to Group retained earnings at 1 January 2020, and restatement of the 2020 and 2021 Group Income Statement and Balance Sheet upon adoption of the amendments in 2022 in respect of such projects are not material.

Onerous Contracts – Cost of Fulfilling a Contract (Amendments to IAS 37 "Provisions, Contingent Liabilities and Contingent Assets"), mandatory in 2022 and not yet endorsed by the UK)

The amendments specify which costs an entity includes in determining the cost of fulfilling a contract for the purpose of assessing whether the contract is onerous. Under the amendment the cost of fulfilling a contract comprises all directly related costs, including both incremental amounts and an allocation of other directly related expenditure. The Group currently makes provision for onerous contracts when the assets dedicated to the contract are fully impaired or the contract becomes stranded as a result of a business decision (refer to note 1(i)). From 2022, the Group will record a provision if a contract is found to be loss-making on a stand-alone basis following allocation of all directly related costs as required by the amendments to IAS 37. As required by the transition arrangements, the Group will apply the amendments in its 2022 Financial Statements without restatement. During 2021, the Group completed a review of the impact of these amendments and concluded that adjustments to retained earnings at 1 January 2022 are not material.

Deferred Tax related to Assets and Liabilities arising from a Single Transaction (Amendments to IAS 12 "Income Taxes", mandatory in 2023 and not yet endorsed by the UK)

Narrow-scope amendments to IAS 12 introduce an exception to the initial recognition exemption for transactions that give rise to equal taxable and deductible temporary differences. The most significant impact from implementing these amendments is expected to be from temporary differences related to the Group's provisions for close-down, restoration, environmental and lease obligations and corresponding capitalised closure costs and right-of-use assets.

Our existing accounting policy states that "where the recognition of an asset and liability from a single transaction gives rise to equal and offsetting temporary differences, Rio Tinto applies the Initial Recognition Exemption allowed by IAS 12, and consequently recognises neither a deferred tax asset nor a deferred tax liability in respect of these temporary differences".

Under the amendment, deferred tax assets and liabilities will be required to be recognised in respect of such temporary differences. Upon transition in 2023, the Group anticipates material adjustments (prior to required offsetting within the same tax jurisdiction) as at 1 January 2021 to deferred tax assets and deferred tax liabilities with the net difference recorded in reserves. Work is ongoing to quantify the impact, including appropriate offsets against existing deferred tax liabilities or assets in various jurisdictions. There will be no impact on tax cash flows or balance sheet tax recoverable or payable as a result of implementing these amendments and the unwind of the newly recognised deferred tax is not expected to materially impact annual profits and losses.

IFRS 17 Insurance Contracts and amendments to IFRS 17 Insurance Contracts (mandatory in 2023 and not yet endorsed by the UK)

The standard provides consistent principles for all aspects of accounting for insurance contracts. The Group continues to evaluate the impact of this pronouncement and to monitor the evolving practice, particularly for potential impact areas related to reinsurance contracts with Equity Accounted Units and in-substance self-insurance arrangements.

Amendments to IAS 1 "Presentation of Financial Statements" on classification of liabilities" (mandatory in 2024 and not yet endorsed by the UK)

These narrow-scope amendments to IAS 1 set out specific guidance for determining the classification of liabilities as current or non-current, based on whether an entity has a substantive right to payment deferral at the reporting date. The Group continues to evaluate the impact of this amendment, which has been tentatively deferred to no earlier than 1 January 2024.

Judgments in applying accounting policies and key sources of estimation uncertainty

The preparation of the financial statements requires management to use judgment in applying accounting policies and in making critical accounting estimates.

These judgments and estimates are based on management's best knowledge of the relevant facts and circumstances, having regard to previous experience, but actual results may differ materially from the amounts included in the financial statements. Areas of judgment in the application of accounting policies that have the most significant effect on the amounts recognised in the financial statements and key sources of estimation uncertainty that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are noted below and further information is contained in the accounting policies and/or the notes to the financial statements.

These areas of judgment and estimation are discussed further in critical accounting policies and estimates on pages 233 to 237. The quantum of ore reserves and mineral resources impacts many of these areas and the basis of calculation is explained below. Information on less material judgments and sources of estimation uncertainty has been incorporated into the relevant accounting policy notes.

Areas of judgment in the application of accounting policies that have the most significant effect on the amounts recognised in the financial statements in the current year are:

- Impairment of non-current assets – determination of cash-generating units (CGUs) and assessment of indicators of impairment – note 1(e) and (i), critical policy (i), note 6, note 12 and note 13.
- Close-down, restoration and environmental obligations – determining when a closure study plan and cost estimate is sufficiently advanced and reliable to form the basis for an update – note 1(l) and critical policy (iii).
- Recoverability of potential deferred tax assets – recognition of deferred tax assets for loss making operations – critical policy (vi) and note 17.
- Uncertain tax positions – technical interpretation of tax law and evaluation of outcomes in the determination of whether multiple or binary scenarios are the appropriate basis for provision measurement – note 1(n), critical policy (v), note 9 and note 30.
- Estimation of asset lives – determination of the life of the orebody and mine reserves, including grade cut-off assumptions consistent with the internal prices described in the Climate Change section – note 1(i) and critical policy (ii).
- Deferral of stripping costs – judgment on components/strip ratios and separate or integrated multiple pit mines – note 1(h) and critical policy (iv).

Other areas of judgment impacting the financial statements are:

- Oyu Tolgoi funding balances - accounting for a transaction with a non-controlling owner, critical policy (xii).
- Provision for onerous contracts – determination of assets dedicated to a contract – note 1(i) and critical policy (vii).
- Identification of functional currencies – different companies may make different judgments based on similar facts – note 1(d) and critical policy (viii).
- Basis of consolidation – judgment as to when the Group has control, joint control or significant influence – critical policy (ix) and notes 32-35.
- Contingencies – assessing the probability of any loss and whether it is possible to quantify any loss – critical policy (x) and note 30.
- Exclusions from underlying earnings – judgment on items to be excluded on grounds of nature or size – critical policy (xi) and note 2.

Notes to the 2021 financial statements

1 Principal accounting policies continued

- Accounting for the Pilbara Iron Arrangements – treatment of payments made over a contractually specified period for network infrastructure capacity – critical policy (xiii) and note 33(c).

Key sources of estimation uncertainty that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are:

- Close-down, restoration and environmental cost obligations – the Group has closure studies ongoing at over 15 sites; many of these are multi-year projects but around five are expected to complete major milestones during 2022. In particular, on 2 February 2022, Energy Resources of Australia released preliminary findings from its reforecast of the total undiscounted cost schedule for the Ranger rehabilitation project giving a revised range, including spend since 1 January 2019, of approximately A$1.6 billion to A$2.2 billion in nominal terms. Information available from this reforecast resulted in the Group recording an increase to the closure provision of US$510 million at 31 December 2021 based on a central case within the given range. The central case is considered to represent Rio Tinto's best estimate of obligations at 31 December 2021, however Rio Tinto continues to perform a technical review over this reforecast and has advised Energy Resources of Australia that it is committed to working with the company to ensure that rehabilitation of the Ranger Project Area is successfully achieved. We therefore expect to make further adjustments to the provision during 2022 as confidence levels in the studies improve.
- Recoverability of potential deferred tax assets – the forecasts used to support the recognition of deferred tax assets will be impacted by changes to forecast commodity prices and the closure uncertainties noted above.

Materiality

The Group considers information to be material if correcting a misstatement, omission or obscuring could, in the light of surrounding circumstances, reasonably be expected to change the judgment of a reasonable person relying on the financial statements. The Group considers both quantitative and qualitative factors in determining whether information is material; the concept of materiality is therefore not driven purely by numerical values.

When considering the potential materiality of information, management makes an initial quantitative assessment using thresholds based on estimates of profit before taxation; for the year ended 31 December 2021 the quantitative threshold was US$700 million (year ended 31 December 2020: US$550 million). However, other considerations can result in a determination that lower values are material or, occasionally, that higher values are immaterial. These considerations include whether a misstatement, omission or obscuring: masks a change or trend in key performance indicators; causes reported key metrics to change from a positive to negative values or vice-versa; affects compliance with regulatory requirements or other contractual requirements; could result in an increase to management's compensation; or might conceal an unlawful transaction.

In assessing materiality, management also applies judgment based on its understanding of the business and its internal and external financial statement users. The assessment will consider user expectations of numerical and narrative reporting. Sources used in making this assessment would include, for example: published analyst consensus measures, experience gained in formal and informal dialogue with users (including regulatory correspondence), and peer group benchmarking.

Ore reserves and mineral resources

Estimates of ore reserves and, in some cases, mineral resources can impact: depreciation and amortisation rates; the carrying values of intangible assets and property, plant and equipment; deferred stripping costs; provisions for close-down and restoration costs; and the recovery of deferred tax assets.

The Group estimates its ore reserves and mineral resources based on information compiled by Competent Persons as defined in accordance with the Joint Ore Reserves Committee (JORC) code (see note 1(j)).

The estimation of ore reserves and mineral resources requires judgment to interpret available geological data and subsequently to select an appropriate mining method and then to establish an extraction schedule. Estimation requires assumptions about future commodity prices and demand, exchange rates, production costs, transport costs, close-down and restoration costs, recovery rates and discount rates and, in some instances, the renewal of mining licences.

There are many uncertainties in the estimation process and assumptions that are valid at the time of estimation may change significantly when new information becomes available. New geological or economic data, or unforeseen operational issues, may change estimates of ore reserves and mineral resources.

The Group uses judgment as to when to include mineral resources in accounting estimates, for example, the use of mineral resources in the Group's depreciation policy is described in note 1(i) below and in the determination of the date of closure as described in note 1(l). The unaudited statement of ore reserves is included on page 354 and of mineral resources on page 366.

(a) Accounting convention

The financial information included in the financial statements for the year ended 31 December 2021, and for the related comparative periods, has been prepared under the historical cost convention, as modified by the revaluation of certain derivative contracts and financial assets, the impact of fair value hedge accounting on the hedged item and the accounting for post-employment assets and obligations. The Group's policy in respect of these items is set out in the notes below.

All financial statement values are rounded to the nearest million (US$m) unless otherwise stated.

Where applicable, comparatives have been adjusted to measure or present them on the same basis as current period figures.

(b) Basis of consolidation (notes 32-35)

All intragroup transactions and balances have been eliminated on consolidation.

Where necessary, adjustments are made to the locally reported assets, liabilities, and results of subsidiaries, joint arrangements and associates to bring their accounting policies in line with those used by the Group.

Subsidiaries

Subsidiaries are entities controlled by either of the companies. Control exists where either of the companies has: power over the entities, that is, existing rights that give it the current ability to direct the relevant activities of the entities (those that significantly affect the companies' returns); exposure, or rights, to variable returns from its involvement with the entities; and the ability to use its power to affect those returns. Subsidiaries are fully consolidated from the date on which the Group obtains control. They are de-consolidated from the date that control ceases.

Joint arrangements

A joint arrangement is an arrangement in which two or more parties have joint control. Joint control is the contractually agreed sharing of control such that decisions about the relevant activities of the arrangement (those that significantly affect the companies' returns) require the unanimous consent of the parties sharing control. The Group has two types of joint arrangements:

Joint operations (JO)

A JO is a joint arrangement in which the parties that share joint control have rights to the assets, and obligations for the liabilities, relating to the arrangement. This includes situations where the parties benefit from the joint activity through a share of the output, rather than by receiving a share of the results of trading. In relation to its interest in a JO, the Group recognises: its share of assets and liabilities; revenue from the sale of its share of the output and its share of any revenue generated from the sale of the output by the JO; and its share of expenses. All such amounts are measured in accordance with the terms of the arrangement, which is usually in proportion to the Group's interest in the JO. These amounts are recorded in the Group's financial statements on the appropriate lines.

Joint ventures (JV)

A JV is a joint arrangement in which the parties that share joint control have rights to the net assets of the arrangement. JVs are accounted for using the equity accounting method.

Other unincorporated arrangements

In some cases, the Group participates in unincorporated arrangements and has rights to its share of the assets and obligations for its share of the liabilities of the arrangement rather than a right to a net return, but does not share joint control. In such cases, the Group recognises: its share of assets and liabilities; revenue from the sale of its share of the output and its share of any revenue generated from the sale of the output by the unincorporated arrangement; and its share of expenses. All such amounts are measured in accordance with the terms of the arrangement, which is usually in proportion to the Group's interest in the arrangement. These amounts are recorded in the Group's financial statements on the appropriate lines.

Associates

An associate is an entity that is neither a subsidiary nor a joint arrangement, over which the Group has significant influence. Significant influence is presumed to exist where there is neither control nor joint control and the Group has over 20% of the voting rights, unless it can be clearly demonstrated that this is not the case. Significant influence can arise where the Group holds less than 20% of the voting rights if it has the power to participate in the financial and operating policy decisions affecting the entity. Investments in associates are accounted for using the equity accounting method.

The Group uses the term "equity accounted units" (EAUs) to refer to associates and JVs collectively. Under the equity accounting method the investment is recorded initially at cost to the Group, including any goodwill on acquisition. In subsequent periods the carrying amount of the investment is adjusted to reflect the Group's share of the EAUs' retained post-acquisition profit or loss and other comprehensive income. Long-term loans to EAUs that in substance form part of the Group's net investment (quasi equity loans) are financial assets but are included in the line "Investments in equity accounted units" on the face of the balance sheet. When the Group's share of losses in an EAU equals or exceeds its interest in the EAU, including such long-term loans and any other unsecured receivables, the Group does not recognise further losses, unless it has incurred legal or constructive obligations to continue to make payments on behalf of the EAU.

Acquisitions (note 36)

Under the "acquisition" method of accounting for business combinations, the purchase consideration is allocated to the identifiable assets acquired and liabilities and contingent liabilities assumed (the identifiable net assets) on the basis of their fair value at the date of acquisition, which is the date on which control is obtained.

In determining whether a particular set of activities is a business, an acquired arrangement has to have an input and substantive process which together significantly contribute to the ability to create outputs.

The consideration transferred for the acquisition of a subsidiary comprises the fair values of the assets transferred, the liabilities incurred to the former owners of the acquiree, the fair value of any asset or liability resulting from a contingent consideration arrangement and any equity interests issued by the Group. Costs related to the acquisition of a subsidiary are expensed as incurred.

The excess of the consideration transferred, the amount of any non-controlling interest in the acquiree and the acquisition-date fair value of any previous equity interest in the acquiree over the fair value of the identifiable net assets acquired is recorded as goodwill. Any shortfall is immediately recognised in the income statement.

Non-controlling interests in the acquiree, that are present ownership interests and entitle their holders to a proportionate share of the entity's net assets in the event of liquidation, are recognised by the Group in one of two ways with the choice being available on an acquisition-by-acquisition basis. They can be measured at either the non-controlling interest's proportionate share of the acquiree's identifiable net assets or at fair value. In some cases, non-controlling interests may be treated as equity options and valued on that basis. Goodwill (see note 1(e)) and amounts attributable to non-controlling interests will differ depending on the basis used.

Where the Group previously held a non-controlling interest in the acquiree, this is remeasured to fair value at the date control is obtained with any gain or loss recognised in the income statement. The cash cost of the share purchase that gives rise to control is included within "investing activities" in the cash flow statement.

Where the Group increases its ownership interest in a subsidiary, the difference between the purchase price and the carrying value of the share of net assets acquired is recorded in equity. The cash cost of such purchases is included within "financing activities" in the cash flow statement.

Provisional fair values allocated at a reporting date are finalised within 12 months of the acquisition date.

The results of businesses acquired during the year are included in the consolidated financial statements from the date on which control, joint control or significant influence is obtained.

Disposals (note 36)

Individual non-current assets or "disposal groups" (that is, groups of assets and liabilities) to be disposed of by sale or otherwise in a single transaction are classified as "held for sale" if the following criteria are met at the period end:

- The carrying amount will be recovered principally through a sale transaction rather than through continuing use; and
- The disposal group is available for immediate sale in its present condition subject only to terms that are usual and customary for such sales; and
- The sale is highly probable.

Notes to the 2021 financial statements

1 Principal accounting policies continued

Disposal groups held for sale are carried at the lower of their carrying amount and fair value less costs to sell. The comparative balance sheet is not restated. Disposal groups acquired with a view to resale are held at the fair value determined at the acquisition date. For these assets acquired for resale no profits or losses are recognised between the acquisition date and the disposal date, unless there is a subsequent impairment.

On classification as held for sale, the assets are no longer depreciated and, if applicable, equity accounting ceases.

If control is lost, any interest in the entity retained by the Group is remeasured to its fair value and the change in carrying amount is recognised in the income statement. The retained interest may be subsequently accounted for as a joint venture, joint operation, associate or financial asset depending on the facts. Certain amounts previously recognised in other comprehensive income in respect of the entity disposed of, or for which control, joint control or significant influence has ceased, may be recycled to the income statement. The cash proceeds of disposals are included within "Investing activities" in the cash flow statement.

Changes in the Group's interest in a subsidiary that do not result in a loss of control are accounted for in equity. The cash proceeds of such disposals are included within "Financing activities" in the cash flow statement.

(c) Sales revenue

Recognition and measurement

The Group recognises sales revenue related to the transfer of promised goods or services when control of the goods or services passes to the customer. The amount of revenue recognised reflects the consideration to which the Group is or expects to be entitled in exchange for those goods or services.

Sales revenue is recognised on individual sales when control transfers to the customer. In most instances, control passes and sales revenue is recognised when the product is delivered to the vessel or vehicle on which it will be transported once loaded, the destination port or the customer's premises. There may be circumstances when judgment is required based on the five indicators of control below.

- The customer has the significant risks and rewards of ownership and has the ability to direct the use of, and obtain substantially all of the remaining benefits from, the good or service.
- The customer has a present obligation to pay in accordance with the terms of the sales contract. For shipments under the Incoterms Cost, Insurance and Freight (CIF)/Carriage Paid to (CPT)/Cost and Freight (CFR) this is generally when the ship is loaded, at which time the obligation for payment is for both product and freight.
- The customer has accepted the asset. Sales revenue may be subject to adjustment if the product specification does not conform to the terms specified in the sales contract but this does not impact the passing of control. Assay and specification adjustments have been immaterial historically.
- The customer has legal title to the asset. The Group usually retains legal title until payment is received for credit risk purposes only.
- The customer has physical possession of the asset. This indicator may be less important as the customer may obtain control of an asset prior to obtaining physical possession, which may be the case for goods in transit.

The Group sells a significant proportion of its products on CFR or CIF Incoterms. This means that the Group is responsible (acts as principal) for providing shipping services and, in some instances, insurance after the date at which control of goods passes to the customer at the loading port.

The Group therefore has separate performance obligations for freight and insurance services that are provided solely to facilitate sale of the commodities it produces. Other Incoterms commonly used by the Group are Free on Board (FOB), where the Group has no responsibility for freight or insurance once control of the goods has passed at the loading port, and Delivered at Place (DAP), where control of the goods passes when the product is delivered to the agreed destination. For these Incoterms there is only one performance obligation, being for provision of product at the point where control passes.

The Group's products are sold to customers under contracts which vary in tenure and pricing mechanisms, including some volumes sold in the spot market. Pricing for iron ore is on a range of terms, the majority being either monthly or quarterly average pricing mechanisms, with a smaller proportion of iron ore volumes being sold on the spot market.

Within each sales contract, each unit of product shipped is a separate performance obligation. Revenue is generally recognised at the contracted price as this reflects the stand-alone selling price. Sales revenue excludes any applicable sales taxes. Mining royalties payable are presented as an operating cost or, where they are in substance a profit-based tax, within taxation.

Sales of copper concentrate are stated net of the treatment and refining charges which will be required to convert it to an end product.

Certain of the Group's products may be provisionally priced at the date revenue is recognised and a provisional invoice issued; however, substantially all iron ore and aluminium sales are reflected at final prices in the results for the period. Provisionally priced receivables are subsequently measured at fair value through the income statement under IFRS 9 "Financial Instruments" as described in note (q). The final selling price for all provisionally priced products is based on the price for the quotational period stipulated in the contract. Final prices for copper concentrate are normally determined between 30-120 days after delivery to the customer. The change in value of the provisionally priced receivable is based on relevant forward market prices and is included in sales revenue; refer to note 3 on page 241 and note 29C(a) on page 271.

Rio Tinto has a number of long-term contracts to supply product to customers in future periods. Generally, revenues are recognised on an as invoiced basis; hence, the right to consideration from a customer corresponds directly with the entity's performance completed to date.

A number of the Group's businesses provide volume discounts in certain circumstances. The impact of constraining such variable consideration under IFRS 15 "Revenue from Contracts with Customers" was immaterial at both 31 December 2021 and 31 December 2020.

The Group applies the practical expedient in paragraph 121 of IFRS 15 and does not disclose information on the transaction price allocated to performance obligations that are unsatisfied.

Presentation and disclosures

Consolidated sales revenue as reported in the income statement comprises sales to third parties. Certain of the Group's products may be provisionally priced at the date revenue is recognised. Sales revenue includes revenue from contracts with customers, which is accounted for under IFRS 15 and subsequent movements in provisionally priced receivables which are accounted for under IFRS 9. A breakdown of sales revenue between these two amounts is disclosed in the product analysis in note 3 and further detail on provisional pricing in note 3. Sales revenue includes revenue from movements in provisionally priced receivables, consistent with the treatment in prior periods.

The Group considers that the impact of economic factors on its sales revenue, particularly pricing and volumes, is best understood by reference to the disclosure of sales revenue by product group and sales destination in note 3. The analysis of provisional pricing adjustments by commodity in the product analysis in note 3 shows which products are subject to price volatility post the transfer of control. With the exception of Oyu Tolgoi, which sells copper concentrate to China, this price uncertainty is largely resolved at the period end.

Typically, the Group has a right to payment before or at the point that control of the goods passes including a right, where applicable, to payment for provisionally priced products and unperformed freight and insurance services. Cash received before control passes is recognised as a contract liability. The amount of consideration does not contain a significant financing component as payment terms are less than one year.

Revenues from the sale of significant by-products, such as gold, are included in sales revenue. Sundry revenue (e.g. sales of surplus power) incidental to the main revenue-generating activities of the operations is treated as a credit to operating costs.

The Group does not disclose sales revenue from freight and insurance services separately as it does not consider that this is necessary in order to understand the impact of economic factors on the Group; the Group's Chief Executive, the chief operating decision maker, as defined under IFRS 8 "Operating Segments", does not review information specifically relating to these sources of revenue in order to evaluate the performance of business segments and Group information on these sources of revenue is not provided externally.

The Group does provide information on freight revenue for the iron ore and bauxite businesses on pages 45 and 51 to help stakeholders understand FOB operating margins for those products.

Third-party commodity swap arrangements principally for delivery and receipt of smelter-grade alumina are offset within operating costs.

(d) Currency translation

The functional currency for each entity in the Group, and for joint arrangements and associates, is the currency of the primary economic environment in which that entity operates. For many of these entities, this is the currency of the country in which they are located. Transactions denominated in other currencies are converted to the functional currency at the exchange rate ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are retranslated at period-end exchange rates.

The Group's financial statements are presented in US dollars, as that presentation currency most reliably reflects the global business performance of the Group as a whole. On consolidation, income statement items for each entity are translated from the functional currency into US dollars at average rates of exchange, except for material one-off transactions, which are translated at the rate prevailing on the transaction date. Balance sheet items are translated into US dollars at period-end exchange rates.

Exchange differences arising on the translation of the net assets of entities with functional currencies other than the US dollar are recognised directly in the currency translation reserve. These translation differences are shown in the statement of comprehensive income, with the exception of translation adjustments relating to Rio Tinto Limited's share capital which are shown in the statement of changes in equity.

Where an intragroup balance is, in substance, part of the Group's net investment in an entity, exchange gains and losses on that balance are taken to the currency translation reserve.

Except as noted above, or in note 1(q) relating to derivative contracts, all other exchange differences are charged or credited to the income statement in the year in which they arise.

(e) Goodwill and intangible assets (excluding exploration and evaluation expenditure) (notes 12 and 13)

Goodwill is not amortised; it is tested annually for impairment or more frequently if events or changes in circumstances indicate a potential impairment. Investments in EAUs, including any goodwill, are tested for impairment as a single asset when a trigger for impairment has been identified. The Group's impairment policy is explained in note 1(i).

Purchased intangible assets are initially recorded at cost. Finite-life intangible assets are amortised over their useful economic lives on a straight line or units of production basis, as appropriate. Intangible assets that are deemed to have indefinite lives and intangible assets that are not yet ready for use are not amortised; they are reviewed annually for impairment or more frequently if events or changes in circumstances indicate a potential impairment in accordance with accounting policy note 1(i).

The Group considers that intangible assets have indefinite lives when, based on an analysis of all of the relevant factors, there is no foreseeable limit to the period over which the asset is expected to generate cash flows for the Group. The factors considered in making this judgment include the existence of contractual rights for unlimited terms or evidence that renewal of the contractual rights without significant incremental cost can be expected for indefinite future periods in view of the Group's investment intentions. The life cycles of the products and processes that depend on the asset are also considered.

(f) Exploration and evaluation (note 13)

Exploration and evaluation expenditure comprises costs that are directly attributable to:

- Researching and analysing existing exploration data;
- Conducting geological studies, exploratory drilling and sampling;
- Examining and testing extraction and treatment methods; and/or
- Compiling various studies (order of magnitude, pre-feasibility and feasibility).

Notes to the 2021 financial statements

1 Principal accounting policies continued

Exploration expenditure relates to the initial search for deposits with economic potential. Expenditure on exploration activity undertaken by the Group is not capitalised.

Evaluation expenditure relates to a detailed assessment of deposits or other projects (including smelter and refinery projects) that have been identified as having economic potential. Capitalisation of evaluation expenditure commences when there is a high degree of confidence that the Group will determine that a project is commercially viable, that is the project will provide a satisfactory return relative to its perceived risks, and therefore it is considered probable that future economic benefits will flow to the Group. The Group's view is that a high degree of confidence is greater than "more likely than not" (that is, greater than 50% certainty) and less than "virtually certain" (that is, less than 90% certainty).

Assessing whether there is a high degree of confidence that the Group will ultimately determine that an evaluation project is commercially viable requires judgment and consideration of all relevant factors such as the nature and objective of the project; the project's current stage; project timeline; current estimates of the project's net present value, including sensitivity analyses for the key assumptions; and the main risks of the project. Development expenditure incurred prior to the decision to proceed is subject to the same criteria for capitalisation, being a high degree of confidence that the Group will ultimately determine that a project is commercially viable.

In some cases, undeveloped projects are regarded as successors to orebodies, smelters or refineries currently in production. Where this is the case, it is intended that these will be developed and go into production when the current source of ore is exhausted or when existing smelters or refineries are closed.

Ore reserves may be declared for an undeveloped mining project before its commercial viability has been fully determined. Evaluation costs may continue to be capitalised during the period between declaration of ore reserves and approval to mine as further work is undertaken in order to refine the development case to maximise the project's returns.

In accordance with IFRS 6 "Exploration for and Evaluation of Mineral Resources", the criteria for the capitalisation of evaluation costs are applied consistently from period to period.

In the case of undeveloped mining projects which have arisen through acquisition, the allocation of the purchase price consideration may result in undeveloped properties being recognised at an earlier stage of project evaluation compared with projects arising from the Group's exploration and evaluation programme. Subsequent expenditure on acquired undeveloped projects is only capitalised if it meets the high degree of confidence threshold discussed above.

The carrying values of capitalised evaluation expenditure for undeveloped mining projects (projects for which the decision to mine has not yet been approved at the appropriate authorisation level within the Group) are reviewed at each reporting date for indicators of impairment in accordance with IFRS 6, and when indicators are identified are tested in accordance with IAS 36 "Impairment of Assets". Evaluation expenditure for non-mining projects is reviewed and tested under IAS 36.

The impairment review is based on a status report summarising the Group's intentions to recover value through development, sale or other partnering arrangements. If a project does not prove viable and is cancelled, all irrecoverable costs associated with the project net of any previously recorded impairment provisions are charged to the income statement.

(g) Property, plant and equipment (note 14)

Once an undeveloped mining project has been determined as commercially viable and approval to mine has been given, expenditure other than that on land, buildings, plant, equipment and capital work in progress is capitalised under "Mining properties and leases" together with any amount transferred from "Exploration and evaluation".

Costs which are necessarily incurred whilst commissioning new assets, in the period before they are capable of operating in the manner intended by management, are capitalised. Development costs incurred after the commencement of production are capitalised to the extent they are expected to give rise to a future economic benefit. Interest on borrowings related to construction or development projects is capitalised, at the rate payable on project-specific debt if applicable or at the Group or subsidiary's cost of borrowing if not, until the point when substantially all the activities that are necessary to make the asset ready for its intended use are complete. It may be appropriate to use a subsidiary's cost of borrowing when the debt was negotiated based on the financing requirements of that subsidiary.

Property, plant and equipment is stated at cost, as defined in IAS 16, less accumulated depreciation and accumulated impairment losses. The cost of property, plant and equipment includes, where applicable, the estimated close-down and restoration costs associated with the asset.

Property, plant and equipment includes right of use assets (note 14) arising from leasing arrangements, shown separately from owned and leasehold assets.

(h) Deferred stripping (note 14)

In open pit mining operations, overburden and other waste materials must be removed to access ore from which minerals can be extracted economically. The process of removing overburden and waste materials is referred to as stripping. During the development of a mine (or, in some instances, pit; see below), before production commences, stripping costs related to a component of an orebody are capitalised as part of the cost of construction of the mine (or pit) and are subsequently amortised over the life of the mine (or pit) on a units of production basis.

Where a mine operates several open pits that are regarded as separate operations for the purpose of mine planning, initial stripping costs are accounted for separately by reference to the ore from each separate pit. If, however, the pits are highly integrated for the purpose of mine planning, the second and subsequent pits are regarded as extensions of the first pit in accounting for stripping costs. In such cases, the initial stripping (i.e. overburden and other waste removal) of the second and subsequent pits is considered to be production phase stripping (see below).

The Group's judgment as to whether multiple pit mines are considered separate or integrated operations depends on each mine's specific circumstances.

The following factors would point towards the initial stripping costs for the individual pits being accounted for separately:

- If mining of the second and subsequent pits is conducted consecutively following that of the first pit, rather than concurrently;
- If separate investment decisions are made to develop each pit, rather than a single investment decision being made at the outset;

- If the pits are operated as separate units in terms of mine planning and the sequencing of overburden removal and ore mining, rather than as an integrated unit;
- If expenditures for additional infrastructure to support the second and subsequent pits are relatively large; and
- If the pits extract ore from separate and distinct orebodies, rather than from a single orebody.

If the designs of the second and subsequent pits are significantly influenced by opportunities to optimise output from several pits combined, including the co-treatment or blending of the output from the pits, then this would point to treatment as an integrated operation for the purposes of accounting for initial stripping costs. The relative importance of each of the above factors is considered in each case.

In order for production phase stripping costs to qualify for capitalisation as a stripping activity asset, three criteria must be met:

- It must be probable that there will be an economic benefit in a future accounting period because the stripping activity has improved access to the orebody;
- It must be possible to identify the "component" of the orebody for which access has been improved; and
- It must be possible to reliably measure the costs that relate to the stripping activity.

A "component" is a specific section of the orebody that is made more accessible by the stripping activity. It will typically be a subset of the larger orebody that is distinguished by a separate useful economic life (for example, a pushback).

Production phase stripping can give rise to two benefits: the extraction of ore in the current period and improved access to ore which will be extracted in future periods. When the cost of stripping which has a future benefit is not distinguishable from the cost of producing current inventories, the stripping cost is allocated to each of these activities based on a relevant production measure using a life-of-component strip ratio. The ratio divides the tonnage of waste mined for the component for the period either by the quantity of ore mined for the component or by the quantity of minerals contained in the ore mined for the component. In some operations, the quantity of ore is a more appropriate basis for allocating costs, particularly where there are significant by-products. Stripping costs for the component are deferred to the extent that the current period ratio exceeds the life of component ratio. The stripping activity asset is depreciated on a "units of production" basis based on expected production of either ore or minerals contained in the ore over the life of the component unless another method is more appropriate.

The life-of-component ratios are based on the ore reserves of the mine (and for some mines, other mineral resources) and the annual mine plan; they are a function of the mine design and, therefore, changes to that design will generally result in changes to the ratios. Changes in other technical or economic parameters that impact the ore reserves (and for some mines, other mineral resources) may also have an impact on the life-of-component ratios even if they do not affect the mine design. Changes to the ratios are accounted for prospectively.

It may be the case that subsequent phases of stripping will access additional ore and that these subsequent phases are only possible after the first phase has taken place. Where applicable, the Group considers this on a mine-by-mine basis. Generally, the only ore attributed to the stripping activity asset for the purposes of calculating a life-of-component ratio, and for the purposes of amortisation, is the ore to be extracted from the originally identified component.

Deferred stripping costs are included in "Mining properties and leases" within "Property, plant and equipment" or within "Investments in equity accounted units", as appropriate. Amortisation of deferred stripping costs is included in "Depreciation of property, plant and equipment" within "Net operating costs" or in "Share of profit after tax of equity accounted units", as appropriate.

(i) Depreciation and impairment (notes 13 and 14)

Depreciation of non-current assets

Property, plant and equipment is depreciated over its useful life, or over the remaining life of the mine or smelter or refinery if that is shorter and there is no reasonable alternative use for the asset by the Group.

The useful lives of the major assets of a cash-generating unit are often dependent on the life of the orebody to which they relate. Where this is the case, the lives of mining properties, and their associated refineries, concentrators and other long-lived processing equipment are generally limited to the expected life of the orebody. The life of the orebody, in turn, is estimated on the basis of the life-of-mine plan. Where the major assets of a cash-generating unit are not dependent on the life of a related orebody, management applies judgment in estimating the remaining service potential of long-lived assets. Factors affecting the remaining service potential of smelters include, for example, smelter technology and electricity purchase contracts when power is not sourced from the companies, or in some cases from local governments permitting electricity generation from hydro-power stations.

The useful lives and residual values for material assets and categories of assets are reviewed annually and changes are reflected prospectively.

Depreciation commences when an asset is available for use. The major categories of property, plant and equipment are depreciated on a units of production and/or straight line basis as follows:

Units of production basis

For mining properties and leases and certain mining equipment, consumption of the economic benefits of the asset is linked to production. Except as noted below, these assets are depreciated on the units of production basis.

In applying the units of production method, depreciation is normally calculated based on production in the period as a percentage of total expected production in current and future periods based on ore reserves and, for some mines, other mineral resources. Other mineral resources may be included in the calculations of total expected production in limited circumstances where there are very large areas of contiguous mineralisation, for which the economic viability is not sensitive to likely variations in grade, as may be the case for certain iron ore, bauxite and industrial mineral deposits, and where there is a high degree of confidence that the other mineral resources can be extracted economically. This would be the case when the other mineral resources do not yet have the status of ore reserves merely because the necessary detailed evaluation work has not yet been performed and the responsible technical personnel agree that inclusion of a proportion of measured and indicated resources in the calculation of total expected production is appropriate based on historical reserve conversion rates.

The required level of confidence is unlikely to exist for minerals that are typically found in low-grade ore (as compared with the above), such as copper or gold. In these cases, specific areas of mineralisation have to be evaluated in detail before their economic status can be predicted with confidence.

Notes to the 2021 financial statements

1 Principal accounting policies continued

Where measured and indicated resources are used in the calculation of depreciation for infrastructure, primarily rail and port, which will benefit current and future mines, then the measured and indicated resources may relate to mines which are currently in production or to mines where there is a high degree of confidence that they will be brought into production in the future. The quantum of mineral resources is determined taking into account future capital costs as required by the JORC code. The depreciation calculation, however, applies to current mines only and does not take into account future development costs for mines which are not yet in production. Measured and indicated resources are currently incorporated into depreciation calculations in the Group's Australian iron ore business.

Straight line basis

Assets within operations for which production is not expected to fluctuate significantly from one year to another or which have a physical life shorter than the related mine are depreciated on a straight line basis.

Impairment charges/reversals of non-current assets

Impairment charges and reversals are assessed at the level of cash-generating units which, in accordance with IAS 36, are identified as the smallest identifiable asset or group of assets that generate cash inflows which are largely independent of the cash inflows from other assets. Separate cash-generating units are identified where an active market exists for intermediate products, even if the majority of those products are further processed internally. Impairment of financial assets is evaluated in accordance with IFRS 9.

In some cases, individual business units consist of several operations with independent cash-generating streams which constitute separate cash- generating units.

Goodwill acquired through business combinations is allocated to the cash-generating unit or groups of cash-generating units that are expected to benefit from the related business combination, and tested for impairment at the lowest level within the Group at which goodwill is monitored for internal management purposes. All goodwill, intangible assets that have an indefinite life and intangible assets that are not ready for use are tested annually for impairment as at 30 September, regardless of whether there has been an impairment trigger, or more frequently if events or changes in circumstances indicate a potential impairment.

Property, plant and equipment and intangible assets with finite lives are reviewed for impairment if there is an indication that the carrying amount may not be recoverable. Right of use assets recognised under IFRS 16 "Leases" are included in the review. The Group conducts an internal review of the asset values annually as at 30 September which is used as a source of information to assess for indications of impairment or reversal of previously recognised impairment losses. External factors, such as changes in forecasted commodity prices, costs and other market factors as well as internal factors such as cancellation of a project or reduced project scope, are also monitored to assess for indications of impairment or reversal of previously recognised impairment losses. If any such indication exists then an impairment review is undertaken; the recoverable amount is assessed by reference to the higher of value in use (being the net present value of expected future cash flows of the relevant cash-generating unit in its current condition) and fair value less costs of disposal (FVLCD).

When the recoverable amount of the cash-generating unit is measured by reference to FVLCD, this amount is further classified in accordance with the fair value hierarchy for observable market data that is consistent with the unit of account for the cash-generating unit being tested. The Group considers that the best evidence of FVLCD is the value obtained from an active market or binding sale agreement and, in this case, the recoverable amount is classified in the fair value hierarchy as level 1. When FVLCD is based on quoted prices for equity instruments but adjusted to reflect factors such as a lack of liquidity in the market, the recoverable amount is classified as level 2 in the fair value hierarchy. No cash-generating units are currently assessed for impairment by reference to a recoverable amount based on FVLCD classified as level 1 or level 2.

Where unobservable inputs are material to the measurement of the recoverable amount, FVLCD is based on the best information available to reflect the amount the Group could receive for the cash-generating unit in an orderly transaction between market participants at the measurement date. This is often estimated using discounted cash flow techniques and is classified as level 3 in the fair value hierarchy.

Where the recoverable amount is assessed using FVLCD based on discounted cash flow techniques, the resulting estimates are based on detailed life-of-mine and/or long-term production plans. These may include anticipated expansions which are at the evaluation stage of study.

The cash flow forecasts for FVLCD purposes are based on management's best estimates of expected future revenues and costs, including the future cash costs of production, capital expenditure, and closure, restoration and environmental costs. For the purposes of determining FVLCD from a market participant's perspective, the cash flows incorporate management's price and cost assumptions in the short and medium term. In the longer term, operating margins are assumed to remain constant where appropriate, as it is considered unlikely that a market participant would prepare detailed forecasts over a longer term. The cash flow forecasts may include net cash flows expected to be realised from the extraction, processing and sale of material that does not currently qualify for inclusion in ore reserves. Such non-reserve material is only included when there is a high degree of confidence in its economic extraction. This expectation is usually based on preliminary drilling and sampling of areas of mineralisation that are contiguous with existing ore reserves. Typically, the additional evaluation required to achieve reserves status for such material has not yet been done because this would involve incurring evaluation costs earlier than is required for the efficient planning and operation of the mine.

As noted above, cost levels incorporated in the cash flow forecasts for FVLCD purposes are based on the current life-of-mine plan or long-term production plan for the cash-generating unit. This differs from value in use which requires future cash flows to be estimated for the asset in its current condition and therefore does not include future cash flows associated with improving or enhancing an asset's performance. Anticipated enhancements to assets may be included in FVLCD calculations and, therefore, generally result in a higher value.

Where the recoverable amount of a cash-generating unit is dependent on the life of its associated orebody, expected future cash flows reflect the current life of mine and/or long-term production plans, which are based on detailed research, analysis and iterative modelling to optimise the level of return from investment, output and sequence of extraction. The mine plan takes account of all relevant characteristics of the orebody, including waste-to-ore ratios, ore grades, haul distances, chemical and metallurgical properties of the ore impacting process recoveries and capacities of processing equipment that can be used. The life-of-mine plan and/or long-term production plans are, therefore, the basis for forecasting production output and production costs in each future year.

Forecast cash flows for ore reserve estimation for JORC purposes are generally based on Rio Tinto's commodity price forecasts, which assume short-term market prices will revert to the Group's assessment of the long-term price, generally over a period of three to five years. For most commodities, these forecast commodity prices are derived from a combination of analyses of the marginal costs of the producers and of the incentive price of these commodities. These assessments often differ from current price levels and are updated periodically. The Group does not believe that published medium- and long-term forward prices necessarily provide a good indication of future levels because they tend to be strongly influenced by spot prices. The price forecasts used for ore reserve estimation are generally consistent with those used for impairment testing unless management deems that in certain economic environments, a market participant would not assume Rio Tinto's view on prices, in which case in preparing FVLCD impairment calculations management estimates the assumptions that a market participant would be expected to use.

Forecast future cash flows of a cash-generating unit take into account the sales prices under existing sales contracts.

The discount rates applied to the future cash flow forecasts represent an estimate of the rate the market participant would apply having regard to the time value of money and the risks specific to the asset for which the future cash flow estimates have not been adjusted. The Group's weighted average cost of capital is generally used as a starting point for determining the discount rates, with appropriate adjustments for the risk profile of the countries in which the individual cash-generating units operate. For final feasibility studies and ore reserve estimation, internal hurdle rates, which are generally higher than the Group's weighted average cost of capital, are used. For developments funded with project finance, the debt component of the weighted average cost of capital may be calculated by reference to the specific interest rate of the project finance and anticipated leverage of the project.

For operations with a functional currency other than the US dollar, the impairment review is undertaken in the relevant functional currency. In estimating FVLCD, internal forecasts of exchange rates take into account spot exchange rates, historical data and external forecasts, and are kept constant in real terms after five years. The great majority of the Group's sales are based on prices denominated in US dollars. To the extent that the currencies of countries in which the Group produces commodities strengthen against the US dollar without an increase in commodity prices, cash flows and, therefore, net present values are reduced. Management considers that over the long term, there is a tendency for movements in commodity prices to compensate to some extent for movements in the value of the US dollar, particularly against the Australian dollar and Canadian dollar, and vice versa. However, such compensating changes are not synchronised and do not fully offset each other. In estimating value in use, the present value of future cash flows in foreign currencies is translated at the spot exchange rate on the testing date.

Non-current assets (excluding goodwill) that have suffered impairment are reviewed using the same basis for valuation as explained above whenever events or changes in circumstances indicate that the impairment loss may no longer exist, or may have decreased. If appropriate, an impairment reversal will be recognised. The carrying amount of the cash-generating unit after reversal must be the lower of (a) the recoverable amount, as calculated above, and (b) the carrying amount that would have been determined (net of amortisation or depreciation) had no impairment loss been recognised for the cash-generating unit in prior periods.

An onerous contract is defined under IAS 37 as a contract under which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it. Provision is made when the assets dedicated to the contract are fully impaired or the contract becomes stranded as a result of a business decision.

(j) Determination of ore reserve and mineral resource estimates

The Group estimates its ore reserves and mineral resources based on information compiled by Competent Persons as defined in accordance with the JORC code.

Ore reserves and, for certain mines, other mineral resources, determined in this way are used in the calculation of depreciation, amortisation and impairment charges and for forecasting the timing of the payment of close-down and restoration costs and the recovery of deferred tax assets. The depreciation and impairment policy above notes instances in which mineral resources are taken into account for accounting purposes. In addition, value may be attributed to mineral resources in purchase price allocations undertaken for the purposes of business combination accounting.

(k) Leases (notes 14, 21, 22)

IFRS 16 "Leases" applies to the recognition, measurement, presentation and disclosure of leases. Certain leases are exempt from the standard, including leases to explore for or use minerals, oil, natural gas and similar non-regenerative resources. The Group applies the scope exemptions in paragraphs 3(e) and 4 of IFRS 16 and does not apply IFRS 16 to leases of any assets which would otherwise fall within the scope of IAS 38 "Intangible Assets".

A significant proportion by value of the Group's lease arrangements relate to dry bulk vessels and office properties. Other leases include land and non-mining rights, warehouses, ports, equipment and vehicles. The majority of lease terms are negotiated through the Group's procurement function, although agreements contain a wide range of different terms and conditions.

Notes to the 2021 financial statements

1 Principal accounting policies continued

The Group recognises all lease liabilities and corresponding right of use assets, with the exception of short-term (12 months or fewer) and low value leases, on the balance sheet. Lease liabilities are recorded at the present value of: fixed payments; variable lease payments that depend on an index or rate; amounts payable under residual value guarantees; and extension options expected to be exercised. Where a lease contains an extension option which the Group can exercise without negotiation, lease payments for the extension period are included in the liability if the Group is reasonably certain that it will exercise the option. Variable lease payments not dependent on an index or rate are excluded from the calculation of lease liabilities. Payments are discounted at the incremental borrowing rate of the lessee, unless the interest rate implicit in the lease can be readily determined. For lease agreements relating to vessels, ports and properties, non-lease components are excluded from the projection of future lease payments and recorded separately within operating costs on a straight line basis. The lease liability is measured at amortised cost using the effective interest method. The right of use asset arising from a lease arrangement at initial recognition reflects the lease liability, initial direct costs, lease payments made before the commencement date of the lease, and capitalised provision for dismantling and restoration, less any lease incentives.

The Group recognises depreciation of right of use assets and interest on lease liabilities in the income statement over the lease term. Repayments of lease liabilities are separated into a principal portion (presented within financing activities) and interest portion (which the Group presents in operating activities) in the cash flow statement. Payments made before the commencement date are included within financing activities unless they in substance represent investing cash flows, for example where pre-commencement cash flows are significant relative to aggregate cash flows of the leasing arrangement.

(l) Close-down, restoration and environmental obligations (note 25)

The Group has provisions for close-down and restoration costs which include the dismantling and demolition of infrastructure, the removal of residual materials and the remediation of disturbed areas for mines and certain refineries and smelters. These provisions are based on all regulatory requirements and any other commitments made to stakeholders.

Closure provisions are not made for those operations that have no known restrictions on their lives as the closure dates cannot be reliably estimated, instead a contingent liability is disclosed (refer to note 30). This applies primarily to certain Canadian smelters which have indefinite- lived water rights from local governments permitting electricity generation from hydro-power stations.

Close-down and restoration costs are a normal consequence of mining or production, and the majority of close-down and restoration expenditure is incurred in the years following closure of the mine, refinery or smelter. Although the ultimate cost to be incurred is uncertain, the Group's businesses estimate their costs using current restoration standards and techniques.

Close-down and restoration costs are provided for in the accounting period when the obligation arising from the related disturbance occurs, based on the net present value of the estimated future costs of restoration to be incurred during the life of the operation and post closure. Where appropriate, the provision is estimated using probability weighting of the different remediation and closure scenarios. The obligation may occur during development or during the production phase of a facility.

Provisions for close-down and restoration costs do not include any additional obligations which are expected to arise from future disturbance.

The costs are estimated on the basis of a closure plan, and are reviewed at each reporting period during the life of the operation to reflect known developments. The estimates are also subject to formal review, with appropriate external support, at regular intervals.

The initial close-down and restoration provision is capitalised within "Property, plant and equipment". Subsequent movements in the close-down and restoration provisions for ongoing operations, including those resulting from new disturbance related to expansions or other activities qualifying for capitalisation, updated cost estimates, changes to the estimated lives of operations, changes to the timing of closure activities and revisions to discount rates are also capitalised within "Property, plant and equipment". These costs are then depreciated over the lives of the assets to which they relate.

Changes in closure provisions relating to closed operations are charged/credited to "Net operating costs" in the income statement.

Where rehabilitation is conducted systematically over the life of the operation, rather than at the time of closure, provision is made for the estimated outstanding continuous rehabilitation work at each balance sheet date and the cost is charged to the income statement.

In determining the appropriate rate for discounting future cash flows for close-down, restoration and environmental obligations, we have considered recent years' market volatility and uncertainty together with the wide variety of timeframes to closure across our portfolio of assets. The Group discount rate is based on a long-term view of low-risk market yields which includes a review of historic trends plus risks and opportunities for which future cash flows have not been adjusted, namely potential improvements in closure practices between the reporting date and the point at which rehabilitation spend takes place. The Group applies a single discount rate when measuring these liabilities since we expect to meet closure cash flows principally from US dollar revenues and financing, with activities co-ordinated by the Group's central closure team. The amortisation or "unwinding" of the discount applied in establishing the provisions is charged to the income statement in each accounting period. The amortisation of the discount is shown within "Finance items" in the income statement.

In some cases, Group companies make a contribution to trust funds in order to meet or reimburse future environmental and decommissioning costs. Amounts due for reimbursement from trust funds are not offset against the corresponding closure provision unless payments into the fund have the effect of passing the closure obligation to the trust.

Environmental costs result from environmental damage that was not a necessary consequence of operations, and may include remediation, compensation and penalties. Provision is made for the estimated present value of such costs at the balance sheet date. These costs are charged to "Net operating costs", except for the unwinding of the discount which is shown within "Finance items".

Remediation procedures may commence soon after the time the disturbance, remediation process and estimated remediation costs become known, but can continue for many years depending on the nature of the disturbance and the remediation techniques used.

(m) Inventories (note 16)

Inventories are valued at the lower of cost and net realisable value, primarily on a weighted average cost basis. Third party production purchased for our own use that is ordinarily interchangeable in accordance with IAS 2 is valued on the same basis, jointly with our own production. Average costs are calculated by reference to the cost levels experienced in the relevant month together with those in opening inventory. The cost of raw materials and consumable stores is the purchase price. The cost of partly-processed and saleable products is generally the cost of production, including:

- Labour costs, materials and contractor expenses which are directly attributable to the extraction and processing of ore or the production of alumina and aluminium;
- The depreciation of mining properties and leases and of property, plant and equipment used in the extraction and processing of ore or the production of alumina and aluminium, copper and other refined products; and
- Production overheads.

Work in progress includes ore stockpiles and other partly processed material. Stockpiles represent ore that has been extracted and is available for further processing. If there is significant uncertainty as to if and/or when the stockpiled ore will be processed, the ore is expensed as mined. If the ore will not be processed within 12 months after the balance sheet date, it is included within non-current assets and net realisable value is calculated on a discounted cash flow basis. Quantities of stockpiled ore are assessed primarily through surveys and assays. Certain estimates, including expected metal recoveries, are calculated using available industry, engineering and scientific data, and are periodically reassessed taking into account technical analysis and historical performance.

(n) Taxation (note 9 and note 17)

Current tax is the tax expected to be payable on the taxable income for the year calculated using rates that have been enacted or substantively enacted at the balance sheet date. It includes adjustments for tax expected to be payable or recoverable in respect of previous periods. Where the amount of tax payable or recoverable is uncertain, Rio Tinto establishes provisions based on either: the Group's judgment of the most likely amount of the liability or recovery; or, when there is a wide range of possible outcomes, a probability weighted average approach.

Deferred tax is calculated in accordance with IAS 12. The Group provides for deferred tax in respect of fair value adjustments on acquisitions including mining rights that, in general, are not eligible for income tax allowances. Provision for deferred tax is based on the difference between the carrying value of the asset and its income tax base (which may be nil). Even when there is no income tax base, the existence of a tax base for capital gains tax purposes is not usually taken into account in determining the deferred tax provision for the assets, unless they are classified as held for sale or it is determined for other reasons that the carrying amount is expected to be recovered primarily through disposal and not through use of the assets. Where the recognition of an asset and liability from a single transaction gives rise to equal and off-setting temporary differences, Rio Tinto applies the Initial Recognition Exemption allowed by IAS 12, and consequently recognises neither a deferred tax asset nor a deferred tax liability in respect of these temporary differences. Primarily this occurs with new lease arrangements and changes in closure cost estimates for assets in operation. Under the amendment to IAS 12, deferred tax assets and liabilities will be required to be recognised in respect of such temporary differences (Refer to note 1 Standards issued, but not yet effective on page 221).

(o) Post-employment benefits (note 42)

The Group operates a number of defined benefit plans which provide lump sums, pensions, medical benefits and life insurance to retirees. In accordance with IAS 19 "Employee Benefits", for post-employment defined benefit plans, the difference between the fair value of any plan assets and the present value of the plan obligations is recognised as an asset or liability in the balance sheet.

Where appropriate, the recognition of assets may be restricted to the present value of any amounts the Group expects to recover by way of refunds from the plan or reductions in future contributions. In determining the extent to which a refund will be available the Group considers whether any third party, such as a trustee or pension committee, has the power to enhance benefits or to wind up a pension plan without the Group's consent.

The most significant assumptions used in accounting for pension plans are the discount rate, the inflation rate and mortality rates. The discount rate is used to determine the net present value of the obligations, the interest cost on the obligations and the interest income on plan assets. The discount rate used is the yield on high-quality corporate bonds with maturities and terms that match those of the post-employment obligations as closely as possible. Where there is no developed corporate bond market in a currency, the rate on government bonds is used. The inflation rate is used to project increases in future benefit payments for those plans that have benefits linked to inflation. The mortality rates are used to project the period over which benefits will be paid, which is then discounted to arrive at the net present value of the obligations.

The current service cost, any past service cost and the effect of any curtailment or settlements are recognised in the income statement. The interest cost less interest income on assets held in the plans is also charged to the income statement. All amounts charged to the income statement in respect of these plans are included within "Net operating costs" or in "Share of profit after tax of equity accounted units", as appropriate.

The Group's contributions to defined contribution plans are charged to the income statement in the period to which the contributions relate. These are included within "Net operating costs" or in "Share of profit after tax of equity accounted units", as appropriate.

(p) Cash and cash equivalents (note 20)

For the purpose of the balance sheet, cash and cash equivalents comprise: cash on hand, deposits held with banks, and short-term, highly liquid investments (mainly money market funds) that are readily convertible into known amounts of cash and which are subject to insignificant risk of changes in value. Bank overdrafts are shown as current liabilities in the balance sheet.

Further detail on cash and cash equivalents, including restricted cash, is shown in note 20.

For the purposes of the cash flow statement, cash and cash equivalents are net of bank overdrafts that are repayable on demand.

(q) Financial instruments (note 29)

(i) Financial assets

Classification and measurement

The Group classifies its financial assets into the following categories: those to be measured subsequently at fair value (either through other comprehensive income (FVOCI) or through profit or loss (FVPL)) and those to be held at amortised cost.

Notes to the 2021 financial statements

1 Principal accounting policies continued

Classification depends on the business model for managing the financial assets and the contractual terms of the cash flows.

Management determines the classification of financial assets at initial recognition. The Group's policy with regard to financial risk management is set out in note 29. Generally, the Group does not acquire financial assets for the purpose of selling in the short term.

The Group's business model is primarily that of "hold to collect" (where assets are held in order to collect contractual cash flows). When the Group enters into derivative contracts, these transactions are designed to reduce exposures relating to assets and liabilities, firm commitments or anticipated transactions.

(a) Financial assets held at amortised cost

This classification applies to debt instruments which are held under a hold to collect business model and which have cash flows that meet the solely payments of principal and interest ("SPPI") criteria.

At initial recognition, trade receivables that do not have a significant financing component are recognised at their transaction price. Other financial assets are initially recognised at fair value plus related transaction costs; they are subsequently measured at amortised cost using the effective interest method. Any gain or loss on de-recognition or modification of a financial asset held at amortised cost is recognised in the income statement.

(b) Financial assets held at fair value through other comprehensive income (FVOCI)

This classification applies to the following financial assets:

– Debt instruments that are held under a business model where they are held for the collection of contractual cash flows and also for sale ("collect and sell") and which have cash flows that meet the SPPI criteria. An example would be where trade receivable invoices for certain customers were factored from time to time.

  All movements in the fair value of these financial assets are taken through other comprehensive income, except for the recognition of impairment gains or losses, interest revenue (including transaction costs by applying the effective interest method), gains or losses arising on de-recognition and foreign exchange gains and losses which are recognised in the income statement. When the financial asset is derecognised, the cumulative fair value gain or loss previously recognised in other comprehensive income is reclassified to the income statement.

– Equity investments where the Group has irrevocably elected to present fair value gains and losses on revaluation in other comprehensive income. The election can be made for each individual investment; however it is not applicable to equity investments held for trading.

  Fair value gains or losses on revaluation of such equity investments, including any foreign exchange component, are recognised in other comprehensive income. When the equity investment is derecognised, there is no reclassification of fair value gains or losses previously recognised in other comprehensive income to the income statement. Dividends are recognised in the income statement when the right to receive payment is established.

(c) Financial assets held at fair value through profit or loss (FVPL)

This classification applies to the following financial assets. In all cases, transaction costs are immediately expensed to the income statement.

– Debt instruments that do not meet the criteria of amortised cost or fair value through other comprehensive income. The Group has a significant proportion of trade receivables with embedded derivatives for provisional pricing. These receivables are generally held to collect but do not meet the SPPI criteria and as a result must be held at FVPL. Subsequent fair value gains or losses are taken to the income statement. In addition, trade receivable invoices for certain customers which are routinely factored, in order to address credit risk and support value delivery through timelier realisation, are held at FVPL.

– Equity investments which are held for trading or where the FVOCI election has not been applied. All fair value gains or losses and related dividend income are recognised in the income statement.

– Derivatives which are not designated as a hedging instrument. All subsequent fair value gains or losses are recognised in the income statement.

(ii) Financial liabilities

Borrowings and other financial liabilities (including trade payables but excluding derivative liabilities) are recognised initially at fair value, net of transaction costs incurred, and are subsequently measured at amortised cost.

The Group participates in supply chain finance arrangements whereby vendors may elect to receive early payment of their invoice from a third-party bank by factoring their receivable from Rio Tinto. These arrangements do not modify the terms of the original liability with respect to either counterparty terms, settlement date or amount due. Utilisation of the early settlement facility is voluntary and at the vendors' discretion on an invoice-by-invoice basis. Financial liabilities subject to supply chain finance therefore continue to be classified as trade payables. At 31 December 2021, trade payables included US$782 million (2020: US$551 million) subject to early settlement election by vendors.

When the basis for determining the contractual cash flows of a financial liability measured at amortised cost change as a result of interest rate benchmark reform, the Group updates the effective interest rate of the financial liability to reflect the change that is required by the reform (refer to page 220). A change in the basis for determining the contractual cash flows is required by interest rate benchmark reform if the following conditions are met:

– the change is necessary as a direct consequence of the reform; and

– the new basis for determining the contractual cash flows is economically equivalent to the previous basis – i.e. the basis immediately before the change.

When changes are made to a financial liability in addition to changes to the basis for determining the contractual cash flows required by interest rate benchmark reform, the Group first updates the effective interest rate of the financial liability to reflect the change that is required by interest rate benchmark reform. After that, the Group applies the policies on accounting for modifications to the additional changes.

(iii) Impairment of financial assets

A forward-looking expected credit loss (ECL) review is required for: debt instruments measured at amortised cost or held at fair value through other comprehensive income; loan commitments and financial guarantees not measured at fair value through profit or loss; lease receivables; and trade receivables that give rise to an unconditional right to consideration.

As permitted by IFRS 9, the Group applies the "simplified approach" to trade receivable balances and receivables relating to net investment in finance leases and the "general approach" to all other financial assets. The general approach incorporates a review for any significant increase in counterparty credit risk since inception. The ECL reviews include assumptions about the risk of default and expected loss rates. For trade receivables and receivables relating to net investment in finance leases, the assessment takes into account the use of credit enhancements, for example, letters of credit. Impairments for undrawn loan commitments are reflected as a provision.

(iv) Derivatives and hedge accounting

The Group applies the hedge accounting requirements under IFRS 9 and its hedging activities are discussed in note 29 with movements on hedging reserves disclosed in note 28. Where applicable, the Group may defer the costs of hedging including currency basis spreads, forward points and the time value of options.

Phase 1 amendments related to IBOR reform adopted in prior periods allowed temporary relief from applying specific hedge accounting requirements to hedging arrangements directly impacted by the reform. Application of the temporary reliefs mean that IBOR reform does not result in termination of hedging relationships referencing an IBOR during the anticipated period of IBOR-related uncertainty. The principal relief which the Group has applied to its hedging portfolio is in the assumption that US LIBOR remains a separately identifiable component for the duration of the hedge; and the US LIBOR rates referenced by fixed-to-floating rate swaps in fair value hedge relationships do not change as the result of IBOR reform, preserving the economic relationship and allowing the related hedges to remain effective (refer to note 29 A (b) (v)). When the basis for determining the contractual cash flows of the hedged item or hedging instrument changes as a result of IBOR reform and therefore there is no longer uncertainty arising about the cash flows of the hedged item or the hedging instrument, the Group amends the hedge documentation of that hedging relationship to reflect the change(s) required by IBOR reform. These amendments in the formal hedge documentation do not constitute the discontinuation of the hedging relationship or the designation of a new hedging relationship, as prescribed by the reliefs of Phase 2 of the reform (refer to page 220).

(r) Share-based payment (note 41)

The fair value of the Group's share plans is recognised as an expense over the expected vesting period with an offset to retained earnings for Rio Tinto plc plans and to other reserves for Rio Tinto Limited plans.

The Group uses fair values provided by independent actuaries calculated using either a lattice-based option valuation model or a Monte Carlo simulation model.

The terms of each plan are considered at the balance sheet date to determine whether the plan should be accounted for as equity-settled or cash-settled. The Group does not operate any plans as cash-settled. However, the Performance Share Plan can, at the discretion of the directors, offer employees an equivalent amount in cash. This is not standard practice. In some jurisdictions, employees are granted cash-settled awards where equity-settled awards are prohibited by local laws and regulations. The value of these awards is immaterial.

The Group's equity-settled share plans are settled either by: the issuance of shares by the relevant parent company; the purchase of shares on market; or the use of shares held in treasury which were previously acquired as part of a share buy-back. If the cost of shares acquired to satisfy the plans differs from the expense charged, the difference is taken to retained earnings or other reserves, as appropriate.

(s) Share capital (notes 26 and 27)

Ordinary shares are classified as equity. Incremental costs directly attributable to the issuance of new shares are shown in equity as a deduction, net of tax, from the proceeds.

Where any Group company purchases the Group's equity share capital (treasury shares), the consideration paid, including any directly attributable incremental costs (net of income taxes) is deducted from equity attributable to owners of Rio Tinto. Where such shares are subsequently reissued, any consideration received, net of any directly attributable incremental costs and the related income tax effects, is included in equity attributable to owners of Rio Tinto. If purchased Rio Tinto plc shares are cancelled, an amount equal to the nominal value of the cancelled share is credited to the capital redemption reserve.

(t) Segment reporting (notes 2 and 3)

Operating segments are reported in a manner consistent with the internal reporting provided to the chief operating decision maker (CODM). The Group considers that Rio Tinto's Chief Executive is the CODM, who is responsible for allocating resources and assessing performance of the operating segments.

Critical accounting policies and estimates

(i) Determination of CGUs, assessment of indicators of impairment, review of asset carrying values, impairment charges and reversals and the recoverability of goodwill (notes 6, 12 and 13)

Impairment is assessed at the cash-generating unit (CGU) level. A CGU is the smallest identifiable asset or group of assets that generates independent cash inflows. Judgment is applied to identify the Group's CGUs, particularly when assets belong to integrated operations, and changes in CGUs could impact impairment charges and reversals. The most significant examples of this judgment are: in 2021, the continued grouping of Rio Tinto Fer et Titane in Quebec, Canada and QIT Madagascar Minerals (QMM) into a single CGU on the basis that they are vertically integrated operations with no active market for ilmenite; and in 2019, disaggregation of the Weipa bauxite mine and the downstream Gladstone alumina refineries (Yarwun and QAL) in Queensland, Australia into three separate CGUs on the basis of the ramp-up of the Amrun expansion at Weipa which increased bauxite exports such that the mine is now considered to generate largely independent cash inflows. Prior to 2019, the Weipa mine and Gladstone refineries were grouped into a single CGU. Management reviews these judgments on an annual basis as part of the annual internal review of asset values as described in note (i) above.

External and internal factors are monitored for indicators of impairment and include an annual internal review of asset values as described in note (i) above. Judgment is required to determine whether the impact of adverse spot commodity price movements is significant and structural in nature. There were no material instances of this judgment resulting in an indicator of impairment as at 31 December 2021.

Notes to the 2021 financial statements

1 Principal accounting policies continued

Generally, discounted cash flow models are used to determine the recoverable amount of CGUs. In this case, significant judgment is required to determine the appropriate estimates and assumptions used and there is significant estimation uncertainty. In particular, for fair value less costs of disposal valuations, judgment is required to determine the estimates a market participant would use. The discounted cash flow model is most sensitive to the following estimates: the timing of project expansions; the cost to complete assets under construction; long-term commodity prices; production timing and recovery rates; exchange rates; operating costs; reserve and resource estimates; closure costs; discount rates; allocation of long-term contract revenues between CGUs; and, in some instances, the renewal of mining licences. Some of these variables are unique to an individual CGU. Future changes in these variables may differ from management's expectations and may materially alter the recoverable amounts of the CGUs.

Note (i) above also describes the Group's methodology for estimating long-term commodity prices, exchange rates and discount rates for impairment testing purposes. Note 6 outlines the significant judgments, assumptions and sensitivities made for both measuring the impairments recorded and for determining whether reversal of part or all of a previous impairment was appropriate. Judgments, assumptions and sensitivities in relation to the testing of CGUs containing goodwill and indefinite-lived intangible assets are outlined in notes 12 and 13 respectively.

(ii) Estimation of asset lives

Intangible assets are considered to have indefinite lives (and therefore no related depreciation or amortisation charge) if, in the Group's judgment, there is no foreseeable limit to the period over which the asset is expected to generate cash flows. Factors that are considered in making this judgment include the existence of contractual rights for unlimited terms or evidence that renewal of the contractual rights without significant incremental costs can be expected for indefinite periods into the future in view of the Group's investment intentions. The most significant assessment of indefinite life applicable to intangible assets relates to contract based water rights in Canada acquired with Alcan, described further in note 13.

The useful lives of the major assets of a CGU are often dependent on the life of the orebody to which they relate. The life of the orebody will be determined on the basis of the life-of-mine plan which is based on the estimates of ore reserves as described on page 353.

The Group expects to spend an estimated US$7.5 billion between 2022 and 2030 on projects to lower carbon emissions from the Group's operations. This includes the replacement of diesel engines in heavy mobile equipment with electric power and investment in renewable power generating assets. The remaining useful economic life for fossil fuel powered assets is monitored closely for indicators of technological obsolescence, however in many instances the requirement for fossil fuel powered back-up means that early retirement of the assets is not practical (refer to note 14).

(iii) Close-down, restoration and environmental obligations (note 25)

Provision is made for close-down, restoration and environmental costs when the obligation occurs, based on the net present value of estimated future costs required to satisfy the obligation. Management uses its judgment and experience to determine the potential scope of closure rehabilitation work required to meet the Group's legal, statutory and constructive obligations, and any other commitments made to stakeholders, and the options and techniques available to meet those obligations and estimate the associated costs and the likely timing of those costs. Significant judgment is also required to determine both the costs associated with that work and the other assumptions used to calculate the provision. External experts support the cost estimation process where appropriate but there remains significant estimation uncertainty.

The key judgment in applying this accounting policy is determining when an estimate is sufficiently reliable to make or adjust a closure provision.

Closure provisions are not made for those operations that have no known restrictions on their lives as the closure dates cannot be reliably estimated. This applies primarily to certain Canadian smelters which have indefinite-lived water rights or power agreements for renewable power sources with local governments.

Cost estimates are updated throughout the life of the operation; generally cost estimates must comply with the Group's Capital Project Framework once the operation is ten years from expected closure. This means, for example, that where an Order of Magnitude (OoM) study is required for closure it must be of the same standard as an OoM study for a new mine, smelter or refinery. As at 31 December 2021, there are 13 operations with remaining lives of under ten years before taking into account unapproved extensions. The largest reforecast currently underway is at Energy Resources of Australia; preliminary information available from this study resulted in an increase to closure liabilities for the Ranger Uranium mine of US$510 million at 31 December 2021.

Adjustments are made to provisions when the range of possible outcomes becomes sufficiently narrow to permit reliable estimation. Depending on the materiality of the change, adjustments may require review and endorsement by the Group's Closure Steering Committee before the provision is updated.

In some cases, the closure study may indicate that monitoring and, potentially, remediation will be required indefinitely - for example ground water treatment. In these cases the underlying cash flows for the provision may be restricted to a period for which the costs can be reliably estimated, which on average is around 30 years. Where an alternative commercial arrangement to meet our obligations can be predicted with confidence, this period may be shorter.

The most significant assumptions and estimates used in calculating the provision are:

- Closure timeframes. The weighted average remaining lives of operations is shown in note 25. Some expenditure may be incurred before closure whilst the operation as a whole is in production.
- The length of any post-closure monitoring period. This will depend on the specific site requirements and the availability of alternative commercial arrangements; some expenditure can continue into perpetuity. The Rio Tinto Kennecott closure and environmental remediation provision includes an allowance for ongoing monitoring and remediation costs, including ground water treatment, of approximately US$0.6 billion.
- The probability weighting of possible closure scenarios. The most significant impact of probability weighting is at the Pilbara

operations (Iron Ore) relating to infrastructure and incorporates the expectation that some infrastructure will be retained by the relevant State authorities post closure. The assignment of probabilities to this scenario reduces the closure provision by US$1.2 billion.

- Appropriate sources on which to base the calculation of the discount rate. On 30 September 2020, management reviewed the rate used for discounting provisions and reduced the discount rate by 0.5% with no further changes required in 2021. The discount rate by nature is subjective and therefore sensitivities are shown in note 25 for how the provision balance, which at 31 December 2021 was US$14.5 billion, would change if discounted at alternative discount rates were applied.

There is significant estimation uncertainty in the calculation of the provision and cost estimates can vary in response to many factors including:

- Changes to the relevant legal or local/national government requirements and any other commitments made to stakeholders;
- Review of remediation and relinquishment options;
- Additional remediation requirements identified during the rehabilitation;
- The emergence of new restoration techniques;
- Precipitation rates and climate change;
- Change in the expected closure date; and
- Change in the discount rate;

Experience gained at other mine or production sites may also change expected methods or costs of closure, although elements of the restoration and rehabilitation of each site are relatively unique to a site. Generally, there is relatively limited restoration and rehabilitation activity and historical precedent elsewhere in the Group, or in the industry as a whole, against which to benchmark cost estimates.

The expected timing of expenditure can also change for other reasons, for example because of changes to expectations around ore reserves and mineral resources, production rates, renewal of operating licences or economic conditions.

As noted in note (l) above, changes in closure and restoration provisions for ongoing operations are usually capitalised and therefore will impact assets and liabilities but have no impact on profit or loss at the time the change is made. However, these changes will impact depreciation and the unwind of discount in future years. Changes in closure estimates at the Group's ongoing operations could result in a material adjustment to assets and liabilities in the next 12 months.

Changes to closure cost estimates for closed operations, and changes to environmental cost estimates at any operation, would impact profit or loss; however, the Group does not consider that there is significant risk of a change in estimates for these liabilities causing a material adjustment to profit or loss in the next 12 months. Any new environmental incidents may require a material provision but cannot be predicted.

Project specific risks are embedded within the cash flows which are based on a central case estimate of closure activities assuming that the obligation is fulfilled by the Group. These cash flows are then discounted using a discount rate specific to the class of obligations. The selection of appropriate sources on which to base the calculation of the discount rate requires judgment. The 1.5% real rate currently used by the Group is based on a number of inputs including observable historical yields on 30 year US Treasury Inflation Protected Securities (TIPS), and consideration of findings by independent valuation experts.

(iv) Deferral of stripping costs (note 14)

Stripping of waste materials takes place throughout the production phase of a surface mine or pit. The identification of components within a mine and of the life of component strip ratios requires judgment and is dependent on an individual mine's design and the estimates inherent within that. Changes to that design may introduce new components and/or change the life of component strip ratios. Changes in other technical or economic parameters that impact ore reserves may also have an impact on the life of component strip ratios, even if they do not affect the mine's design. Changes to the life of component strip ratios are accounted for prospectively.

The Group's judgment as to whether multiple pit mines are considered separate or integrated operations determines whether initial stripping of a pit is deemed to be pre-production or production phase stripping and, therefore, the amortisation base for those costs. The analysis depends on each mine's specific circumstances and requires judgment: another mining company could make a different judgment even when the fact pattern appears to be similar.

(v) Uncertain tax positions

The Group operates across a large number of jurisdictions and is subject to periodic challenges by local tax authorities on a range of tax matters during the normal course of business, including transfer pricing, indirect taxes and transaction related issues.

Uncertain tax provisions include the related interest and penalties for all matters worldwide based on the Group's judgment of the most likely amount of the liability or recovery; or, when there is a wide range of possible outcomes, a probability weighted average approach. The most significant judgments are in relation to transfer pricing matters. Whilst the potential outcomes are highly variable our current expectation is that there will be no material change to the amounts provided in the 12 months from 31 December 2021.

(vi) Recoverability of potential deferred tax assets (note 17)

The Group has tax losses and other deductible temporary differences, mainly in Australian, Canadian, US and Mongolian taxable entities, that have the potential to reduce tax payments in future years. Deferred tax assets have been recognised to the extent that their recovery is probable, having regard to the availability of sufficient taxable temporary differences relating to the same taxation authority and the same taxable entity, the estimates of projected future taxable income of these taxable entities and after taking account of specific risk factors that are expected to affect the recovery of these assets including the risk of expiry of losses. Further information on deferred tax assets is given in note 17.

In addition to the risk of expiry of losses, the projections on which recovery of tax losses are based are subject to the same estimation uncertainty as noted in (i) above in relation to impairment. The key judgment in the application of this accounting policy is the recognition of deferred tax assets for losses where the operation is not currently profitable for tax purposes.

Notes to the 2021 financial statements

1 Principal accounting policies continued

(vii) Provision for onerous contracts

Provision for an onerous contract is made only when the assets dedicated to that contract are fully impaired or the contract becomes stranded as a result of a business decision. Judgment is required in determining which assets are considered dedicated to a contract when there is optionality as to how the contract obligations can be settled. Key estimates are the cash flows associated with the contract and the discount rate assumption. The Group completed the disposal of its remaining coking coal assets in 2018 and has retained the onerous provisions made in past periods for rail infrastructure "take or pay" contracts which were considered stranded. As at 31 December 2021, the balance of the provision was US$172 million (2020: US$219 million). At 31 December 2021, the Group's investment in the Escondida Joint Venture included US$118 million share of provision relating to contractual payments under a power purchase agreement which became stranded in 2019 and was judged to be onerous upon early cancellation in favour of renewable energy sources.

(viii) Identification of functional currencies

The functional currency for each subsidiary, unincorporated arrangement, joint operation and equity accounted unit, is the currency of the primary economic environment in which it operates. Determination of functional currency involves significant judgment and other companies may make different judgments based on similar facts. For many of Rio Tinto's businesses, their functional currency is the currency of the country in which they operate. The Group reconsiders the functional currency of its businesses if there is a change in the underlying transactions, events or conditions which determine their primary economic environment.

The determination of functional currency is a key judgment which affects the measurement of non-current assets included in the balance sheet and, as a consequence, the depreciation and amortisation of those assets included in the income statement. It also impacts exchange gains and losses included in the income statement and in equity. The Group applies judgment in determining whether settlement of certain intragroup loans is neither planned nor likely in the foreseeable future and therefore whether the associated exchange gains and losses can be taken to equity. During 2021, A$14 billion of intragroup loans continued to meet these criteria; associated exchange gains and losses are taken to equity.

(ix) Basis of consolidation (notes 32-35)

Judgment is sometimes required to determine whether after considering all relevant factors, the Group has control, joint control or significant influence over an entity or arrangement. Significant influence includes situations of collective control (see note 35 (a)). Other companies may make different judgments regarding the same entity or arrangement. The most significant instance of such a judgment by the Group is in the determination that Escondida is a joint venture, based on the nature of significant commercial decisions, including capital expenditure, which require approval by both Rio Tinto and its partner BHP. In contrast our partner has assessed Rio Tinto's rights as protective and concluded that it controls Escondida through its rights to direct relevant activities. Adoption of the equivalent judgment by the Group would result in reclassification of Escondida from a joint venture to an associate, with no other financial reporting consequence since accounting under the equity method would remain in place.

(x) Contingencies (note 30)

Disclosure is made of material contingent liabilities unless the possibility of any loss arising is considered remote based on the Group's judgment and legal advice. Contingent liabilities are quantified unless, in the Group's judgment, the amount cannot be reliably estimated.

The unit of account for claims is the matter taken as a whole and therefore when a provision has been recorded for the best estimate of the cost to settle the obligation there is no further contingent liability component. This means that when a provision is recognised for the best estimate of the expenditure required to settle the present obligation from a single past event, a further contingent liability is not reported for the maximum potential exposure in excess of that already provided. We also consider the requirements of IAS 1 and provide disclosure when there is a significant risk the value of assets or liabilities could materially change within the next 12 months.

(xi) Exclusions from underlying earnings (note 2)

As set out in note 2 on page 239, certain items are excluded from net earnings/(loss) in arriving at underlying earnings in each period irrespective of materiality. In addition, there is a final judgmental category which includes, where applicable, other credits and charges that, individually or in aggregate if of a similar type, are of a nature or size to require exclusion in order to provide additional insight into underlying business performance. The specific items for the years ended 2021, 2020 and 2019 to which exclusions apply are presented in note 2 on page 240.

The exclusion of closure estimates at Energy Resources of Australia and Gove Refinery were due to the magnitude of the individual updates and materiality when aggregated. This was the only application of the judgemental category in 2021.

(xii) Funding of Oyu Tolgoi

As described in note 32(l), Turquoise Hill, a 50.8% subsidiary of Rio Tinto, has funded common share investments in Oyu Tolgoi on behalf of Erdenes Oyu Tolgoi LLC ("Erdenes"), a company controlled by the Mongolian government, which owns the 34% non-controlling interest in Oyu Tolgoi not owned by Turquoise Hill. Funded amounts earn interest at an annual effective rate of LIBOR plus 6.5% and are repayable via a pledge over Erdenes' share of future Oyu Tolgoi common share dividends; Erdenes also has the right to reduce the outstanding balance by making payments directly to Turquoise Hill.

These funding balances, including accrued interest, are expected to be recovered through the pledge over Erdenes' share of dividends from or sale by Erdenes of its interest in Oyu Tolgoi. The formal funding arrangement is with the non-controlling shareholder (Erdenes) in a partially owned subsidiary (Oyu Tolgoi). After considering these facts together with Erdenes' discretionary rights to repayment and the most probable method of eventual settlement, being the pledge over Erdenes dividends, we concluded that the funding balances and interest owing from Erdenes do not result in assets or income in the Group Financial Statements, representing instead a series of transactions with a non-controlling shareholder in a subsidiary. This results in an increase to the effective interest, in Oyu Tolgoi, attributable to owners of Rio Tinto while the funding balances and interest owing from Erdenes remain outstanding. Related amounts are therefore recorded as a reduction to the net carrying value of non-controlling interests with a change in equity interest between Rio Tinto and non-controlling interests in the Group Statement of Changes in Equity for the Group's share of interest accrued on funding balances owing from Erdenes to Turquoise Hill in the period.

All cash flows relating to this funding take place between Group companies and therefore eliminate upon consolidation. As such these transactions, including the recording of interest within equity, do not result in any changes to Group cash flows, or separate presentation of cash inflows and outflows relating to common share investment in Oyu Tolgoi by either Turquoise Hill or Erdenes in the Group Cash Flow Statement

On 25 January 2022, the funding balances and interest owing from Erdenes were waived in full; refer to note 45.

(xiii) Pilbara Iron Arrangements

The arrangements described in note 33 (c) to the accounts permit each of the partners to the joint operation to request the other to construct assets on their tenure to increase the capacity of the rail and port infrastructure network. The requesting partner's (Asset User's) share of the capacity of the network will increase by the capacity of the newly constructed asset but, generally, that capacity may be provided from any of the network assets. The Asset User will pay an annual charge (Committed Use Charge – "CUC") over a contractually specified period irrespective of usage of the network. The constructing partner (Asset Owner) has an ongoing obligation to make available capacity from those assets and to maintain the assets in good working order as required under relevant State Agreements and associated tenure.

The Group considered whether the CUC arrangements give rise to a lease between the Asset Owner and the Asset User. The conclusion that they do not is because there is no specified asset; rather the Asset User has a first priority right to the capacity in the CUC asset. This treatment was grandfathered on adoption of IFRS 16 on 1 January 2019, following assessment under the preceding standards IAS 17 "Leases" and IFRIC 4 "Determining whether an arrangement contains a lease", with no change to the conclusion under IFRS 16 for subsequent expenditure subject to the existing CUC arrangements. Management considers that these arrangements are unique and has used judgment to apply the principles of IFRS to the accounting for the arrangements as described above. The obligation of the Asset Owner to make capacity available is fulfilled over time and not at a point in time. The CUC arrangement is therefore an executory contract as defined under IAS 37, whereby neither party has performed any of its obligations, or both parties have partially performed their obligations to an equal extent, and so the CUC payments are expensed as incurred. An alternative interpretation of the fact pattern could have resulted in a gross presentation in the Group's balance sheet with an asset and a corresponding liability to reflect the present value of the CUC payments. The Asset User is a wholly owned subsidiary of Rio Tinto, whereas the Asset Owner is a joint operation. This impact would be some US$1.4 billion (calculated on the basis of grossing up the tax written down value of the CUC assets). Other methods of calculating the gross up might give rise to different numbers.

(xiv) Estimation of obligations for post-employment costs (note 42)

The value of the Group's obligations for post-employment benefits is dependent on the amount of benefits that are expected to be paid out, discounted to the balance sheet date. The discount rate is a key assumption and is based upon the yields on high quality corporate bonds in the relevant currency which have durations consistent with the term of the obligations. The discount rate will vary from one period to another in line with movements in corporate bond yields, but at any given measurement date there is relatively little estimation uncertainty. This rate is also used to calculate the interest cost on obligations and interest income on plan assets.

The following key assumptions are used to calculate the estimated benefit: future pay increases to be received by members of final pay plans, the level of inflation (for those benefits that are subject to some form of inflation protection), current mortality rates and future improvements in mortality rates. The assumption regarding future inflation is based on market yields on inflation linked instruments, where possible, combined with consensus views. The Group reviews the actual mortality rates of retirees in its major pension plans on a regular basis and uses these rates to set its current mortality assumptions. It also uses its judgment with respect to allowances for future improvements in longevity having regard to standard improvement scales in each relevant country and after taking external actuarial advice.

Most of the Group's defined benefit pension plans are closed to new entrants and the majority of the obligations relate to former employees. The carrying value of the Group's post-employment obligations is therefore less sensitive to assumptions about future salary increases than it is to assumptions regarding future inflation.

Details of the key assumptions, how they have moved since the previous balance sheet date and the sensitivity of the carrying value to changes in the assumptions are set out in note 42.

Notes to the 2021 financial statements

2 Operating segments

Rio Tinto's management structure is based on the principal product groups (PG) together with global support functions whose leaders make up the Executive Committee. The Executive Committee members each report directly to the Chief Executive of Rio Tinto who is the chief operating decision maker (CODM) and is responsible for allocating resources and assessing performance of the operating segments. The CODM monitors the performance of each product group based on a number of measures, including underlying earnings, underlying EBITDA, capital expenditure, net cash generated from operating activities and Free cash flow. Our primary measure of profit is underlying EBITDA. Finance costs and net debt are managed on a group-wide basis and are therefore excluded from the segmental results.

The Group's reportable segments are based on principal product groups and are consistent with the internal reporting structure as at 31 December 2021. Business units (BUs) are allocated to PGs based on management structure. The reportable segments are described as follows:

Reportable segment	Principal activities
Iron Ore	Iron ore mining and salt and gypsum production in Western Australia.
Aluminium	Bauxite mining; alumina refining; aluminium smelting.
Copper	Mining and refining of copper, gold, silver, molybdenum and other by-products; exploration activities together with the Simandou iron ore project, which is the responsibility of the Copper product group chief executive.
Minerals	Includes businesses with products such as borates, titanium dioxide feedstock together with the Iron Ore Company of Canada (iron ore mining and iron concentrate/pellet production). Also includes diamond mining, sorting and marketing.

The Group's reportable segments have been recast in accordance with the organisational restructure announced on 28 January 2021.The main impacts are as follows: Simandou has moved from the previous Energy & Minerals product group to the Copper product group; Uranium has moved from the previous Energy & Minerals product group to Other Operations; Diamonds has moved from the previous Copper & Diamonds product group to the Minerals product group; the Minerals product group retains the Argyle Residual operations and from 1 January 2021, Argyle Closure has moved to Other Operations. Argyle Residual operations includes activity relating to the sale of remaining diamond inventory and property held. Argyle Closure includes activity relating to the management and execution of the Argyle mine closure obligations and management of entities with interests in state and traditional owner agreements and licences. As a result of these changes, the Copper & Diamonds segment is renamed Copper and the Energy & Minerals segment is renamed Minerals from 2021. Other Operations, which also include our 100% interest in the Gove alumina refinery (in closure), Rio Tinto Marine, and the remaining legacy liabilities of Rio Tinto Coal Australia are separately shown from the above reportable segments as none of these operations met the quantitative thresholds to be reportable segments.

The financial information by business unit provided on pages 318 to 320 of these financial statements provides additional voluntary disclosure which the Group considers useful to the users of the financial statements.

Year ended 31 December 2021	Gross product sales[b] US$m	Underlying EBITDA[c] US$m	Underlying earnings[d] US$m	Capital expenditure[e] US$m	Depreciation and amortisation[f] US$m
Iron Ore	39,582	27,592	17,323	3,947	2,023
Aluminium	12,695	4,382	2,468	1,372	1,289
Copper	7,827	3,969	1,579	1,548	1,103
Minerals	6,481	2,603	888	644	474
Reportable segments total	66,585	38,546	22,258	7,511	4,889
Other Operations	251	(28)	(84)	(11)	199
Inter-segment transactions	(268)	42	19		
Product group total	66,568	38,560	22,193	7,500	5,088
Other items				117	106
Share of equity accounted units[a]	(3,073)			(294)	(497)
Proceeds from disposal of property, plant and equipment				61	
Central pension costs, share-based payments & insurance & derivatives		110	133		
Restructuring, project and one-off costs		(80)	(51)		
Central costs		(613)	(585)		
Central exploration and evaluation		(257)	(215)		
Net interest			(95)		
Consolidated sales revenue/Capital expenditure/Depreciation and amortisation[g]	63,495			7,384	4,697
Underlying EBITDA/Underlying earnings		37,720	21,380		

Year ended 31 December 2020	Gross product sales[b] US$m	Underlying EBITDA[c] US$m	Underlying earnings[d] US$m	Capital expenditure[e] US$m	Depreciation and amortisation[f] US$m
Iron Ore	27,508	18,837	11,398	2,941	1,838
Aluminium	9,314	2,152	471	1,085	1,191
Copper (adjusted)	4,969	2,084	754	1,837	1,093
Minerals (adjusted)	5,170	1,710	580	455	452
Reportable segments total	46,961	24,783	13,203	6,318	4,574
Other Operations (adjusted)	321	24	(48)	2	199
Inter-segment transactions	(264)	(94)	(32)		
Product group total	47,018	24,713	13,123	6,320	4,773
Other items				79	82
Share of equity accounted units[a]	(2,407)			(255)	(576)
Proceeds from disposal of property, plant and equipment				45	
Central pension costs, share-based payments & insurance & derivatives		117	118		
Restructuring, project and one-off costs		(133)	(108)		
Central costs		(545)	(455)		
Central exploration and evaluation		(250)	(216)		
Net interest			(14)		
Consolidated sales revenue/Capital expenditure/Depreciation and amortisation[g]	44,611			6,189	4,279
Underlying EBITDA/Underlying earnings		23,902	12,448		

Year ended 31 December 2019	Gross product sales[b] US$m	Underlying EBITDA[c] US$m	Underlying earnings[d] US$m	Capital expenditure[e] US$m	Depreciation and amortisation[f] US$m
Iron Ore	24,075	16,098	9,638	1,741	1,723
Aluminium	10,340	2,285	599	1,456	1,312
Copper (adjusted)	5,196	1,918	575	2,048	1,176
Minerals (adjusted)	5,394	1,862	565	585	569
Reportable segments total	45,005	22,163	11,377	5,830	4,780
Other Operations (adjusted)	393	(22)	(64)	1	180
Inter-segment transactions	(31)	(9)	(3)		
Product group total	45,367	22,132	11,310	5,831	4,960
Other items				64	77
Share of equity accounted units[a]	(2,202)			(456)	(653)
Proceeds from disposal of property, plant and equipment				49	
Central pension costs, share-based payments & insurance & derivatives		59	60		
Restructuring, project and one-off costs		(183)	(94)		
Central costs		(496)	(550)		
Central exploration and evaluation		(315)	(231)		
Net interest			(122)		
Consolidated sales revenue/Capital expenditure/Depreciation and amortisation[g]	43,165			5,488	4,384
Underlying EBITDA/Underlying earnings		21,197	10,373		

(a) For Gross product sales - share of equity accounted units also includes adjustments for intra-subsidiary/equity accounted units sales.

(b) Gross product sales includes the Group's proportionate share of product sales by equity accounted units (after adjusting for sales to subsidiaries) of US$3,117 million (2020: US$2,441 million; 2019: US$2,234 million) which are not included in consolidated sales revenue. Consolidated sales revenue includes subsidiary sales of US$44 million (2020: US$34 million; 2019: US$32 million) to equity accounted units which are not included in gross product sales.

(c) Underlying EBITDA represents profit before tax, net finance items, depreciation and amortisation excluding the EBITDA impact of the same items that are excluded in arriving at underlying earnings (as defined below). The reconciliation of underlying EBITDA to profit before taxation can be found on page 240.

(d) Underlying earnings represent net earnings attributable to the owners of Rio Tinto, adjusted to exclude items which do not reflect the underlying performance of the Groups operations. Exclusions from underlying earnings are those gains and losses that individually, or in aggregate with similar items, are of a nature or size to require exclusion in order to provide additional insight into underlying business performance.
The following items are excluded from net earnings in arriving at underlying earnings in each period irrespective of materiality:
- Net gains/(losses) on disposal of interests in businesses.
- Impairment charges and reversals.
- Profit/(loss) after tax from discontinued operations.
- Exchange and derivative gains and losses. This exclusion includes exchange gains/(losses) on external net debt and intragroup balances, unrealised gains/(losses) on currency and interest rate derivatives not qualifying for hedge accounting, unrealised gains/(losses) on certain commodity derivatives not qualifying for hedge accounting, and unrealised gains/(losses) on embedded derivatives not qualifying for hedge accounting.
- Adjustments to closure provisions where the adjustment is associated to an impairment charge, for legacy sites where the disturbance or environmental contamination relates to the pre-acquisition period.

The reconciliation of underlying earnings to net earnings can be found on page 240.

(e) Capital expenditure for reportable segments comprises the net cash outflow on purchases less disposals of property, plant and equipment, capitalised evaluation costs and purchases less disposals of other intangible assets. The details provided include 100% of subsidiaries' capital expenditure and Rio Tinto's share of the capital expenditure of joint operations and equity accounted units.

(f) Product group depreciation and amortisation for reportable segments include 100% of subsidiaries' depreciation and amortisation and Rio Tinto's share of the depreciation and amortisation of equity accounted units. Rio Tinto's share of the depreciation and amortisation charge of equity accounted units is deducted to arrive at depreciation and amortisation as shown in the cash flow statement. These figures do not include impairment charges and reversals, which are excluded from underlying earnings.

(g) Capital expenditure and Depreciation and amortisation as reported in the cash flow statement.

Notes to the 2021 financial statements

2 Operating segments continued

Reconciliation of underlying EBITDA to profit before taxation

	2021 US$m	2020 US$m	2019 US$m
Underlying EBITDA	**37,720**	23,902	21,197
Depreciation and amortisation in subsidiaries and equity accounted units[(a)]	**(5,022)**	(4,650)	(4,925)
Taxation and finance items in equity accounted units	**(759)**	(443)	(296)
Finance items	**(26)**	(1,751)	(648)
(Losses)/gains on embedded commodity derivatives not qualifying for hedge accounting (including exchange)	**(51)**	6	(260)
Impairment charges net of reversals	**(269)**	(1,272)	(3,487)
Gain on recognition of a new wharf at Kitimat, Canada	**336**	—	—
Change in closure estimates (non-operating and fully impaired sites)	**(1,096)**	(401)	—
Net losses on consolidation and disposal of interests in businesses	**—**	—	(291)
Other exclusions	**—**	—	(171)
Profit before taxation	**30,833**	15,391	11,119

(a) Depreciation and amortisation in subsidiaries and equity accounted units for the year ended 31 December 2021 is net of capitalised depreciation of US$54 million (31 December 2020: US$205 million; 31 December 2019: US$112 million).

Reconciliation of underlying earnings to net earnings

Underlying earnings are reported by Rio Tinto to provide greater understanding of the underlying business performance of its operations. Underlying earnings and net earnings both represent amounts attributable to owners of Rio Tinto. Exclusions from underlying earnings relating to equity accounted units are stated after tax and included in the column "Pre-tax". Items (a) to (g) below are excluded from net earnings in arriving at underlying earnings.

	Pre-tax 2021 US$m	Taxation 2021 US$m	Non-controlling interests 2021 US$m	Net amount 2021 US$m	Net amount 2020 US$m	Net amount 2019 US$m
Underlying earnings	**31,341**	**(8,482)**	**(1,479)**	**21,380**	12,448	10,373
Items excluded from underlying earnings						
Impairment charges net of reversals (note 6)	**(269)**	**72**	**—**	**(197)**	(1,115)	(1,658)
Losses on disposal of interest in business[(a)]	**—**	**—**	**—**	**—**	—	(291)
Exchange and derivative gains/(losses):						
– Exchange gains/(losses) on external net debt, intragroup balances and derivatives[(b)]	**800**	**(78)**	**4**	**726**	(1,125)	51
– Losses on currency and interest rate derivatives not qualifying for hedge accounting[(c)]	**(211)**	**88**	**(4)**	**(127)**	(157)	(59)
– (Losses)/gains on embedded commodity derivatives not qualifying for hedge accounting[(d)]	**(68)**	**17**	**(2)**	**(53)**	18	(192)
Net losses from movements to closure estimates (non-operating and fully impaired sites)[(e)]	**(1,096)**	**125**	**—**	**(971)**	(300)	—
Gain on recognition of a new wharf at Kitimat, Canada[(f)]	**336**	**—**	**—**	**336**	—	—
Other exclusions[(g)]	**—**	**—**	**—**	**—**	—	(214)
Total excluded from underlying earnings	**(508)**	**224**	**(2)**	**(286)**	(2,679)	(2,363)
Net earnings	**30,833**	**(8,258)**	**(1,481)**	**21,094**	9,769	8,010

(a) In 2019, the net loss mainly related to the disposal of our entire 68.62% stake in Rössing Uranium on 16 July 2019 for which we recorded a pre-tax loss of US$289 million (US$289 million net of tax). Refer to note 36 for further details in respect of this transaction.

(b) Exchange gains/(losses) on external net debt and intragroup balances comprise post-tax foreign exchange losses on net debt of US$187 million offset by post-tax gains of US$913 million on intragroup balances, primarily as a result of the Australian dollar weakening against the US dollar. In 2020, exchange losses on external net debt and intragroup balances comprise post-tax foreign exchange losses on intragroup balances of US$1,330 million partially offset by post-tax gains of US$205 million on external net debt, primarily as a result of a stronger Australian dollar against the US dollar during the year. In 2019, exchange gains on external net debt and intragroup balances comprise post-tax foreign exchange gains on net debt of US$60 million and post-tax losses of US$9 million on intragroup balances, primarily as a result of the Canadian dollar strengthening against the US dollar. From 1 January 2019, all foreign exchange gains and losses relating to net debt are excluded from underlying earnings.

(c) Valuation changes on currency and interest rate derivatives, which are ineligible for hedge accounting, other than those embedded in commercial contracts, and the currency revaluation of embedded US dollar derivatives contained in contracts held by entities whose functional currency is not the US dollar.

(d) Valuation changes on derivatives, embedded in commercial contracts, that are ineligible for hedge accounting, but for which there will be an offsetting change in future Group earnings. Mark-to-market movements on commodity derivatives entered into with the commercial objective of achieving spot pricing for the underlying transaction at the date of settlement are included in underlying earnings.

(e) On 2 February 2022, Energy Resources of Australia released preliminary findings from its reforecast of the total undiscounted cost schedule for the Ranger rehabilitation project. Information available from this study resulted in the Group recording an increase to the closure provision of US$510 million at 31 December 2021. Other increases to closure estimates charged to the income statement in 2021 relate to Diavik, Gove refinery, and a number of the Group's legacy sites where the environmental damage preceded ownership by Rio Tinto. The adjustments at Energy Resources Australia and Gove refinery have been recognised in the income statement as these are non-operating sites, and excluded from underlying earnings due to the magnitude of the individual updates and materiality when aggregated. In 2020 we recognised an increase in the Diavik closure provision based on preliminary Pre-Feasibility Study findings. On completion of the study in 2021 a true up was recorded in the income statement and excluded from underlying earnings in line with the treatment of the initial increase in 2020, which was excluded from underlying earnings as Diavik was fully impaired during the year. Other closure costs excluded in 2020 were the increase in the Gove refinery closure provision offset by a decrease in the Argyle mine closure provision on completion of Pre-Feasibility Studies at each site. The 2020 comparative also included the net earnings impact (US$138 million loss) in respect of increases to Closure provisions in legacy and non-operating sites following a reduction to the closure discount rate to 1.5%. When further funding is required, no allocation is made to the non-controlling interests of partially owned legacy sites until the funding is received.

(f) On 3 December 2021 we gained control over a new wharf at Kitimat, Canada that was built and paid for by LNG Canada. The gain on recognition has been excluded from underlying earnings on the grounds of individual magnitude and consistency with the associated impairment charge, refer to note 6.

(g) In 2019, other exclusions included provisions for obligations in respect of legacy operations of US$246 million (loss of US$233 million after tax), partially offset by the write-back of a net realisable value provision in respect of low grade stockpile inventories at Oyu Tolgoi of US$75 million (gain of US$19 million after tax and non-controlling interests). As a result of increased uncertainty over timing of production from the Oyu Tolgoi underground project (refer to note 6), we expected to utilise low grade stockpiles sooner than previously forecast. This was excluded from underlying earnings, consistent with the related impairment charge recognised in 2019.

3 Operating segments – additional information

Consolidated sales revenue by destination[a]

	2021 %	2020 %	2019 %	2021 US$m	2020 US$m	2019 US$m
China	**57.2**	58.1	51.3	**36,308**	25,940	22,135
United States of America	**12.6**	10.9	14.2	**8,012**	4,867	6,125
Asia (excluding China and Japan)	**9.4**	10.2	10.6	**5,985**	4,536	4,558
Japan	**7.9**	7.5	8.9	**5,012**	3,354	3,855
Europe (excluding UK)	**5.2**	5.9	6.0	**3,271**	2,623	2,610
Canada	**2.6**	2.9	3.3	**1,677**	1,289	1,478
Australia	**1.8**	1.7	1.7	**1,122**	745	737
UK	**0.4**	0.5	0.6	**243**	242	248
Other countries	**2.9**	2.3	3.4	**1,865**	1,015	1,419
Consolidated sales revenue	**100**	100	100	**63,495**	44,611	43,165

(a) Consolidated sales revenue by geographical destination is based on the ultimate country of the product's destination, if known. Where the ultimate destination is not known, we have defaulted to the shipping address of the customer. Rio Tinto is domiciled in both the UK and Australia.

Consolidated sales revenue by product

Consolidated sales revenues of the Group are derived from the following products sold to external customers:

	Revenue from contracts with customers 2021 US$m	Other revenue[a] 2021 US$m	Consolidated sales revenue 2021 US$m
Iron ore	**42,992**	**(796)**	**42,196**
Aluminium, alumina and bauxite	**12,336**	**103**	**12,439**
Copper	**3,229**	**96**	**3,325**
Industrial minerals (comprising titanium dioxide slag, borates and salt)	**2,114**	**3**	**2,117**
Gold	**1,075**	**2**	**1,077**
Diamonds	**501**	**—**	**501**
Other products[b]	**1,837**	**3**	**1,840**
Consolidated sales revenue	**64,084**	**(589)**	**63,495**

	Revenue from contracts with customers 2020 US$m	Other revenue[a] 2020 US$m	Consolidated sales revenue 2020 US$m	Revenue from contracts with customers 2019 US$m	Other revenue[a] 2019 US$m	Consolidated sales revenue 2019 US$m
Iron ore	28,202	1,000	29,202	25,516	229	25,745
Aluminium, alumina and bauxite	9,092	54	9,146	10,207	(32)	10,175
Copper	1,721	64	1,785	2,030	(7)	2,023
Industrial minerals (comprising titanium dioxide slag, borates and salt)	2,054	(3)	2,051	2,251	(12)	2,239
Gold	471	6	477	667	2	669
Diamonds	459	—	459	619	—	619
Other products[b]	1,493	(2)	1,491	1,697	(2)	1,695
Consolidated sales revenue	43,492	1,119	44,611	42,987	178	43,165

(a) Certain of the Group's products may be provisionally priced at the date revenue is recognised. The change in value of the provisionally priced receivables is based on relevant forward market prices and is included in "Other revenue" above.
(b) "Other products" includes metallic co-products, molybdenum, silver and other commodities. This category also now includes uranium sales of US$229 million (2020: US$299 million; 2019: US$375 million) that were previously disclosed separately.

Notes to the 2021 financial statements

3 Operating segments – additional information continued

Non-current assets other than excluded items[(a)]

The total of non-current assets other than excluded items is shown by location below.

	2021 US$m	2020 US$m
Australia	**32,807**	32,290
Canada	**15,139**	14,666
Mongolia	**11,653**	10,285
United States of America	**6,141**	6,090
Africa	**3,080**	3,294
South America	**2,451**	2,718
Europe (excluding UK)	**246**	212
UK	**111**	117
Other countries	**1,197**	1,008
Total non-current assets other than excluded items	**72,825**	70,680
Non-current assets excluded from analysis above:		
Deferred tax assets	**3,375**	3,385
Other financial assets[(b)]	**528**	829
Quasi equity loans to equity accounted units[(b)]	**97**	112
Tax recoverable	**29**	4
Receivables and other assets	**1,610**	1,525
Total non-current assets per balance sheet	**78,464**	76,535

(a) Allocation of non-current assets by country is based on the location of the business units holding the assets. It includes investments in equity accounted units totalling US$3,407 million (2020: US$3,652 million) which represents the Group's share of net assets excluding quasi equity loans shown separately above.
(b) Loans to equity accounted units comprise quasi equity loans of US$97 million (2020: US$112 million) included in "Investments in equity accounted units" on the face of the balance sheet and no non-current non-quasi equity loans (2020: US$1 million) shown within "Other financial assets".

4 Net operating costs (excluding items shown separately)

	Note	2021 US$m	2020 US$m	2019 US$m
Raw materials, consumables, repairs and maintenance		**9,957**	8,490	9,485
Amortisation of intangible assets	13	**178**	161	133
Depreciation of property, plant and equipment	14	**4,519**	4,118	4,251
Employment costs	5	**5,513**	4,770	4,522
Shipping and other freight costs		**3,275**	2,088	2,257
Decrease/(increase) in finished goods and work in progress[(a)]		**29**	(47)	42
Royalties		**3,878**	2,763	2,501
Amounts charged by equity accounted units[(b)]		**1,160**	958	1,136
Net foreign exchange losses/(gains)		**14**	300	(52)
Other external costs[(c)]		**4,018**	3,083	3,627
Loss on sale of property, plant and equipment		**53**	50	31
Gain on recognition of new wharf at Kitimat, Canada[(d)]		**(336)**	—	—
Provisions (including exchange differences on provisions)	25	**1,906**	894	753
Research and development		**65**	45	45
Costs included above capitalised or shown separately as exploration and evaluation costs[(e)]		**(646)**	(708)	(651)
Other operating income		**(893)**	(711)	(773)
Net operating costs (excluding items shown separately)		**32,690**	26,254	27,307

(a) Includes purchases of third party material to satisfy sales contracts.
(b) Amounts charged by equity accounted units relate to toll processing and also include purchases from equity accounted units of bauxite and aluminium which are then processed by the product group or sold to third parties. Generally, purchases are in proportion to the Group's share of the equity accounted unit but in 2021, US$121 million (2020: US$129 million; 2019: US$291 million) related to purchases of the other investors' share of production.
(c) In 2021, other external costs include US$502 million (2020: US$314 million, 2019: US$327 million) of short-term lease costs and US$34 million (2020: US$30 million, 2019 US$15 million) of variable lease costs recognised in the income statement in accordance with IFRS 16 "Leases". Refer to note 22.
(d) On 3 December 2021 we recognised a new wharf at Kitimat, Canada within Property, plant and equipment that was built and paid for by LNG Canada. The gain on recognition has been excluded from underlying earnings, refer to note 2 and note 6.
(e) In 2021, US$445 million (2020: US$537 million; 2019: US$469 million) of operating costs were capitalised and US$201 million (2020: US$171 million; 2019: US$182 million) of costs were shown separately within "Exploration and evaluation costs" in the Group income statement.

5 Employment costs

	Note	2021 US$m	2020 US$m	2019 US$m
Total employment costs				
– Wages and salaries		**4,699**	4,141	3,923
– Social security costs		**386**	330	328
– Net post-retirement charge	42	**554**	469	384
– Share-based payment charge	41	**126**	138	123
		5,765	5,078	4,758
Less: charged within provisions[(a)]	25	**(252)**	(308)	(236)
Total employment costs	4	**5,513**	4,770	4,522

(a) Amounts included above relate to provisions for pensions, post-retirement healthcare, long service leave and other employee entitlements. These are included in "Provisions (including exchange differences on provisions)" in note 4.

6 Impairment charges net of reversals

	Note	Pre-tax amount 2021 US$m	Taxation 2021 US$m	Non-controlling interest 2021 US$m	Net amount 2021 US$m	Pre-tax amount 2020 US$m	Pre-tax amount 2019 US$m
Aluminium – Kitimat		**(269)**	**72**	**—**	**(197)**	—	—
Aluminium – Pacific Aluminium		**—**	**—**	**—**	**—**	(489)	—
Aluminium – Sohar		**—**	**—**	**—**	**—**	(220)	—
Aluminium – ISAL		**—**	**—**	**—**	**—**	(93)	(109)
Minerals – Diavik		**—**	**—**	**—**	**—**	(441)	—
Copper – Oyu Tolgoi		**—**	**—**	**—**	**—**	—	(2,240)
Aluminium - Yarwun alumina refinery		**—**	**—**	**—**	**—**	—	(1,138)
Total impairment charges net of reversals		**(269)**	**72**	**—**	**(197)**	(1,243)	(3,487)
Allocated as:							
Intangible assets	13	**—**				(4)	(1)
Property, plant and equipment	14	**(269)**				(900)	(3,486)
Investment in equity accounted units ("EAUs")		**—**				(339)	—
Total impairment charges net of reversals		**(269)**				(1,243)	(3,487)
Comprising:							
Impairment charges of consolidated balances					**(269)**	(904)	(3,487)
Impairment charges related to EAUs (pre-tax)					**—**	(368)	—
Total impairment charges net of reversals in the financial information by business unit (page 318)					**(269)**	(1,272)	(3,487)
Taxation (including related to EAUs)					**72**	157	323
Non-controlling interests					**—**	—	1,506
Total impairment charges net of reversals in the income statement					**(197)**	(1,115)	(1,658)

2021

Aluminium – Kitimat, Canada

On 3 December 2021, we announced completion of the newly-constructed wharf at Kitimat. Construction spend was incurred by LNG Canada and therefore a gain of US$336 million representing the estimated fair value of the cost of construction has been recorded and the carrying value of the Kitimat cash-generating unit (CGU) increased accordingly. Output from the smelter was reduced to 25% as a result of a workforce strike in mid-2021 and ramp-up to full capacity will extend through 2022. As a previously impaired CGU, and therefore carrying limited headroom, these factors were identified as conditions that could indicate that the uplifted carrying value may not be supportable and therefore the CGU was tested for impairment.

The recoverable amount for the Kitimat CGU has been calculated based on the IAS 36 "Impairment" fair value less cost of disposal (FVLCD) methodology by reference to the net present value of post-tax cash flows, expressed in real-terms and discounted at 6.6%. The recoverable amount of US$3,126 million is less than the carrying value of US$3,323 million resulting in a post-tax impairment charge of US$197 million, equivalent to US$269 million pre-tax. The overall adjustment to the carrying value of the property, plant and equipment at Kitimat from the gain on recognition of the wharf less the impairment charge is an increase of US$67 million.

The pricing data used to calculate net present value of cash flows is based on a blend of the three strategic pricing scenarios described in the climate change section of note 1. While keeping all other inputs constant, we have flexed the cash flows to reflect the carbon and commodity prices generated by the one scenario that we believe is consistent with the goals of the Paris Agreement. The net present value of post-tax cash flows would have been US$58 million greater under this interpretation of Paris-aligned accounting (see note 1).

To illustrate the sensitivity of the recoverable amount, an increase in the discount rate by 50 basis points to 7.1% (post-tax real terms rate) would reduce the recoverable amount by US$180 million with all other valuation inputs remaining constant.

Notes to the 2021 financial statements

6 Impairment charges net of reversals continued

Copper – Oyu Tolgoi, Mongolia

Development of the Oyu Tolgoi underground progressed through 2021 at a slower pace than anticipated due to COVID-19 affecting staffing levels. Initiation of the caving process, known as the undercut, was expected to occur during 2021, however at 31 December 2021 the non-technical criteria for approval, including negotiations with the Government of Mongolia, remained ongoing and therefore this aspect of the construction was paused. On 30 December 2021 the Mongolian parliament approved Resolution 103 which indicated support for concessions offered by Rio Tinto during these negotiations, but introduced new funding constraints on the shareholders of Oyu Tolgoi LLC until first sustainable production. As a critical milestone in the development of the mine, we identified the delay to the undercut and consequential delay to production from the underground operations as being an impairment trigger and therefore assessed the recoverable amount of the project as at 31 December 2021.

The recoverable amount of the Oyu Tolgoi CGU has been prepared in accordance with the FVLCD methodology. It is based on forecast post-tax future cash flows over the life of mine of the open pit and underground reserves of Hugo North Lift 1 (HNL1) together with an estimate of future expansion potential to extract mineral resources from further underground developments and enlarged open pit. Mining of these mineral resources is subject to future investment decisions and comprises approximately 20% of the total value. These cash flows, expressed in real terms, have been discounted to present value using a project specific post-tax discount rate of 8%.

The development of HNL1 underground comprises three continuous sections. The initial development in 'Panel 0' is in the central section of the orebody with Panel 1 to the north and Panel 2 located to the south. Evaluation of mine plans for Panels 1 and 2 remain under study and are linked to the lateral development of project. To reflect the risk inherent in these aspects of the mine plan that are currently at the pre-feasibility study level of confidence, a risk adjustment factor of 10% has been applied to the net cash flows associated with years of the development of those sections of the underground mine.

At 31 December 2021, the non-technical criteria for the undercut had not been satisfied and therefore, an adjustment to the underlying cash flows of the valuation model was made to weight the timing of the undercut between an immediate approval and the potential for a six-month delay.

In finalising the determination of a recoverable amount for the cash-generating unit, we considered the likely impact of elevated uncertainty on a market participant's perspective at the balance sheet date, in particular that arising from the incomplete status of negotiations and financing arrangements. Considerations included immediate funding requirements and the restrictions placed thereon in Resolution 103. To represent this uncertainty, a further judgmental reduction has been applied to the total net present value of cash flows from mining operations. After taking all of the above adjustments into account, the resulting recoverable amount almost equals the carrying value for the cash-generating unit of US$11.8 billion. Accordingly, management has determined that neither an impairment charge nor an impairment reversal is required.

As described in note 45, on 25 January 2022, Rio Tinto, Turquoise Hill Resources and the Government of Mongolia reached agreement to unanimously approve the commencement of underground operations. Through this agreement, the non-technical criteria for the undercut have been satisfied, including agreement over the pathway to funding the project to sustainable production. Underground mining operations have subsequently commenced. No hindsight has been applied in determining the appropriate valuation assumptions at 31 December 2021, however the timing and substance of the agreement reached was within the range of plausible outcomes considered in making this determination.

The pricing data used to calculate the net present value of cash flows is based on a blend of the three strategic pricing scenarios described in the climate change section of note 1. While keeping all other inputs constant, we have flexed the cash flows to reflect carbon and commodity prices under this one scenario that we believe is consistent with achieving the goals of the Paris Agreement. The net present value of post-tax cash flows would have been US$1.9 billion greater under this interpretation of Paris-aligned accounting (see note 1), assuming no changes to the ore mined (ie alternative economic grade cut-off is impractical to estimate, but higher prices could potentially result in more ore being mined and sold).

To further illustrate the sensitivity of the recoverable amount, an increase in the discount rate by 50 basis points to 8.5% (post-tax real terms rate) would reduce the recoverable amount by US$0.8 billion with all other valuation inputs remaining constant.

The funding of equity contributions to the project on behalf of Erdenes Oyu Tolgoi (Erdenes) by way of a carry account loan has been accounted for in accordance with the accounting policy in note 1 (xii). Additional information regarding these funding balances owing from Erdenes to Turquoise Hill and the impact on non-controlling interests is provided in note 32. On 25 January 2022, as part of a comprehensive package negotiated with the Government of Mongolia in order to approve commencement of underground operations, Turquoise Hill agreed to waive the full amount of funding balances and interest owing from Erdenes to Turquoise Hill. The waiver does not have an impact on the Group's assessment of impairment for either 2021 or 2022; refer to note 45.

2020 and 2019

Aluminium – Pacific Aluminium, Australia and New Zealand

On 9 July 2020, we announced the conclusion of the NZAS strategic review and gave Meridian Energy 14 months' notice for the termination of the power contract. As a result of the decision to wind-down operations an impairment trigger was identified. The net present value of post-tax cash flows over the remaining life for this CGU was negative and therefore the non-current assets of the smelter were fully impaired.

High operating costs and challenging outlook for the aluminium industry also resulted in impairment triggers being identified at the Bell Bay aluminium smelter in Tasmania, Australia and at Boyne Smelter in Queensland, Australia at 30 June 2020. The forecast net present value of cash flows over the period to anticipated expiry in 2025 of a power contract with Hydro Tasmania was negative taking into account market conditions at the time. The property, plant and equipment of the Bell Bay smelter was therefore fully impaired. We determined the recoverable amount for our share of the Boyne Smelter CGU. which also includes the Gladstone Power Station. as US$273 million based on post-tax cash flows expressed in real terms and discounted at 6.6%. Accordingly our share of impairment after tax in the equity accounted unit was US$119 million (US$148 million pre-tax) related to the smelter and US$26 million (US$36 million pre-tax) related to the power station.

Aluminium – Sohar

In 2020, the challenging outlook for the Middle Eastern aluminium industry was identified as an impairment trigger at the Sohar aluminium smelter in Oman, an equity accounted unit of the Group.

At 30 September 2020, we determined the recoverable amount for our share of the Sohar CGU to be US$258 million based on post-tax cash flows expressed in real terms and discounted at 7.6%. Accordingly, our share of impairment after tax in the equity accounted unit was US$220 million.

Aluminium – ISAL smelter, Iceland

Our announcement in February 2020 of a strategic review of the ISAL smelter in Iceland, combined with challenging market conditions, was identified as an impairment trigger at 30 June 2020. Subsequent restoration of smelter competitiveness resulting from improved power delivery terms represented an indicator of partial impairment reversal at 31 December 2020. We calculated a post-tax recoverable amount for the CGU of US$139 million at 31 December 2020 based on FVLCD, discounted using a post-tax rate of 6.6%. As a consequence, with full impairment of the CGU and a pre-tax impairment charge of US$204 million in the first half of 2020 followed by reversal of US$111 million to previously recorded pre-tax impairment in the second half of 2020, the full year results for the year ended 31 December 2020 included a net pre-tax impairment charge of US$93 million (2019: pre-tax impairment charge of US$109 million upon reclassification from assets held for sale).

Minerals (previously under Copper & Diamonds) – Diavik, Canada

The COVID-19 pandemic significantly disrupted global demand for diamonds, and in April 2020 our then joint venture partner in the Diavik 'Diamond Mine' filed for creditor protection and defaulted on cash calls. These circumstances were identified as an impairment trigger. The net present value of post-tax cash flows projected over the remaining life of the Diavik 'Diamond Mine' to 2025 did not support retaining any carrying value, resulting in the Group's 60% interest in plant and equipment and intangible assets of the CGU being fully impaired at 30 June 2020.

Copper (previously under Copper & Diamonds) – Oyu Tolgoi, Mongolia

On 16 July 2019 we announced that the first sustainable production from the Oyu Tolgoi underground project could be delayed by 16 to 30 months compared with the original feasibility study guidance in 2016. We also announced that development capital spend for the project could increase materially. We identified these matters as an impairment trigger and prepared an assessment of the recoverable amount for the CGU at 30 June 2019 using a FVLCD model, as prescribed by IAS 36.

At 30 June 2019 we determined the post-tax recoverable amount to be US$8.3 billion using a real terms discount rate of 8.3%, this resulted in a pre-tax impairment charge of US$2.2 billion (100% basis). The net adjustment to tax represented an increase to deferred tax assets of US$320 million for the temporary difference corresponding to the impairment and a decrease in deferred tax assets of US$359 million for tax losses that were expected to expire without utilisation.

On 16 December 2020 we confirmed completion of the Definitive Estimate detailing how Oyu Tolgoi underground would achieve sustainable production and selection of a preferred development option for the Oyu Tolgoi underground project. Development capital assumptions of US$6.75 billion and forecast sustainable production by October 2022 incorporated the impacts of COVID-19. This information was within the range of assumptions used to calculate the CGU's recoverable amount in the 2019 impairment test, and not indicative of an impairment loss in 2020.

Aluminium - Yarwun alumina refinery

In 2019, our annual impairment assessment of the Yarwun CGU resulted in a pre-tax impairment charge of US$1,138 million to property, plant and equipment as a result of this CGU being assessed on a stand-alone basis for the first time and a 30% year-on-year reduction in the spot price of alumina to US$275/t at 31 December 2019.

Notes to the 2021 financial statements

7 Share of profit after tax of equity accounted units

Rio Tinto share	2021 US$m	2020 US$m	2019 US$m
Sales revenue[(a)]	**3,181**	2,490	2,358
Operating costs	**(1,435)**	(1,439)	(1,812)
Profit before finance items and taxation	**1,746**	1,051	546
Finance items	**(58)**	(59)	(65)
Share of profit after tax of equity accounted units	**13**	23	10
Profit before taxation	**1,701**	1,015	491
Taxation	**(659)**	(363)	(190)
Profit for the year	**1,042**	652	301

(a) Sales revenue of equity accounted units includes sales by equity accounted units to Group subsidiaries.

Further information relating to the Group's interests in joint ventures and associates is given in notes 34 and 35.

8 Finance income and finance costs

	Note	2021 US$m	2020 US$m	2019 US$m
Finance income from equity accounted units		**2**	4	4
Other finance income (including bank deposits, net investment in leases, and other financial assets)		**62**	137	296
Total finance income		**64**	141	300
Interest on:				
– Financial liabilities at amortised cost (excluding lease liabilities) and associated derivatives		**(489)**	(561)	(816)
– Lease liabilities		**(47)**	(50)	(55)
Fair value movements:				
– Bonds designated as hedged items in fair value hedges		**246**	(284)	(185)
– Derivatives designated as hedging instruments in fair value hedges		**(242)**	287	181
Loss on early redemption of bonds[(a)]		**(69)**	—	—
Amounts capitalised	14	**358**	340	321
Total finance costs		**(243)**	(268)	(554)

(a) In 2021 we completed a bond buy-back programme of US$1.2 billion (nominal value). The loss on the early redemption of the bond includes a premium charge of US$115 million; unamortised debt issuance costs and fees of US$5 million offset by a fair value credit of US$51 million. We did not undertake a bond buy-back programme in 2020 or 2019.

9 Taxation

Taxation charge

	Note	2021 US$m	2020 US$m	2019 US$m
– Current		**8,144**	5,169	4,436
– Deferred	17	**114**	(178)	(289)
Total taxation charge		**8,258**	4,991	4,147

Prima facie tax reconciliation

	2021 US$m	2020 US$m	2019 US$m
Profit before taxation	**30,833**	15,391	11,119
Deduct: share of profit after tax of equity accounted units[(a)]	**(1,042)**	(652)	(301)
Add: impairment after tax of investments in equity accounted units [(a)]	**—**	339	—
Parent companies' and subsidiaries' profit before tax	**29,791**	15,078	10,818
Prima facie tax payable at UK rate of 19% (2020: 19%; 2019: 19%)[(b)]	**5,660**	2,865	2,055
Higher rate of taxation of 30% on Australian underlying earnings (2020: 30%; 2019: 30%)	**2,693**	1,779	1,495
Other tax rates applicable outside the UK and Australia on underlying earnings	**110**	(80)	(110)
Impact of items excluded in arriving at underlying earnings[(c)]:			
– Impairment charges[(d)]	**(21)**	44	340
– Net gains and losses on consolidation and disposal of interests in businesses	**—**	—	55
– Exchange and gains/losses on derivatives	**(126)**	260	(22)
– Losses from increases to closure estimates (non-operating and fully impaired sites)	**84**	(24)	—
– Utilisation of capital losses on the gain from the recognition of the wharf at Kitimat, Canada	**(64)**	—	—
– Other exclusions	**—**	—	38
Impact of changes in tax rates and laws	**—**	—	1
Resource depletion and other depreciation allowances	**(52)**	(34)	(57)
Recognition of previously unrecognised deferred tax assets[(e)]	**(212)**	(182)	—
Write-down of previously recognised deferred tax assets[(f)]	**—**	173	42
Amounts under/(over) provided in prior years	**63**	9	83
Other items[(g)]	**123**	181	227
Total taxation charge[(a)]	**8,258**	4,991	4,147

(a) This tax reconciliation relates to the Group's parent companies, subsidiaries and joint operations, and excludes equity accounted units. The Group's share of profit of equity accounted units is net of tax charges of US$659 million (2020: US$363 million; 2019: US$190 million). Impairment after tax of investments in equity accounted units is net of tax credits of US$nil (2020: US$29 million; 2019: US$nil).

(b) As a UK headquartered and listed Group, the reconciliation of expected tax on accounting profit to tax charge uses the UK corporation tax rate to calculate the prima facie tax payable. Rio Tinto is also listed in Australia, and the reconciliation includes the impact of the higher tax rate in Australia where a significant proportion of the Group's profits are currently earned. The impact of other tax rates applicable outside the UK and Australia is also included. The weighted average statutory corporation tax rate on profit before tax is approximately 29% (2020: 30% 2019: 31%).

(c) The impact for each item includes the effect of tax rates applicable outside the UK.

(d) The tax impact of impairments relates to a tax rate differential between the Canadian and UK rates on the Kitimat impairment. In the comparative period to 31 December 2020 the tax impact of impairments includes the write-down of deferred tax assets at ISAL and NZAS and non-recognition of deferred tax on those impairments. The tax impact also includes recognition at local tax rates of deferred tax assets arising on the impairments of Bell Bay, Gladstone Power Station and Diavik. In the comparative period to 31 December 2019, the tax impact of impairment includes the write down of deferred tax assets in respect of prior year tax losses in Mongolia and recognition of deferred tax on impaired assets. Refer to note 6.

(e) The recognition of previously unrecognised deferred tax assets relates to the recognition of prior year deferred tax assets at Oyu Tolgoi and in our Australian Aluminium business due to improved deferred tax asset recovery expectations. In the comparative period to 31 December 2020 the recognition of previously unrecognised deferred tax assets relates to the recognition of prior year deferred tax assets on losses and on impaired assets at Oyu Tolgoi due to improved deferred tax asset recovery expectations.

(f) In the comparative period to 31 December 2020 the write down of previously recognised deferred tax assets relates primarily to the partial de-recognition of deferred tax assets in our Australian Aluminium business.

(g) Other items include non-deductible costs and withholding taxes, and various adjustments to provisions for taxation, the most significant of which relate to transfer pricing matters, including issues under discussion with the Australian Tax Office.

	2021 US$m	2020 US$m	2019 US$m
Tax on fair value movements:			
– Cash flow hedge fair value gains	**62**	3	(6)
Tax (charge)/credit on re-measurement gains/(losses) on pension and post-retirement healthcare plans	**(305)**	112	83
Tax relating to components of other comprehensive income/(loss) for the year[(a)]	**(243)**	115	77

(a) This comprises a deferred tax charge of US$243 million (2020: credit of US$115 million; 2019: credit of US$77 million) and a current tax charge of US$nil (2020: US$nil; 2019: US$nil), see note 17.

Future tax developments

We are closely monitoring the Organisation for Economic Co-operation and Development's Two Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy, which are expected to be enacted in 2022 with application from 1 January 2023. The accounting implications under IAS12 will be determined when the relevant legislation is available.

Notes to the 2021 financial statements

10 Earnings per ordinary share

	2021 Earnings US$m	2021 Weighted average number of shares (millions)	2021 Per share amount (cents)	2020 Earnings US$m	2020 Weighted average number of shares (millions)	2020 Per share amount (cents)
Basic earnings per share attributable to ordinary shareholders of Rio Tinto[a]	**21,094**	**1,618.4**	**1,303.4**	9,769	1,617.4	604.0
Diluted earnings per share attributable to ordinary shareholders of Rio Tinto[b]	**21,094**	**1,628.9**	**1,295.0**	9,769	1,628.6	599.8

	2019 Earnings US$m	2019 Weighted average number of shares (millions)	2019 Per share amount (cents)
Basic earnings per share attributable to ordinary shareholders of Rio Tinto[a]	8,010	1,630.1	491.4
Diluted earnings per share attributable to ordinary shareholders of Rio Tinto[b]	8,010	1,642.1	487.8

(a) The weighted average number of shares is calculated as the average number of Rio Tinto plc shares outstanding not held as treasury shares of 1,247.4 million (2020: 1,246.5 million; 2019: 1,259.4 million) plus the average number of Rio Tinto Limited shares outstanding of 371.0 million (2020: 370.9 million; 2019: 370.7 million) over the relevant period. There were no cross holdings of shares between Rio Tinto Limited and Rio Tinto plc at 31 December 2021 (31 December 2020: nil).

(b) For the purposes of calculating diluted earnings per share, the effect of dilutive securities of 10.5 million shares in 2021 (2020: 11.2 million; 2019: 12.0 million) is added to the weighted average number of shares described in (a) above. This effect is calculated under the treasury stock method, in accordance with IAS 33 "Earnings per Share". The Group's only potential dilutive ordinary shares are share awards for which terms and conditions are described in note 41.

11 Dividends

	2021 US$m	2020 US$m	2019 US$m
Rio Tinto plc previous year final dividend payable	**3,809**	2,783	2,245
Rio Tinto plc previous year special dividend payable	**1,146**	—	3,032
Rio Tinto plc interim dividend payable	**4,627**	1,937	1,930
Rio Tinto plc interim special dividend payable	**2,276**	—	780
Rio Tinto Limited previous year final dividend payable	**1,138**	857	666
Rio Tinto Limited previous year special dividend payable	**343**	—	900
Rio Tinto Limited interim dividend payable	**1,372**	555	556
Rio Tinto Limited interim special dividend payable	**674**	—	225
Dividends payable during the year	**15,385**	6,132	10,334
Amount of unclaimed dividends during the year	**(28)**	—	—
Dividends paid during the year	**15,357**	6,132	10,334
Dividends per share: Ordinary - paid during the year	**685.0 c**	386.0 c	331.0 c
Dividends per share: Special - paid during the year	**278.0 c**	—	304.0 c
Ordinary dividends per share: proposed in the announcement of the results for the year	**417.0 c**	309.0 c	231.0 c
Special dividends per share: proposed in the announcement of the results for the year	**62.0 c**	93.0 c	—

	Dividends per share 2021	Dividends per share 2020	Dividends per share 2019
Rio Tinto plc previous year final (pence)	**221.86 p**	177.47 p	135.96 p
Rio Tinto plc previous year special (pence)	**66.77 p**	—	183.55 p
Rio Tinto plc interim (pence)	**270.84 p**	119.74 p	123.32 p
Rio Tinto plc interim special (pence)	**133.26 p**	—	49.82 p
Rio Tinto Limited previous year final – fully franked at 30% (Australian cents)	**397.48 c**	349.74 c	250.89 c
Rio Tinto Limited previous year special – fully franked at 30% (Australian cents)	**119.63 c**	—	338.70 c
Rio Tinto Limited interim – fully franked at 30% (Australian cents)	**509.42 c**	216.47 c	219.08 c
Rio Tinto Limited interim special – fully franked at 30% (Australian cents)	**250.64 c**	—	88.50 c

	Number of shares 2021 (millions)	Number of shares 2020 (millions)	Number of shares 2019 (millions)
Rio Tinto plc previous year final and special when paid	**1,247.6**	1,246.4	1,265.0
Rio Tinto plc interim final and special when paid	**1,247.8**	1,246.5	1,256.4
Rio Tinto Limited previous year final and special when paid	**371.2**	371.2	371.2
Rio Tinto Limited interim and special when paid	**371.2**	371.2	371.2

The dividends paid in 2021 are based on the following US cents per share amounts: 2020 final – 309.0 cents, 2020 final special - 93.0 cents, 2021 interim – 376.0 cents, 2021 interim special - 185.0 cents (2020 dividends paid: 2019 final – 231.0 cents, 2020 interim – 155.0 cents; 2019 dividends paid: 2018 final – 180.0 cents, 2018 final special - 243.0 cents, 2019 interim – 151.0 cents; 2019 interim special - 61.0 cents).

The number of shares on which Rio Tinto plc dividends are based, excludes those held as treasury shares and those held by employee share trusts which waived the right to dividends. Employee share trusts waived dividends on 101,752 Rio Tinto plc ordinary shares and 27,873 American Depository Receipts (ADRs) for the 2020 final dividend and on 91,008 Rio Tinto plc ordinary shares and 27,501 ADRs for the 2021 interim dividend (2020: on 258,779 Rio Tinto plc ordinary shares and 28,743 ADRs for the 2019 final dividend and on 171,213 Rio Tinto plc ordinary shares and 29,634 ADRs for the 2020 interim dividend; 2019: on 852,283 Rio Tinto plc ordinary shares and 37,678 ADRs for the 2018 final dividend and on 564,099 Rio Tinto plc ordinary shares and 47,674 ADRs for the 2019 interim dividend). In 2021, 2020 and 2019, no Rio Tinto Limited shares were held by Rio Tinto plc.

The number of shares on which Rio Tinto Limited dividends are based, excludes those held by shareholders who have waived the rights to dividends. Employee share trusts waived dividends on 45,250 Rio Tinto Limited ordinary shares for the 2020 final dividend and on 33,531 shares for the 2021 interim dividend (2020: on 98,065 shares for the 2019 final dividend and 84,377 shares for the 2020 interim dividend; 2019: on 628,566 shares for the 2018 final dividend and 342,062 shares for the 2019 interim dividend).

In addition, the directors of Rio Tinto announced a final dividend of 417.0 cents per share and a special dividend of 62.0 cents per share on 23 February 2022. This is expected to result in payments of US$7.7 billion. The dividend will be paid on 21 April 2022 to Rio Tinto plc and Rio Tinto Limited shareholders on the register at the close of business on 11 March 2022.

The proposed Rio Tinto Limited dividends will be franked out of existing franking credits or out of franking credits arising from the payment of income tax during 2022.

The approximate amount of the Rio Tinto Limited consolidated tax group's retained profits and reserves that could be distributed as dividends and franked out of available credits that arose from net payments of income tax in respect of periods up to 31 December 2021 (after deducting franking credits expected to be utilised on the 2021 final and special dividends declared) is US$11,006 million (2020: US$11,014 million; 2019: US$8,599 million).

12 Goodwill

	2021 US$m	2020 US$m
Net book value		
At 1 January	946	922
Adjustment on currency translation	(67)	24
At 31 December	879	946
– cost	16,987	17,341
– accumulated impairment	(16,108)	(16,395)
At 1 January		
– cost	17,341	16,926
– accumulated impairment	(16,395)	(16,004)

At 31 December, goodwill has been allocated as follows:

	2021 US$m	2020 US$m
Net book value		
Richards Bay Minerals	428	468
Pilbara	362	383
Dampier Salt	89	95
	879	946

Impairment tests for goodwill

Richards Bay Minerals

Richards Bay Minerals' annual impairment review resulted in no impairment charge for 2021 (2020: no impairment charge). The recoverable amount has been assessed by reference to FVLCD, in line with the policy set out in note 1(i) and classified as level 3 under the fair value hierarchy. FVLCD was determined by estimating cash flows until the end of the life-of-mine plan including anticipated expansions. In arriving at FVLCD, a post-tax discount rate of 8.6% (2020: 8.6%) has been applied to the post-tax cash flows expressed in real terms.

The key assumptions to which the calculation of FVLCD for Richards Bay Minerals is most sensitive and the corresponding decrease in FVLCD are set out below:

	US$m
5% decrease in the titanium slag price	207
1% increase in the discount rate applied to post-tax cash flows	160
10% strengthening of the South African rand	380

Notes to the 2021 financial statements

12 Goodwill continued

Other assumptions include the long-term pig iron and zircon prices and operating costs. Future selling prices and operating costs have been estimated in line with the policy set out in note 1(i). The recoverable amount of the cash-generating unit (CGU) exceeds the carrying value when each of these sensitivities are applied whilst keeping all other assumptions constant.

Pilbara

The annual impairment review of the Pilbara CGU has been assessed by reference to FVLCD using discounted cash flows, which is in line with the policy set out in note 1(i) and is classified as level 3 under the fair value hierarchy. In arriving at FVLCD, a post-tax discount rate of 6.6% (2020: 6.6%) has been applied to the post-tax cash flows expressed in real terms. The recoverable amount was determined to be significantly in excess of carrying value, and there are no reasonably possible changes in key assumptions that would cause the remaining goodwill to be impaired.

13 Intangible assets

Year ended 31 December 2021	**Exploration and evaluation[(a)] US$m**	**Trademarks, patented and non-patented technology US$m**	**Contract based intangible assets[(b)] US$m**	**Other intangible assets US$m**	**Total US$m**
Net book value					
At 1 January 2021	**271**	**33**	**1,994**	**457**	**2,755**
Adjustment on currency translation	**(14)**	**(2)**	**(11)**	**(21)**	**(48)**
Expenditure during the year	**110**	**5**	**—**	**110**	**225**
Amortisation for the year[(c)]	**—**	**(14)**	**(10)**	**(154)**	**(178)**
Disposals, transfers and other movements	**(4)**	**—**	**35**	**47**	**78**
At 31 December 2021	**363**	**22**	**2,008**	**439**	**2,832**
– cost	**2,513**	**220**	**3,089**	**1,725**	**7,547**
– accumulated amortisation and impairment	**(2,150)**	**(198)**	**(1,081)**	**(1,286)**	**(4,715)**

Year ended 31 December 2020	Exploration and evaluation[(a)] US$m	Trademarks, patented and non-patented technology US$m	Contract based intangible assets[(b)] US$m	Other intangible assets US$m	Total US$m
Net book value					
At 1 January 2020	173	44	1,947	473	2,637
Adjustment on currency translation	17	3	56	35	111
Expenditure during the year	87	—	—	69	156
Amortisation for the year[(c)]	—	(14)	(8)	(139)	(161)
Impairment charges	—	—	—	(4)	(4)
Disposals, transfers and other movements	(6)	—	(1)	23	16
At 31 December 2020	271	33	1,994	457	2,755
– cost	2,415	232	3,070	1,710	7,427
– accumulated amortisation and impairment	(2,144)	(199)	(1,076)	(1,253)	(4,672)

At 31 December 2021, a total of US$272 million of capitalised exploration and evaluation spend within intangible assets relates to brownfield expansion of existing sites (31 December 2020: US$180 million).

(a) Exploration and evaluation assets' useful economic lives are not determined until transferred to property, plant and equipment.

(b) The Group benefits from certain intangible assets acquired with Alcan, including power supply contracts, customer contracts and water rights. The water rights are expected to contribute to the efficiency and cost effectiveness of operations for the foreseeable future; accordingly, these rights are considered to have indefinite lives and are not subject to amortisation but are tested annually for impairment. These water rights constitute the majority of the amounts in "Contract based intangible assets".
The remaining carrying value of the water rights of US$1,796 million as at 31 December 2021 (31 December 2020: US$1,798 million) relates wholly to the Quebec smelters cash-generating unit (CGU). The Quebec smelters CGU was tested for impairment by reference to FVLCD using discounted cash flows, which is in line with the policy set out in note 1(i). The recoverable amount of the Quebec smelters is classified as level 3 under the fair value hierarchy. In arriving at FVLCD, post-tax cash flows expressed in real terms have been estimated over the expected useful economic lives of the underlying smelting assets and discounted using a real post-tax discount rate of 6.6% (2020: 6.6%).
The recoverable amounts were determined to be significantly in excess of carrying value, and there are no reasonably possible changes in key assumptions that would cause the remaining water rights to be impaired.

(c) Finite life intangible assets are amortised over their useful economic lives on a straight line or units of production basis, as appropriate. Where amortisation is calculated on a straight line basis, the following useful lives have been determined:
Trademarks, patented and non-patented technology:
- Trademarks: 14 to 20 years
- Patented and non-patented technology: ten to 20 years

Contract-based intangible assets:
- Power contracts/water rights: two to 45 years
- Other purchase and customer contracts: five to 15 years

Other intangible assets:
- Internally generated intangible assets and computer software: two to five years
- Other intangible assets: two to 20 years

Exploration and evaluation expenditure

The charge for the year and the net amount of intangible assets capitalised during the year are as follows:

	2021 US$m	2020 US$m	2019 US$m
Net expenditure in the year (net of cash proceeds of US$7 million (2020: US$1 million; 2019: US$10 million) on disposal of undeveloped projects)	**(852)**	(711)	(671)
Non-cash movements and non-cash proceeds on disposal of undeveloped projects	**23**	—	—
Amount capitalised during the year	**110**	87	57
Net charge for the year	**(719)**	(624)	(614)
Reconciliation to income statement:			
Exploration and evaluation costs	**(726)**	(625)	(624)
Profit relating to interests in undeveloped projects	**7**	1	10
Net charge for the year	**(719)**	(624)	(614)

14 Property, plant and equipment

Property, plant and equipment comprises owned and leased assets.

	2021 US$m	2020 US$m
Property, plant and equipment – owned	**63,793**	62,007
Right of use assets – leased	**1,134**	875
Net book value	**64,927**	62,882

Property, plant and equipment – Owned

Year ended 31 December 2021	Note	Mining properties and leases[(a)] US$m	Land and buildings US$m	Plant and equipment US$m	Capital works in progress US$m	Total US$m
Net book value						
At 1 January 2021		**11,173**	**6,369**	**32,754**	**11,711**	**62,007**
Adjustment on currency translation[(b)]		**(385)**	**(194)**	**(1,097)**	**(259)**	**(1,935)**
Adjustments to capitalised closure costs	25	**518**	**—**	**—**	**—**	**518**
Interest capitalised[(c)]	8	**—**	**—**	**—**	**358**	**358**
Additions		**227**	**70**	**1,841**	**5,337**	**7,475**
Depreciation for the year[(a)(d)]		**(736)**	**(390)**	**(3,061)**	**—**	**(4,187)**
Impairment charges[(e)]		**(2)**	**(66)**	**(195)**	**(6)**	**(269)**
Disposals		**(2)**	**(18)**	**(90)**	**(7)**	**(117)**
Transfers and other movements[(f)]		**24**	**224**	**3,301**	**(3,606)**	**(57)**
At 31 December 2021		**10,817**	**5,995**	**33,453**	**13,528**	**63,793**
– cost		**25,114**	**12,031**	**73,415**	**14,661**	**125,221**
– accumulated depreciation and impairment		**(14,297)**	**(6,036)**	**(39,962)**	**(1,133)**	**(61,428)**
Non-current assets pledged as security[(g)]		**1,637**	**457**	**5,196**	**7,621**	**14,911**

Year ended 31 December 2020	Note	Mining properties and leases[(a)] US$m	Land and buildings US$m	Plant and equipment US$m	Capital works in progress US$m	Total US$m
Net book value						
At 1 January 2020		10,402	6,403	31,491	8,011	56,307
Adjustment on currency translation[(b)]		457	307	1,758	366	2,888
Adjustments to capitalised closure costs	25	946	—	—	—	946
Interest capitalised[(c)]	8	—	—	—	340	340
Additions		329	45	726	5,211	6,311
Depreciation for the year[(a)(d)]		(666)	(354)	(2,776)	—	(3,796)
Impairment charges[(e)]		(327)	(85)	(369)	(82)	(863)
Disposals		(2)	(13)	(64)	(16)	(95)
Transfers and other movements[(f)]		34	66	1,988	(2,119)	(31)
At 31 December 2020		11,173	6,369	32,754	11,711	62,007
– cost		25,052	12,178	71,603	12,906	121,739
– accumulated depreciation and impairment		(13,879)	(5,809)	(38,849)	(1,195)	(59,732)
Non-current assets pledged as security[(g)]		1,712	494	5,065	6,974	14,245

Notes to the 2021 financial statements

14 Property, plant and equipment continued

(a) At 31 December 2021, the net book value of capitalised production phase stripping costs totalled US$2,432 million, with US$2,017 million within "Property, plant and equipment" and a further US$415 million within "Investments in equity accounted units" (2020: total of US$2,398 million, with US$2,019 million in "Property, plant and equipment" and a further US$379 million within "Investments in equity accounted units"). During the year, capitalisation of US$319 million was partly offset by depreciation of US$282 million (including amounts recorded within equity accounted units). Depreciation of deferred stripping costs in respect of subsidiaries of US$201 million (2020: US$145 million; 2019: US$139 million) is included within "Depreciation for the year".
(b) Adjustment on currency translation represents the impact of exchange differences arising on the translation of the assets of entities with functional currencies other than the US dollar, recognised directly in the currency translation reserve. The adjustment in 2021 arose from the weakening of the Australian dollar against the US dollar.
(c) Interest is capitalised at a rate based on the Group or relevant subsidiary's cost of borrowing or at the rate on project specific debt, where applicable. The Group's average borrowing rate used for capitalisation of interest is 3.40% (2020: 4.20%).
(d) Assets within operations for which production is not expected to fluctuate significantly from one year to another or which have a physical life shorter than the related mine are depreciated on a straight line basis as follows:
Land and buildings:
- Land: not depreciated
- Buildings: five to 50 years

Plant and equipment:
- Other plant and equipment: three to 50 years
- Power assets: refer to the table below

Capital work in progress: not depreciated
(e) During 2021, the impairment charge related to our Aluminium smelter at Kitimat, Canada. In 2020, impairment charges related to Pacific Aluminium smelters, the ISAL smelter in Iceland and our interest in the Diavik diamond mine (see note 6).
(f) "Transfers and other movements" includes reclassifications between categories.
(g) Excludes assets held under capitalised lease arrangements. Non-current assets pledged as security represent amounts pledged as collateral against US$4,403 million (2020: US$4,518 million) of loans, which are included in note 21.

Useful economic lives of power generation assets

The group has committed to reducing scope 1 and 2 carbon emissions by 50% relative to our 2018 baseline by 2030 and achieving net zero emissions across our operations by 2050. Transitioning electricity from principally fossil fuel based power generating assets to principally renewables is critical to achieving that goal. The carrying value of power generating assets is set out in the table below. The weighted average remaining useful economic life of plant and equipment for fossil fuel based power generating assets is 14 years (2020:16 years). Given the technical limitations of intermittent renewable energy generation and energy storage systems, and our need for reliable baseload electricity, we expect our current generation assets will be required as an integral part of the total portfolio of generation assets for the foreseeable future. We are investing in research and development and evaluating new market options that can overcome these technical challenges. Should pathways for eliminating fossil fuel power generating assets be identified we may need to accelerate depreciation.

	2021		2020	
Net book value	**Land and buildings US$m**	**Plant and equipment US$m**	Land and buildings US$m	Plant and equipment US$m
Fossil fuels	**26**	**952**	28	1,048
Renewables	**195**	**1,541**	202	1,588

Right-of-use assets – Leased

	Land and buildings US$m	**Plant and equipment US$m**	**Total US$m**
Net book value			
31 December 2021	**549**	**585**	**1,134**
31 December 2020	475	400	875
Additions for the year			
31 December 2021	**135**	**407**	**542**
31 December 2020	30	75	105
Depreciation for the year (included within operating costs)			
31 December 2021	**(81)**	**(251)**	**(332)**
31 December 2020	(93)	(229)	(322)
Impairment charges[(a)]			
31 December 2021	**—**	**—**	**—**
31 December 2020	(6)	(31)	(37)

(a) Impairment charges in 2020 relate to Pacific Aluminium smelters, the ISAL smelter in Iceland and our interest in the Diavik diamond mine (see note 6).

The leased assets of the Group comprise land and buildings (mainly office buildings) and plant and equipment, the majority of which are marine vessels. Lease terms are negotiated on an individual basis and contain a wide range of terms and conditions. Right of use assets are depreciated on a straight line basis over the life of the lease, taking into account any extensions that are likely to be enacted.

15 Investments in equity accounted units

Summary balance sheet (Rio Tinto share)

	2021 US$m	2020 US$m
Rio Tinto's share of assets		
– Non-current assets	**5,139**	5,307
– Current assets	**1,063**	1,077
	6,202	6,384
Rio Tinto's share of liabilities		
– Current liabilities	**(788)**	(785)
– Non-current liabilities	**(1,910)**	(1,835)
	(2,698)	(2,620)
Rio Tinto's share of net assets	**3,504**	3,764

Further details of investments in equity accounted units are set out in notes 34 and 35.

At 31 December 2021 and 2020, the Group had no investments in equity accounted units with shares listed on recognised stock exchanges.

At 31 December 2021, net debt of equity accounted units, excluding amounts due to Rio Tinto, was US$978 million (2020: US$931 million).

16 Inventories

	2021 US$m	2020 US$m
Raw materials and purchased components	**870**	640
Consumable stores	**1,142**	1,050
Work in progress	**1,736**	1,288
Finished goods and goods for resale	**1,884**	1,113
Total inventories	**5,632**	4,091
Comprising:		
Expected to be used within one year	**5,436**	3,917
Expected to be used after more than one year	**196**	174
Total inventories	**5,632**	4,091

During 2021, the Group recognised a net inventory write back of US$7 million (2020:US$15 million write back.) This comprised inventory write-offs of US$18 million (2020: US$35 million) offset by write-back of previously written down inventory due to an increase in realisable values amounting to US$25 million (2020: US$50 million).

At 31 December 2021, US$754 million (2020: US$621 million) of inventories were pledged as security for liabilities.

17 Deferred taxation

	2021 US$m	2020 US$m
At 1 January – deferred tax asset/(liability)	**146**	(118)
Adjustment on currency translation	**61**	(43)
(Charged)/credited to the income statement	**(114)**	178
(Charged)/credited to statement of comprehensive income[a]	**(243)**	115
Other movements[b]	**22**	14
At 31 December – deferred tax (liability)/asset	**(128)**	146
Comprising:		
– deferred tax assets[c][d]	**3,375**	3,385
– deferred tax liabilities[e]	**(3,503)**	(3,239)

Notes to the 2021 financial statements

17 Deferred taxation continued

Deferred tax balances for which there is a right of offset within the same tax jurisdiction are presented net on the face of the balance sheet as permitted by IAS 12. The closing deferred tax assets and liabilities, prior to this offsetting of balances, are shown below.

Analysis of deferred tax

	Total 2021 US$m	Total 2020 US$m
Deferred tax assets arising from:		
Tax losses[c]	**1,492**	1,867
Provisions	**2,165**	2,121
Capital allowances	**784**	529
Post-retirement benefits	**521**	698
Unrealised exchange losses	**188**	204
Other temporary differences	**1,356**	1,046
Total	**6,506**	6,465
Deferred tax liabilities arising from:		
Capital allowances	**(5,019)**	(4,966)
Unremitted earnings[e]	**(366)**	(402)
Capitalised interest	**(342)**	(351)
Post-retirement benefits	**(327)**	(224)
Unrealised exchange gains	**(3)**	(7)
Other temporary differences	**(577)**	(369)
Total	**(6,634)**	(6,319)
(Charged)/credited to the income statement		
Unrealised exchange losses	**—**	25
Tax losses	**(375)**	12
Provisions	**216**	188
Capital allowances	**(42)**	(82)
Tax on unremitted earnings	**(1)**	1
Post-retirement benefits	**21**	9
Other temporary differences	**67**	25
Total	**(114)**	178

(a) The amounts (charged)/credited directly to the statement of comprehensive income include provisions for tax on cash flow hedges and on re-measurement gains/(losses) on pension schemes and on post-retirement healthcare plans.
(b) "Other movements" include deferred tax relating to tax payable recognised by subsidiary holding companies on the profits of the equity accounted units to which it relates.
(c) US$1,152 million (2020: US$1,617 million) of recognised deferred tax assets are subject to expiry if not recovered within certain time limits as specified in local tax legislation and investment agreements. None (2020: US$65 million) of those recognised assets would expire within one year if not used, US$71 million (2020: US$85 million) would expire within one to five years, and US$1,081 million (2020: US$1,467 million) would expire in more than five years.
(d) Recognised and unrecognised deferred tax assets are shown in the table below and totalled US$7,024 million at 31 December 2021 (2020: US$7,226 million). Of this total, US$3,375 million has been recognised as deferred tax assets (2020: US$3,385 million), leaving US$3,649 million (2020: US$3,841 million) unrecognised, as recovery is not considered probable.
(e) Deferred tax liabilities are not recognised on the unremitted earnings of subsidiaries and joint ventures totalling US$2,081 million (2020: US$2,895 million) where the Group is able to control the timing of the remittance and it is probable that there will be no remittance in the foreseeable future. If these earnings were remitted, tax of US$103 million (2020: US$112 million) would be payable.

The recognised amounts in the table below do not include deferred tax assets that have been netted off against deferred tax liabilities.

Analysis of deferred tax assets

	Recognised		Unrecognised	
At 31 December	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m
France	**—**	—	**1,222**	1,284
Canada	**545**	617	**538**	574
US	**851**	938	**67**	84
Australia	**787**	649	**506**	528
Mongolia[a]	**954**	974	**406**	540
Other	**238**	207	**910**	831
Total[b]	**3,375**	3,385	**3,649**	3,841

(a) Deferred tax assets in Mongolia include US$108 million (2020: US$292 million) from tax losses that expire if not recovered against taxable profits within eight years. Tax losses have been calculated in accordance with the tax stability provisions of the Oyu Tolgoi Investment Agreement and Mongolian laws. The interpretation of the stabilised tax laws by the Mongolian Tax Authority has been, and is expected to continue to be, subject to dispute. Changes to agreements or their interpretation could have a material impact on the amount and period of recovery of deferred tax assets.
(b) US$705 million (2020: US$720 million) of the unrecognised assets relate to realised or unrealised capital losses, the recovery of which depends on the existence of capital gains in future years. There are time limits, the shortest of which is one year, for the recovery of US$356 million of the unrecognised assets (2020: US$551 million).

18 Receivables and other assets

	Non-current 2021 US$m	Current 2021 US$m	Total 2021 US$m	Non-current 2020 US$m	Current 2020 US$m	Total 2020 US$m
Trade receivables[(a)]	—	2,241	2,241	1	2,543	2,544
Other financial receivables[(a)]	133	305	438	339	332	671
Receivables relating to net investment in finance leases[(a)]	2	13	15	29	9	38
Amounts due from equity accounted units[(a)]	—	68	68	—	33	33
Other receivables[(b)]	392	418	810	369	422	791
Prepayment of tolling charges to jointly controlled entities[(c)]	183	—	183	218	—	218
Pension surpluses (note 42)	1,070	—	1,070	782	—	782
Other prepayments	414	529	943	58	305	363
Total	**2,194**	**3,574**	**5,768**	1,796	3,644	5,440

(a) At 31 December 2021, trade and other financial receivables, receivables relating to net investment in finance leases and amounts due from equity accounted units are stated net of allowances for expected credit losses of US$57 million (2020: US$59 million).

(b) At 31 December 2021, other receivables include US$388 million (2020: US$410 million) related to Energy Resources of Australia Ltd (ERA's) deposit held in a trust fund which is controlled by the Government of Australia. ERA are entitled to reimbursement from the fund once specific phases of rehabilitation relating to the Ranger Project are completed. The fund is outside of the scope of IFRS 9 - "Financial Instruments".

(c) These prepayments will be charged to Group operating costs as tolling services are rendered and product processing occurs.

There is no material element of receivables and other assets that is interest-bearing or financing in nature.

The fair value of current trade and other receivables and the majority of amounts classified as non-current trade and other receivables approximates to their carrying value.

19 Other financial assets

	Non-current 2021 US$m	Current 2021 US$m	Total 2021 US$m	Non-current 2020 US$m	Current 2020 US$m	Total 2020 US$m
Derivative financial instruments	210	62	272	531	134	665
Equity shares and quoted funds	98	19	117	66	9	75
Other investments, including loans[(a)]	220	2,462	2,682	231	2,668	2,899
Loans to equity accounted units	—	—	—	1	40	41
Total	**528**	**2,543**	**3,071**	829	2,851	3,680

(a) Current "Other investments, including loans" includes US$2,401 million (2020: US$2,538 million) of highly liquid financial assets held in managed investment funds classified as held for trading.

Detailed information relating to other financial assets is given in note 29.

20 Cash and cash equivalents

		2021 US$m	2020 US$m
Cash at bank and in hand		1,344	1,150
Money market funds, reverse repurchase agreements and other cash equivalents[(a)]		11,463	9,231
Balance per Group balance sheet		**12,807**	10,381
Bank overdrafts repayable on demand (unsecured)	21	(2)	—
Balance per Group cash flow statement		**12,805**	10,381

(a) We continue to purchase securities under resale agreements ("reverse repurchase agreements"). At 31 December 2021 we held US$4,520 million (2020: US$1,200 million) of reverse repurchase agreements, measured at amortised cost and reported within cash and cash equivalents as they are highly liquid products maturing within three months. We accepted collateral of investment grade quality in respect of these reverse repurchase agreements, with a fair value of US$4,638 million as at 31 December 2021 (2020: US$1,260 million). Collateral is not recognised on our balance sheet and in the event of the counterparty's default we would be able to sell it.

Restricted cash and cash equivalent analysis

Cash and cash equivalents of US$235 million (2020: US$295 million) are held in countries where there are restrictions on remittances. Of this balance, US$165 million (2020: US$238 million) could be used to repay subsidiaries' third-party borrowings.

There are also restrictions on a further US$981 million (2020: US$1,422 million) of cash and cash equivalents, the majority of which is held by partially owned subsidiaries and is not available for use in the wider Group due to legal and contractual restrictions currently in place. Of this balance US$752 million (2020: US$1,215 million) could be used to repay these subsidiaries' third-party borrowings.

Notes to the 2021 financial statements

21 Borrowings and other financial liabilities

Borrowings at 31 December

	Note	Non-current 2021 US$m	Current 2021 US$m	Total 2021 US$m	Non-current 2020 US$m	Current 2020 US$m	Total 2020 US$m
Rio Tinto Finance plc Euro Bonds 2.875% due 2024[(a)(b)]		497	—	497	555	—	555
Rio Tinto Finance (USA) Limited Bonds 3.75% 2025[(a)(c)]		—	—	—	1,299	—	1,299
Rio Tinto Finance (USA) Limited Bonds 7.125% 2028[(a)]		934	—	934	1,005	—	1,005
Alcan Inc. Debentures 7.25% due 2028[(a)]		105	—	105	109	—	109
Rio Tinto Finance plc Sterling Bonds 4.0% due 2029[(a)(b)]		682	—	682	717	—	717
Alcan Inc. Debentures 7.25% due 2031[(a)]		420	—	420	438	—	438
Alcan Inc. Global Notes 6.125% due 2033[(a)]		722	—	722	744	—	744
Alcan Inc. Global Notes 5.75% due 2035[(a)]		283	—	283	292	—	292
Rio Tinto Finance (USA) Limited Bonds 5.2% 2040[(a)]		1,156	—	1,156	1,173	—	1,173
Rio Tinto Finance (USA) plc Bonds 4.75% 2042[(a)]		495	—	495	501	—	501
Rio Tinto Finance (USA) plc Bonds 4.125% 2042[(a)]		735	—	735	743	—	743
Rio Tinto Finance (USA) Limited Bonds 2.75% 2051[(a)(c)]		1,225	—	1,225	—	—	—
Oyu Tolgoi LLC MIGA Insured Loan LIBOR plus 2.65% due 2027[(d)]		597	76	673	674	4	678
Oyu Tolgoi LLC Commercial Banks "B Loan" LIBOR plus 3.4% due 2027[(d)]		1,387	178	1,565	1,571	10	1,581
Oyu Tolgoi LLC Export Credit Agencies Loan 2.3% due 2028[(d)]		237	41	278	275	2	277
Oyu Tolgoi LLC Export Credit Agencies Loan LIBOR plus 3.65% due 2029[(d)]		805	61	866	867	5	872
Oyu Tolgoi LLC International Financial Institutions "A Loan" LIBOR plus 3.78% due 2030[(d)]		744	32	776	771	6	777
Other secured loans		—	246	246	246	68	314
Other unsecured loans		332	176	508	322	256	578
Lease liabilities	22	1,039	324	1,363	945	233	1,178
Bank overdrafts	20	—	2	2	—	—	—
Total borrowings including overdrafts[(e)]		**12,395**	**1,136**	**13,531**	13,247	584	13,831

(a) These borrowings are subject to hedging arrangements and are summarised in the interest rate risk section of note 29.
(b) Rio Tinto has a US$10 billion (2020: US$10 billion) European Debt Issuance Programme against which the cumulative amount utilised was US$1.1 billion equivalent at 31 December 2021 (2020: US$1.2 billion). The carrying value of these bonds after hedge accounting adjustments amounted to US$1.2 billion (2020: US$1.3 billion) in aggregate.
(c) On 28 October 2021, the Group issued US$1.25 billion of 30-year fixed rate debt with a coupon of 2.75%. We used the proceeds to complete a US$1.2 billion (nominal value) bond buy-back programme. The notes purchased and redeemed have been cancelled.
(d) These borrowings relate to the Oyu Tolgoi LLC project finance facility. The project finance facility provides for interest-only payments for the first five years from 2016 followed by minimum repayments according to a stepped amortisation schedule for the remaining life of the facility. The due dates stated represent the final repayment date. The interest rates stated are pre-completion and will increase by 1% post-completion.
(e) The Group's borrowings of US$13.5 billion (2020: US$13.8 billion) include US$4.4 billion (2020: US$4.5 billion) of subsidiary entity borrowings that are subject to various financial and general covenants with which the respective borrowers were in compliance as at 31 December 2021.

Other financial liabilities

	Non-current 2021 US$m	Current 2021 US$m	Total 2021 US$m	Non-current 2020 US$m	Current 2020 US$m	Total 2020 US$m
Derivative financial instruments	393	225	618	161	23	184
Other financial liabilities	—	20	20	—	—	—
Total other financial liabilities	**393**	**245**	**638**	161	23	184
Total borrowings including overdrafts (as above)	12,395	1,136	13,531	13,247	584	13,831
Total borrowings and other financial liabilities	**12,788**	**1,381**	**14,169**	13,408	607	14,015

22 Leases

Lessee arrangements

We have made the following payments associated with leases:

Description of payment	2021 US$m	2020 US$m	Included within
Principal lease payments	358	324	Cash flows from financing activities
Interest payments on leases	48	50	Cash flows from operating activities
Payments for short-term leases	502	314	Net operating costs
Payments for variable lease components	34	30	Net operating costs
Payments for low value leases (>12 months in duration)	2	1	Net operating costs
Total lease payments	**944**	719	

Lease liabilities

The maturity profile of lease liabilities recognised at the balance sheet date is:

	Note	2021 US$m	2020 US$m
Lease liabilities			
Due within 1 year		**361**	271
Between 1 and 3 years		**440**	386
Between 3 and 5 years		**226**	185
More than 5 years		**704**	724
Total undiscounted cash payments expected to be made		**1,731**	1,566
Effect of discounting		**(368)**	(388)
Present value of minimum lease payments	21	**1,363**	1,178

At 31 December 2021, commitments for leases not yet commenced were US$476 million (2020: US$125 million); commitments relating to short-term leases which had already commenced at 31 December 2021 were US$165 million (2020: US$155 million). Short-term and low value leases are not recognised on the balance sheet as a lease liability and are expensed as incurred.

23 Consolidated net cash/(debt)

	Financing liabilities			**Other assets**		
Year ended 31 December 2021	**Borrowings excluding overdrafts[(a)] US$m**	**Lease liabilities[(b)] US$m**	**Net-debt related derivatives (included in Other financial assets/ liabilities)[(c)] US$m**	**Cash and cash equivalents including overdrafts US$m**	**Other investments[(d)] US$m**	**Net cash/ (debt) US$m**
Analysis of changes in consolidated net cash/(debt)						
Opening balance	**(12,653)**	**(1,178)**	**248**	**10,381**	**2,538**	**(664)**
Foreign exchange adjustment	**67**	**30**	**(45)**	**100**	**—**	**152**
Cash movements excluding exchange movements	**270**	**358**	**(51)**	**2,324**	**(107)**	**2,794**
Other non-cash movements	**150**	**(573)**	**(253)**	**—**	**(30)**	**(706)**
Closing balance	**(12,166)**	**(1,363)**	**(101)**	**12,805**	**2,401**	**1,576**

	Financing liabilities			Other assets		
Year ended 31 December 2020	Borrowings excluding overdrafts[(a)] US$m	Lease liabilities[(b)] US$m	Net-Debt related derivatives (included in Other financial assets/ liabilities)[(c)] US$m	Cash and cash equivalents including overdrafts US$m	Other investments[(d)] US$m	Net debt US$m
Analysis of changes in consolidated net debt						
Opening balance	(12,806)	(1,309)	(147)	8,027	2,584	(3,651)
Foreign exchange adjustment	(83)	(47)	39	165	—	74
Cash movements excluding exchange movements	505	324	91	2,189	(58)	3,051
Other non-cash movements	(269)	(146)	265	—	12	(138)
Closing balance	(12,653)	(1,178)	248	10,381	2,538	(664)

(a) Borrowings excluding overdrafts and including lease liabilities at 31 December 2021 of US$13,529 million (2020: US$13,831 million) differ from total borrowings and other financial liabilities of US$14,169 million (2020: US$14,015 million) on the balance sheet as they exclude other current financial liabilities of US$245 million (2020: US$23 million), other non-current financial liabilities of US$393 million (2020: US$161 million) and bank overdraft of US$2 million (2020: US$nil).

(b) Other movements in lease liabilities include the net impact of additions, modifications and terminations during the year.

(c) Included within "Net debt-related derivatives" are interest rate and cross currency interest rate swaps that are in hedge relationships with the Group's debt. In 2021, we have also included currency forwards that we use to mitigate the foreign exchange exposure on our non-US dollar separately managed funds. These forwards are not in a hedge relationship but are included within the Group's net debt definition.

(d) Other investments comprise US$2,401 million (2020: US$2,538 million) of highly liquid financial assets held in managed investment funds classified as held for trading. During the year we entered into non-US dollar denominated managed investment funds.

Further information relating to the currency and interest rate exposures arising from net debt and related derivatives is given in note 29.

Notes to the 2021 financial statements

24 Trade and other payables

	Non-current 2021 US$m	Current 2021 US$m	Total 2021 US$m	Non-current 2020 US$m	Current 2020 US$m	Total 2020 US$m
Trade payables	—	3,410	3,410	1	3,124	3,125
Other financial payables	254	909	1,163	298	862	1,160
Other payables	82	110	192	97	115	212
Deferred income[(a)]	141	399	540	133	344	477
Accruals	42	1,488	1,530	27	1,294	1,321
Employee entitlements	—	798	798	—	762	762
Royalties and mining taxes	2	574	576	3	863	866
Amounts owed to equity accounted units	213	40	253	190	51	241
Government grants deferred	64	5	69	71	6	77
Total	798	7,733	8,531	820	7,421	8,241

(a) Deferred income includes contract liabilities of US$383 million (2020: US$338 million).

The fair value of trade payables and financial instruments within other payables approximates their carrying value.

25 Provisions (including post-retirement benefits)

	Note	Pensions and post-retirement healthcare[(b)] US$m	Other employee entitlements[(c)] US$m	Close-down and restoration/ environmental[(d)] US$m	Other US$m	Total 2021 US$m	Total 2020 US$m
At 1 January		3,055	419	13,335	856	17,665	15,103
Adjustment on currency translation		(11)	(23)	(483)	(29)	(546)	890
Adjustments to mining properties/right of use assets:	14						
– increases to existing and new provisions		—	—	518	3	521	141
– change in discount rate		—	—	—	—	—	816
Charged/(credited) to profit:							
– increases to existing and new provisions		161	112	1,475	382	2,130	1,074
– change in discount rate		—	—	—	—	—	140
– unused amounts reversed		—	(21)	(192)	(37)	(250)	(299)
– exchange losses on provisions		—	—	23	—	23	(22)
– amortisation of discount		—	—	415	3	418	377
Utilised in year		(129)	(102)	(541)	(128)	(900)	(774)
Re-measurement (gains)/losses recognised in other comprehensive income		(687)	—	—	—	(687)	250
Transfers and other movements[(a)]		(291)	9	(8)	(48)	(338)	(31)
At 31 December		2,098	394	14,542	1,002	18,036	17,665
Balance sheet analysis:							
Current		66	317	1,023	700	2,106	1,729
Non-current		2,032	77	13,519	302	15,930	15,936
Total		2,098	394	14,542	1,002	18,036	17,665

Projected cash spend for the undiscounted close-down and restoration/environmental clean-up provision

Undiscounted close-down and environmental restoration cash flows	<1yr US$m	1-3 yrs US$m	3-5 yrs US$m	> 5 yrs US$m	Total US$m
At 31 December 2021	1,023	1,652	1,680	14,420	18,775
At 31 December 2020	776	1,203	1,433	13,988	17,400

(a) During the year ended 31 December 2021, the Group entered into an agreement to transfer its partially funded pension obligations in France to an external insurer. The insurance premium was paid by the transfer of the existing pension assets valued at US$89 million plus an additional cash payment of €247 million (US$294 million), of which US$3 million was taken to the income statement. The Group has no further legal or constructive obligation relating to the insured pensions and has reflected this transaction as a settlement.

(b) The main assumptions used to determine the provision for pensions and post-retirement healthcare, and other information, including the expected level of future funding payments in respect of those arrangements, are given in note 42.

(c) The provision for other employee entitlements includes a provision for long service leave of US$272 million (2020: US$283 million), based on the relevant entitlements in certain Group operations and includes US$60 million (2020: US$62 million) of provision for redundancy and severance payments.

(d) The Group's policy on close-down and restoration costs is described in note 1(l) and in paragraph (iii) under "Critical accounting policies and estimates" on page 230. Close-down and restoration costs are a normal consequence of mining, and the majority of close-down and restoration expenditure is incurred in the years following closure of the mine, refinery or smelter. Non-current provisions for close-down, restoration and environmental expenditure include amounts relating to environmental clean-up of US$645 million (2020: US$468 million) expected to take place between one and five years from the balance sheet date, and US$1,059 million (2020: US$937 million) expected to take place later than five years after the balance sheet date.
Close-down, restoration and environmental liabilities at 31 December 2021 have not been adjusted for closure related receivables amounting to US$410 million (2020: US$574 million) due from the ERA trust fund and other financial assets held for the purposes of meeting closure obligations. These are included within "Receivables and other assets" on the balance sheet.

Analysis of close-down and restoration/environmental clean-up provisions

As at 31 December	2021 US$m	2020 US$m
Undiscounted close-down and environmental restoration obligations	**18,775**	17,400
Impact of discounting	**(4,233)**	(4,065)
Present closure obligation	**14,542**	13,335
Attributable to:		
Operating sites	**10,727**	10,736
Non-operating sites	**3,815**	2,599
Total	**14,542**	13,335

Remaining lives of operations and infrastructure range from one to over 50 years with an average for all sites, weighted by present closure obligation, of around 16 years (2020: 17 years). Although the ultimate cost to be incurred is uncertain, the Group's businesses estimate their respective costs based on current restoration standards, techniques and expected climate conditions.

Provisions of US$14,542 million (2020: US$13,335 million) for close-down and restoration costs and environmental clean-up obligations are based on risk-adjusted cash flows. The Group re-assessed the closure discount rate in the current year and continues to consider that real rate of 1.5%, applied prospectively since 30 September 2020, is the most appropriate rate to use. This assumption is based on the currency in which we plan to fund the closures and our expectation of long-term interest rate and exchange rate parity at the locations of our operations. Prior to 30 September 2020 and in recent years, the close-down and restoration costs and environmental clean-up obligations were discounted at a real rate of 2.0%. To illustrate the sensitivity of the provision to discounting, if the discount rate at 31 December 2021 were decreased to 1.0% then the provision would be US$1.3 billion higher, of which approximately US$1.2 billion would be capitalised within "Property, plant and equipment" at operating sites and US$0.1 billion would be charged to the income statement for non-operating and fully impaired sites. If the discount rate were increased to 3.0% then the provision would be US$2.8 billion lower, of which approximately US$2.5 billion would result in a decrease within "Property, plant and equipment" at operating sites and US$0.3 billion would be credited to the income statement for non-operating and fully impaired sites.

Closure cost composition as at 31 December	2021 US$m	2020 US$m
Decommissioning, decontamination and demolition	**3,343**	3,131
Closure and rehabilitation earthworks [(a)]	**4,125**	4,223
Long-term water management costs [(b)]	**967**	966
Post closure monitoring and maintenance	**1,676**	1,318
Indirect costs, owners' costs and contingency [(c)]	**4,431**	3,697
Total	**14,542**	13,335

The underlying costs for closure have been estimated with varying degrees of accuracy based on a function of the age of the underlying asset and proximity to closure. For assets within ten years of closure, closure plans and cost estimates are supported by detailed studies which are refined as the closure date approaches. These closure studies consider climate change and plan for resilience to expected climate conditions with a particular focus on precipitation rates. For new developments, consideration of climate change and ultimate closure conditions are an important part of the approval process. For longer-lived assets, closure provisions are typically based on conceptual level studies that are refreshed at least every five years; these are evolving to incorporate greater consideration of forecast climate conditions at closure.

(a) A key component of earthworks rehabilitation involves re-landscaping the area disturbed by mining activities utilising the largely diesel powered heavy mobile equipment. In developing low-carbon solutions for our mobile fleet, this may include electrification of the vehicles during the mine life. The forecast cash flows for the heavy mobile equipment in the closure cost estimate are based on existing fuel sources. The cost incurred during closure could reduce if these activities are powered by renewable energy.

(b) Long-term water management relates to the post-closure treatment of water due to acid rock drainage and other environmental commitments and is an area of research and development focus for our Closure team. The cost of this water processing can continue for many years after the bulk earthworks and demolition activities have completed and are therefore exposed to long-term climate change. This could materially affect rates of precipitation and therefore change the volume of water requiring processing. It is not currently possible to forecast accurately the impact this could have on the closure provision as some of our locations could experience drier conditions whereas others could experience greater rainfall. A further consideration relates to the alternative commercial use for the processed water, which could support ultimate transfer of these costs to a third party.

(c) Indirect costs, owners' costs and contingency include adjustments to the underlying cash flows to align the closure provision with a central-case estimate. This excludes allowances for quantitative estimation uncertainties, which are allocated to the underlying cost driver and presented within the respective cost categories above.

Geographic composition as at 31 December	2021 US$m	2020 US$m
Australia	**7,605**	7,076
USA	**4,057**	3,819
Canada	**1,662**	1,482
Rest of World	**1,218**	958
Total	**14,542**	13,335

The geographic composition of the closure provision shows that our closure obligations are largely in countries with established levels of regulation in respect of mine and site closure.

Notes to the 2021 financial statements

26 Share capital – Rio Tinto plc

	2021 Number (million)	2020 Number (million)	2019 Number (million)	**2021 US$m**	2020 US$m	2019 US$m
Issued and fully paid up share capital of 10p each						
At 1 January	**1,255.756**	1,259.345	1,287.660	**207**	207	211
Ordinary shares issued[(a)(c)]	**0.039**	0.039	0.041	**—**	—	—
Shares purchased and cancelled[(b)]	**—**	(3.628)	(28.356)	**—**	—	(4)
At 31 December	**1,255.795**	1,255.756	1,259.345	**207**	207	207
Shares held by public						
At 1 January	**1,246.904**	1,249.924	1,278.215			
Shares reissued from treasury[(a)]	**1.198**	0.569	0.024			
Ordinary shares issued[(a)(c)]	**0.039**	0.039	0.041			
Shares purchased and cancelled[(b)]	**—**	(3.628)	(28.356)			
At 31 December	**1,248.141**	1,246.904	1,249.924			
Shares held in treasury	**7.654**	8.852	9.421			
Shares held by public	**1,248.141**	1,246.904	1,249.924			
Total share capital	**1,255.795**	1,255.756	1,259.345			
Other share classes						
Special Voting Share of 10p each[(d)]	**1 only**	1 only	1 only			
DLC Dividend Share of 10p each[(d)]	**1 only**	1 only	1 only			

(a) 38,581 ordinary shares were issued in 2021 under the Global Employee Share Plan (GESP). 1,197,858 ordinary shares were reissued from treasury during the year resulting from the vesting of awards under Rio Tinto plc employee share-based payment plans, with market values between £44.61 and £64.80 per share (2020: 39,273 ordinary shares were issued under the GESP and 568,863 ordinary shares were reissued from treasury with exercise prices and market values between £32.74 and £56.32 per share; 2019: 40,974 ordinary shares were issued under the GESP and 23,659 ordinary shares reissued from treasury with exercise prices and market values between £36.33 and £49.74 per share).

(b) The authority for the company to buy back its ordinary shares was renewed at the 2021 annual general meeting. No shares were bought back and cancelled in 2021 under the on-market buy-back programme. 3,627,568 shares were bought back and cancelled in 2020 under the on-market buy-back programme. 28,356,034 shares were bought back in 2019 under the on-market buy-back programme.

(c) The aggregate consideration for new shares issued under the GESP was US$1.8 million (2020: US$1.3 million; 2019: US$1.1 million). The difference between the nominal value and the issue price of the shares issued was credited to the share premium account. The aggregate consideration received for treasury shares reissued was US$0.2 million (2020: US$1 million; 2019: US$1 million). No new shares were issued as a result of the exercise of options under Rio Tinto plc employee share-based payment plans in 2021, 2020 and 2019.

(d) The "Special Voting Share" was issued to facilitate the joint voting by shareholders of Rio Tinto plc and Rio Tinto Limited on Joint Decisions, following the DLC Merger. The "DLC Dividend Share" was issued to a subsidiary of Rio Tinto Limited to facilitate the efficient management of funds within the DLC structure. In addition, an Equalisation Share is authorised but not issued and is governed by the terms of the DLC Merger Sharing Agreement.

During 2021, US$18 million of shares and ADRs (2020: US$31 million; 2019: US$43 million) were purchased by employee share ownership trusts on behalf of Rio Tinto plc to satisfy employee share awards on vesting. At 31 December 2021, 259,583 shares and 46,977 ADRs were held in the employee share ownership trusts on behalf of Rio Tinto plc.

Information relating to share-based incentive schemes is given in note 41.

27 Share capital – Rio Tinto Limited

	2021 Number (million)	2020 Number (million)	2019 Number (million)	**2021 US$m**	2020 US$m	2019 US$m
Issued and fully paid up share capital						
At 1 January	**371.21**	371.21	371.21	**3,781**	3,448	3,477
Adjustment on currency translation				**(211)**	333	(29)
At 31 December	**371.21**	371.21	371.21	**3,570**	3,781	3,448
– Special Voting Share[(a)]	**1 only**	1 only	1 only			
– DLC Dividend Share[(a)]	**1 only**	1 only	1 only			
Total share capital	**371.21**	371.21	371.21			

(a) The "Special Voting Share" was issued to facilitate the joint voting by shareholders of Rio Tinto Limited and Rio Tinto plc on Joint Decisions following the DLC Merger. The "DLC Dividend Share" was issued to facilitate the efficient management of funds within the DLC structure. Directors have the ability to issue an Equalisation Share if that is required under the terms of the DLC Merger Sharing Agreement.

During 2021, US$95 million of shares (2020: US$76 million; 2019: US$63 million) were purchased by employee share ownership trusts on behalf of Rio Tinto Limited to satisfy employee share awards on vesting. At 31 December 2021, 995,173 shares were held in the employee share ownership trusts on behalf of Rio Tinto Limited.

Information relating to share-based incentive schemes is given in note 41.

28 Other reserves and retained earnings

	2021 US$m	2020 US$m	2019 US$m
Capital redemption reserve[(a)]			
At 1 January	51	51	47
Own shares purchased and cancelled	—	—	4
At 31 December	51	51	51
Cash flow hedge reserve			
At 1 January	124	160	195
Cash flow hedge (losses)/gains	(211)	24	12
Cash flow hedge losses/(gains) transferred to the income statement	14	(63)	(41)
Tax on the above	62	3	(6)
At 31 December	(11)	124	160
Fair value through other comprehensive income reserve			
At 1 January	(2)	(11)	(6)
Gains/(losses) on equity investments	4	9	(5)
At 31 December	2	(2)	(11)
Cost of hedging reserve			
At 1 January	(3)	(10)	(13)
Cost of hedging deferred to reserves during the year	(18)	7	3
At 31 December	(21)	(3)	(10)
Other reserves[(b)]			
At 1 January	11,628	11,643	11,650
Own shares purchased from Rio Tinto Limited shareholders to satisfy share options	(95)	(76)	(63)
Employee share options: value of services	55	60	52
Deferred tax on share options	(6)	1	4
At 31 December	11,582	11,628	11,643
Foreign currency translation reserve[(c)]			
At 1 January	162	(2,656)	(3,212)
Parent and subsidiaries' currency translation and exchange adjustments	(1,755)	2,814	331
Equity accounted units currency translation adjustments	(12)	4	10
Currency translation reclassified on disposal	—	—	215
At 31 December	(1,605)	162	(2,656)
Total other reserves per balance sheet	9,998	11,960	9,177

	2021 US$m	2020 US$m	2019 US$m
Retained earnings[(d)]			
At 1 January	26,792	23,387	27,025
Adjustment for transition to new accounting pronouncements[(e)]	—	—	(113)
Parent and subsidiaries' profit for the year	20,052	9,456	7,709
Equity accounted units' profit after tax for the year	1,042	313	301
Re-measurement gains/(losses) on pension and post-retirement healthcare plans[(f)]	1,015	(482)	(259)
Tax relating to components of other comprehensive income	(297)	116	81
Total comprehensive income for the year	21,812	9,403	7,832
Share buy-back programme	—	(1)	(1,135)
Dividends paid	(15,385)	(6,132)	(10,334)
Change in equity interest held by Rio Tinto	76	84	85
Own shares purchased/treasury shares reissued for share options and other movements	(18)	(31)	(43)
Employee share options and other IFRS 2 charges taken to the income statement	60	82	70
At 31 December	33,337	26,792	23,387

(a) The capital redemption reserve was set up to comply with section 733 of the UK Companies Act 2006 (previously section 170 of the UK Companies Act 1985) when shares of a company are redeemed or purchased wholly out of the company's profits. Balances reflect the amount by which the company's issued share capital is diminished in accordance with this section.
(b) Other reserves includes US$11,936 million which represents the difference between the nominal value and issue price of the shares issued arising from Rio Tinto plc's rights issue completed in July 2009. No share premium was recorded in the Rio Tinto plc financial statements through the operation of the merger relief provisions of the UK Companies Act 1985.
Other reserves also include the cumulative amount recognised under IFRS 2 "Share Based Payment" in respect of options granted but not exercised to acquire shares in Rio Tinto Limited, less, where applicable, the cost of shares purchased to satisfy share options exercised. The cumulative amount recognised under IFRS 2 in respect of options granted but not exercised to acquire shares in Rio Tinto plc is recorded in retained earnings.
(c) Exchange differences arising on the translation of the Group's net investment in foreign controlled companies are taken to the foreign currency translation reserve, as described in note 1(d). The cumulative differences relating to an investment are transferred to the income statement when the investment is disposed of.
(d) Retained earnings and movements in reserves of subsidiaries include those arising from the Group's share of joint operations.
(e) The impact of the transition to new accounting pronouncements; IFRS 16 "Leases" and IFRIC 23 "Uncertainty over income tax treatments" on 1 January 2019.
(f) There were US$12 million re-measurement gains relating to equity accounted units in 2021 (31 December 2020: US$11 million losses, 31 December 2019: US$7 million losses).

Notes to the 2021 financial statements

29 Financial instruments and risk management

In this note, except where stated, the information relates to the financial instruments of the parent companies and their subsidiaries and joint operations, and excludes those of equity accounted units. We have grouped the information in the following sections:

A – Financial assets and liabilities by categories
B – Derivative financial instruments
C – Fair values

A (a) Financial assets and liabilities by categories

At 31 December 2021	Note	**Total US$m**	**Amortised cost US$m**	**Fair value through other comprehensive income US$m**	**Fair value through profit and loss US$m**
Financial assets					
Cash and cash equivalents	20	**12,807**	**8,669**	**—**	**4,138**
Trade and other financial receivables[(a)(b)]	18	**2,762**	**1,598**	**—**	**1,164**
Equity shares and quoted funds	19	**117**	**—**	**98**	**19**
Other investments, including loans[(c)]	19	**2,682**	**22**	**—**	**2,660**
Derivatives related to net debt: designated as hedges[(d)]	19, 23	**139**	**—**	**—**	**139**
Derivatives and embedded derivatives not related to net debt: not designated as hedges[(d)]	19	**133**	**—**	**—**	**133**
Loans to equity accounted units including quasi equity loans		**96**	**96**	**—**	**—**
Total financial assets		**18,736**	**10,385**	**98**	**8,253**
Financial liabilities					
Trade and other financial payables[(e)]	24	**(6,356)**	**(6,289)**		**(67)**
Short-term borrowings and bank overdrafts	21	**(1,136)**	**(1,136)**		**—**
Medium-term and long-term borrowings	21	**(12,395)**	**(12,395)**		**—**
Derivatives related to net debt: designated as hedges[(d)]	21, 23	**(240)**	**—**		**(240)**
Derivatives and embedded derivatives not related to net debt: not designated as hedges[(d)]	21	**(255)**	**—**		**(255)**
Embedded derivatives not related to net debt: designated as hedges[(d)]	21	**(123)**	**—**		**(123)**
Other financial liabilities	21	**(20)**	**(20)**		**—**
Total financial liabilities		**(20,525)**	**(19,840)**		**(685)**

At 31 December 2020	Note	Total US$m	Amortised cost US$m	Fair value through other comprehensive income US$m	Fair value through profit and loss US$m
Financial assets					
Cash and cash equivalents	20	10,381	3,970	—	6,411
Trade and other financial receivables[(a)(b)]	18	3,286	1,479	—	1,807
Equity shares and quoted funds	19	75	—	64	11
Other investments, including loans[(c)]	19	2,899	138	—	2,761
Derivatives related to net debt: designated as hedges[(d)]	19, 23	388	—	—	388
Derivatives and embedded derivatives not related to net debt: not designated as hedges[(d)]	19	204	—	—	204
Embedded derivatives not related to net debt: designated as hedges[(d)]	19	73	—	—	73
Loans to equity accounted units including quasi equity loans		153	153	—	—
Total financial assets		17,459	5,740	64	11,655
Financial liabilities					
Trade and other financial payables[(e)]	24	(5,847)	(5,817)		(30)
Short-term borrowings and bank overdrafts	21	(584)	(584)		—
Medium-term and long-term borrowings	21	(13,247)	(13,247)		—
Derivatives related to net debt: designated as hedges[(d)]	21, 23	(140)	—		(140)
Derivatives and embedded derivatives not related to net debt: not designated as hedges[(d)]	21	(24)	—		(24)
Embedded derivatives not related to net debt: designated as hedges[(d)]	21	(20)	—		(20)
Other financial liabilities	21	—	—		—
Total financial liabilities		(19,862)	(19,648)		(214)

(a) Trade and other financial receivables comprise trade receivables, other financial receivables, receivables relating to net investments in finance leases and amounts due from equity accounted units within note 18.
(b) Provisionally priced receivables are fair valued.
(c) Other investments, including loans, include US$2,401 million (2020: US$2,538 million) of highly liquid financial assets in managed investment funds classified as held for trading.
(d) These financial assets and liabilities in aggregate agree to the total derivative financial instruments disclosed in notes 19 and 21.
(e) Trade and other financial payables comprise trade payables, other financial payables, accruals and amounts due to equity accounted units within note 24. The trade and other payables held at fair value are valued using Level 2 inputs.

A (b) Financial risk management

Objectives and policy

Our financial risk management objectives are:

- to have in place a robust capital structure to manage the organisation through the commodity cycle; and
- to allow our financial exposures to float with the market.

Any exceptions to these require formal approval by the Board.

The Group operates a floating prices and rates policy for the management of our key economic exposure to commodity price, foreign exchange and interest rates risks. We do not seek to hedge this floating exposure and will re-float, where possible, any material price or rates that are fixed. Where this is impossible (or sub-optimal) any non-floating price risks are managed within defined market risk tolerances. Derivatives are used as and when required in order to manage our exposure in accordance with this underlying financial risk management principle.

In the paragraphs below, we summarise the risks that we are exposed to, and outline how our Treasury and Commercial teams manage these risks in accordance with agreed policies. These teams operate under a strong control environment, within approved limits. Our Board reviews and approves limits at least annually.

(i) Capital and liquidity risk

Our overriding objective when managing capital and liquidity is to safeguard the business as a going concern. Capital is allocated in a consistent and disciplined manner, prioritising sustaining capital expenditure, followed by the ordinary dividend and then an iterative allocation between investing in compelling growth opportunities, maintaining balance sheet strength and delivering further returns to shareholders.

Our Board and senior management regularly review the capital structure and liquidity of the Group. They take into account our strategic priorities, the economic and business conditions, and any identified investment opportunities, along with the expected returns to shareholders. We expect total cash returns to shareholders over the longer term to be in a range of 40–60% of underlying earnings in aggregate through the commodity cycle.

We consider various financial metrics when managing our risk, including net debt, gearing, the overall level of borrowings and their maturity profile, liquidity levels, total capital, future cash flows, underlying EBITDA and interest cover ratios.

Our total capital as at 31 December was:

Total capital	Note	**2021 US$m**	2020 US$m
Equity attributable to owners of Rio Tinto (see Group balance sheet)		**51,432**	47,054
Equity attributable to non-controlling interests (see Group balance sheet)		**5,158**	4,849
Net (cash)/debt	23	**(1,576)**	664
Total capital		**55,014**	52,567

Our net cash increased by US$2.2 billion to US$1.6 billion at 31 December 2021 from net debt of US$0.7 billion at 31 December 2020. This was driven by operating cash inflows, partially offset by capital expenditure and cash returns to shareholders during the year. At 31 December 2021 net gearing was (3)% (2020: 1%) and interest cover was 59 times (2020: 39 times).

We have access to various forms of financing including our US Shelf Programme, European Debt Issuance Programme, Commercial Paper and credit facilities. On 28 October 2021, we issued US$1.25 billion 30-year fixed rate SEC-registered bonds with a coupon of 2.75%. The proceeds of the new issuance were used to fund the early redemption and extinguishment of the company's US$1.20 billion 3.75% bonds due to mature in June 2025.

On 16 November 2021, Rio Tinto Finance plc and Rio Tinto Finance Limited completed the renewal of our US$7.5 billion multi-currency revolving credit facility with a syndicate of banks. The facility is guaranteed by Rio Tinto plc and Rio Tinto Limited and has a five-year term, that now matures in November 2026. Other features include: two consecutive one-year extension options and a US$6.2 billion denominated same day access swing-line facility. The new facility replaced the US$7.5 billion dual tranche revolving credit facility dated 15 November 2013, last amended in November 2020. The facility remained undrawn throughout the year.

Our credit ratings, as provided by Standard & Poor's and Moody's investor services, as at 31 December were:

	2021	2020
Long-term rating	**A/A2**	A/A2
Short-term rating	**A-1/P-1**	A-1/P-1
Outlook	**Stable/Stable**	Stable/Stable

Our unified credit status is maintained through cross guarantees, which mean the contractual obligations of Rio Tinto plc and Rio Tinto Limited are automatically guaranteed by the other.

Notes to the 2021 financial statements

29 Financial instruments and risk management continued

In the table below, we summarise the maturity profile of our financial liabilities on our balance sheet based on contractual undiscounted payments. When the amount payable is not fixed, the amount disclosed is determined by reference to the conditions existing at the end of the reporting period. This will therefore not necessarily agree with the amounts disclosed as the carrying value.

Financial liability analysis

At 31 December 2021 (Outflows)/Inflows	**Within 1 year or on demand US$m**	**Between 1 and 2 years US$m**	**Between 2 and 3 years US$m**	**Between 3 and 4 years US$m**	**Between 4 and 5 years US$m**	**After 5 years US$m**	**Total US$m**
Non-derivative financial liabilities							
Trade and other financial payables[a]	**(5,766)**	**(31)**	**(34)**	**(18)**	**(20)**	**(406)**	**(6,275)**
Expected lease liability payments	**(361)**	**(266)**	**(174)**	**(133)**	**(93)**	**(704)**	**(1,731)**
Borrowings before swaps	**(827)**	**(746)**	**(1,318)**	**(604)**	**(597)**	**(8,112)**	**(12,204)**
Expected future interest payments[a]	**(511)**	**(486)**	**(460)**	**(439)**	**(414)**	**(3,485)**	**(5,795)**
Other financial liabilities	**(20)**	**—**	**—**	**—**	**—**	**—**	**(20)**
Derivative financial liabilities[b]							
Derivatives related to net debt – gross settled[a]:							
– gross inflows	**41**	**41**	**506**	**27**	**27**	**756**	**1,398**
– gross outflows	**(44)**	**(44)**	**(590)**	**(34)**	**(34)**	**(909)**	**(1,655)**
Derivatives not related to net debt – net settled	**(186)**	**(77)**	**(40)**	**(10)**	**(3)**	**(37)**	**(353)**
Derivatives not related to net debt – gross settled:							
– gross inflows	**1,302**	**—**	**—**	**—**	**—**	**—**	**1,302**
– gross outflows	**(1,340)**	**—**	**—**	**—**	**—**	**—**	**(1,340)**
Total	**(7,712)**	**(1,609)**	**(2,110)**	**(1,211)**	**(1,134)**	**(12,897)**	**(26,673)**

At 31 December 2020 (Outflows)/Inflows	Within 1 year or on demand US$m	Between 1 and 2 years US$m	Between 2 and 3 years US$m	Between 3 and 4 years US$m	Between 4 and 5 years US$m	After 5 years US$m	Total US$m
Non-derivative financial liabilities							
Trade and other financial payables[a]	(5,251)	(53)	(15)	(34)	(19)	(394)	(5,766)
Expected lease liability payments	(271)	(231)	(155)	(101)	(84)	(724)	(1,566)
Borrowings before swaps	(351)	(667)	(743)	(1,256)	(1,892)	(7,477)	(12,386)
Expected future interest payments[a]	(525)	(522)	(495)	(469)	(427)	(2,999)	(5,437)
Other financial liabilities	—	—	—	—	—	—	—
Derivative financial liabilities[b]							
Derivatives related to net debt – gross settled[a]:							
– gross inflows	27	27	27	27	27	790	925
– gross outflows	(34)	(34)	(34)	(34)	(34)	(943)	(1,113)
Derivatives not related to net debt – net settled	(20)	(7)	(2)	(2)	(2)	(9)	(42)
Derivatives not related to net debt – gross settled:							
– gross inflows	290	—	—	—	—	—	290
– gross outflows	(291)	—	—	—	—	—	(291)
Total	(6,426)	(1,487)	(1,417)	(1,869)	(2,431)	(11,756)	(25,386)

(a) The interest payable at year end was removed from trade and other financial payables and is shown within expected future interest payments. Interest payments have been projected using interest rates applicable at the end of the applicable financial year. Where debt is subject to variable interest rates, future interest payments are subject to change in line with market rates.
(b) The maturity grouping is based on the earliest payment date.

Offsetting and enforceable master netting agreements

When we have a legally enforceable right to offset our financial assets and liabilities and an intention to settle on a net basis, or realise the asset and settle the liability simultaneously, we report the net amount in the consolidated balance sheet. Agreements with derivative counterparties are based on the International Swaps and Derivatives Association master netting agreements that do not meet the criteria for offsetting, but allow for the related amounts to be set-off in certain circumstances. During the year, there were no material amounts offset in the balance sheet.

(ii) Commodity price risk

Our broad commodity base means our exposure to commodity prices is diversified. Our normal policy is to sell our products at prevailing market prices. Exceptions to this rule are subject to strict limits laid down by the Board, and to defined market risk tolerances and internal controls.

We sell our products to customers under contracts which vary in tenure and pricing mechanisms, including some volumes sold in the spot market. Sales revenue may be subject to adjustment if product specifications do not conform to the terms specified in a sales contract.

Pricing for iron ore is on a range of terms, the majority being either monthly or quarterly average pricing mechanisms. We sell a smaller proportion of iron ore volumes on the spot market.

We generally sell copper and aluminium under contracts which vary in tenure and pricing mechanisms, with some volumes sold in the spot market. The prices are determined by reference to prevailing market prices on terminal markets, such as the London Metal Exchange (LME) and the Commodities Exchange (COMEX) in New York. Prices fluctuate widely in response to changing levels of supply and demand but, in the long run, prices are related to the marginal cost of supply. Gold is also priced in an active market in which prices respond to daily changes in quantities offered and sought. Newly mined gold is only one source of supply; investment and disinvestment can be important elements of supply and demand.

At the date revenue is recognised, certain of our products are provisionally priced, based on the amount we expect to receive in the future. After initial recognition of revenue, we record any change in revenue relating to market prices separately in “Other revenue” (refer to note 3). Substantially all iron ore and aluminium sales are reflected at final prices at each reporting period. Final prices for copper concentrate, however, are normally determined between 30 and 180 days after delivery to our customer.

At 31 December 2021, we had 201 million pounds of copper sales, including share of equity accounted unit (31 December 2020: 261 million pounds), that were provisionally priced at US 436 cents per pound (2020: US 336 cents per pound). The final price of these sales will be determined during the first half of 2022. A 10% change in the price of copper realised on the provisionally priced sales, all other factors held constant, would increase or reduce net earnings by US$54 million (2020: US$58 million).

For some products, particularly aluminium, we are also exposed to fluctuations in power prices.

Hedging strategy

We do not generally consider that using derivatives to fix commodity prices would provide a long-term benefit to our shareholders. However, for certain physical commodity transactions for which the price was fixed at the contract date, we enter into derivatives to achieve the prevailing market prices at the point of revenue recognition.

To mitigate our exposure to changes in the relationship between aluminium prices and power prices, we have a number of electricity purchase contracts which are directly linked to the daily official LME cash ask price for high grade aluminium (“LME price”) and to the US Midwest Transaction Premium (“Midwest premium”).

In accordance with IFRS 9, we apply hedge accounting to two embedded derivatives within our power contracts. The embedded derivatives (notional aluminium forward sales) have been designated as the hedging instrument. The forecasted aluminium sales, priced using the LME price and the Midwest premium, represent the hedged item.

The hedging ratio is 1:1, as the quantity of sales designated as being hedged matches the notional amount of the hedging instrument. The hedging instrument’s notional amount, expressed in equivalent metric tonnes of aluminium, is derived from our expected electricity consumption under the power contracts as well as other relevant contract parameters.

When we designate such embedded derivatives as the hedging instrument in a cash flow hedge, we recognise the effective portion of the change in the fair value of the hedging instrument in other comprehensive income, and it is accumulated in the cash flow hedge reserve. The amount that is recognised in other comprehensive income is limited to the lesser of the cumulative change in the fair value of the hedging instrument and the cumulative change in the fair value of the hedged item, in absolute terms. On realisation of the hedges, realised amounts are reclassified from reserves to consolidated sales revenue in the income statement.

We recognise any ineffectiveness relating to the hedging relationship immediately in the income statement.

Sources of ineffectiveness include: differences in the timing of the cash flows between the hedged item and the hedging instrument, non-zero initial fair value of the hedging instrument, the existence of a cap on the Midwest premium in the hedging instrument and counterparty credit risk.

We held the following notional aluminium forward sales contracts embedded in the power contracts:

At 31 December 2021	**Total**	**Within 1 year**	**Between 1 and 5 years**	**Between 5 and 10 years**	**After 10 years**
Notional amount (in tonnes)	**573,653**	**72,555**	**289,867**	**211,231**	**—**
Notional amount (in US$ millions)	**1,377**	**162**	**683**	**532**	**—**
Average hedged rate (in US$ per tonne)	**2,401**	**2,234**	**2,355**	**2,520**	**—**

At 31 December 2020	Total	Within 1 year	Between 1 and 5 years	Between 5 and 10 years	After 10 years
Notional amount (in tonnes)	640,963	72,548	287,587	280,828	—
Notional amount (in US$ millions)	1,522	159	663	700	—
Average hedged rate (in US$ per tonne)	2,375	2,189	2,305	2,495	—

Notes to the 2021 financial statements

29 Financial instruments and risk management continued

The impact on our financial statements of these hedging instruments and hedging items are:

	Aluminium embedded derivatives separated from the power contract (Hedging instrument)[(a)]			Highly probable forecast aluminium sales (Hedged item)				
	Nominal US$m	Carrying amount US$m	Change in fair value in the period US$m	Cash flow hedge reserve[(b)] US$m	Change in fair value in the period US$m	Total hedging (losses)/ gains recognised in reserves US$m	Hedge ineffective-ness in the period gains/ (losses)[(c)] US$m	Losses/ (gains) reclassified from reserves to income statement[(d)] US$m
2021	**1,377**	**(124)**	**(201)**	**(11)**	**300**	**(211)**	**10**	**17**
2020	1,522	46	23	184	(49)	27	(4)	(40)

(a) Aluminium embedded derivatives (forward contracts and options) are contained within certain aluminium smelter electricity purchase contracts.2021: nil (2020: US$66 million) of the carrying value is shown within "Other financial assets" and US$124 million (2020: US$20 million) shown within "Other financial liabilities".
(b) The difference between this amount and the total cash flow hedge reserve of the Group (shown in note 28) relates to our cash flow hedge on the sterling bond (refer to interest rate risk section).
(c) Hedge ineffectiveness is included in net operating costs (raw materials, consumables, repairs and maintenance) in the income statement.
(d) On realisation of the hedge, realised amounts are reclassified from reserves to consolidated sales revenue in the income statement.

There was no cost of hedging recognised in 2021 or 2020 relating to this hedge relationship.

We set out details of our commodity derivatives that are not designated as hedges in section B.

Sensitivities

Our commodity derivatives are impacted by changes in market prices. The table below summarises the impact that changes in aluminium market prices have on aluminium forward and option contracts embedded in power supply agreements outstanding at 31 December 2021. Any change in price will result in an offsetting change in our future earnings.

	Change in market prices	2021 US$m	2020 US$m
Effect on net earnings	**+10 %**	**(78)**	(19)
	(10)%	**73**	19
Effect on equity	**+10 %**	**(98)**	(98)
	(10)%	**95**	100

We exclude our "own use contracts" from this sensitivity analysis as they are outside the scope of IFRS 9. Our business units continue to hold these types of contracts to satisfy their expected purchase, sale or usage requirements.

(iii) Credit risk

We are exposed to credit risk in our operating activities (primarily from customer trade receivables); and from our investing activities that primarily include government securities (primarily US Government), corporate and asset-backed securities, reverse re-purchase agreements, money market funds, and balances with banks and financial institutions. We are also exposed to credit risk arising from our interest rate and currency derivative contracts.

Credit risks related to receivables

Our Commercial team manages customer credit risk subject to our established policy, procedures and controls. The team establishes credit limits for all of our customers. Where customers are rated by an independent credit rating agency, these ratings are used as a guide to set credit limits. Where there are no independent credit ratings available, we assess the credit quality of the customer through a credit rating model and assign appropriate credit limit. The Commercial team monitors outstanding customer receivables regularly and highlights any credit concerns to senior management. Receivables to high risk customers are often secured by letters of credit or other forms of credit enhancement.

The expected credit loss on our trade receivable portfolio is insignificant (see note 18).

Credit risk related to financial instruments and cash deposits

Our Treasury team manages credit risk from our investing activities in accordance with a Board-approved credit risk framework which sets the risk appetite. Our Board reviews this annually. We make investments of surplus funds only with approved investment grade (BBB- and above) counterparties who have been assigned specific credit limits. The limits are set to minimise the concentration of credit risk and therefore mitigate the potential for financial loss through counterparty failure.

The maximum credit risk exposure arising on our financial assets at the balance sheet date is as follows:

	Note	2021 US$m	2020 US$m
Cash and cash equivalents	20	**12,807**	10,381
Trade and other financial receivables	18	**2,762**	3,286
Investments	19	**2,682**	2,899
Derivative assets	19	**272**	665
Loans to equity accounted units		**—**	41
Total		**18,523**	17,272

(iv) Foreign exchange risk

The broad geographic spread of our sales and operations means that our earnings, cash flows and shareholders' equity are influenced by a wide variety of currencies.

The majority of our sales are denominated in the US dollar.

Our operating costs are influenced by the currencies of those countries where our mines and processing plants are located, and by those currencies in which we buy imported equipment and services. The US dollar, the Australian dollar and the Canadian dollar are the most important currencies influencing our costs. In any particular year, currency fluctuations may have a significant impact on our financial results. A strengthening of the US dollar against the currencies in which our costs are partly denominated has a positive effect on our underlying earnings. However, a strengthening of the US dollar reduces the value of non-US dollar denominated net assets, and therefore total equity.

Our external borrowings and cash are mainly denominated in US dollars, either directly or through the use of derivatives, as we consider the US dollar the most appropriate currency for financing our operations.

In most cases our debt and other financial assets and liabilities, including intragroup balances, is held in the functional currency of the relevant subsidiary. There are instances where these balances are held in currencies other than the functional currency of the relevant subsidiary. This means we recognise exchange gains and losses in our income statement (except where they can be taken to equity) as these balances are translated into the functional currency of the relevant subsidiary. Our income statement also includes exchange gains and losses arising on US dollar net debt and intragroup balances. On consolidation, these balances are retranslated to our US dollar presentation currency and there is a corresponding and offsetting exchange difference recognised directly in the currency translation reserve. There is no impact on total equity.

The table below summarises, by currency, our net cash/(debt), after taking into account relevant cross currency interest rate swaps and foreign exchange contracts:

Net cash/(debt) by currency	**Total borrowings excluding overdrafts US$m**	**Lease liabilities US$m**	**Derivatives related to net debt US$m**	**Cash and cash equivalents US$m**	**Other investments US$m**	**Net cash/ (debt) 2021 US$m**	Net cash/ (debt) 2020 US$m
US dollar	**(11,707)**	**(410)**	**(101)**	**12,018**	**2,401**	**2,201**	(141)
Australian dollar	**(282)**	**(493)**	**—**	**276**	**—**	**(499)**	(286)
Canadian dollar	**(172)**	**(192)**	**—**	**44**	**—**	**(320)**	(333)
South African rand	**—**	**(3)**	**—**	**118**	**—**	**115**	140
Other	**(5)**	**(265)**	**—**	**349**	**—**	**79**	(44)
Total	**(12,166)**	**(1,363)**	**(101)**	**12,805**	**2,401**	**1,576**	(664)

Hedging strategy

Under normal market conditions, we do not consider that active currency hedging of transactions would provide long-term benefits to shareholders. We review our exposure on a regular basis and will undertake hedging if deemed appropriate. We may deem currency protection measures appropriate in specific commercial circumstances. Capital expenditures and other significant financial items such as acquisitions, disposals, tax and dividend cash flows may be economically hedged subject to strict limits laid down by the Board. Details of the cross-currency interest rate swaps and the currency forward contracts used to manage our currency risk exposures at 31 December 2021 are in section B.

Notes to the 2021 financial statements

29 Financial instruments and risk management continued

Sensitivities

The table below shows the estimated retranslation effect on financial assets and financial liabilities, including intragroup balances, of a 10% strengthening in the closing exchange rate of the US dollar against significant currencies. We deem 10% to be the annual exchange rate movement that is reasonably probable (on an annual basis over the long run) for any of our significant currencies and therefore an appropriate representation.

We calculate sensitivities in relation to the functional currencies of our individual entities. We translate the impact of these on net earnings and underlying earnings into US dollars at the exchange rates on which the sensitivities are based. The impact to net earnings associated with a 10% weakening of a particular currency, shown below, is broadly offset within equity through movements in the currency translation reserve and therefore generally has no impact on our net assets. The offsetting currency translation movement is not shown in the table below. The impact is expressed in terms of the effect on net earnings, underlying earnings, and equity, assuming that each exchange rate moves in isolation. The sensitivities are based on financial assets and financial liabilities held at 31 December 2021, where balances are not denominated in the functional currency of the subsidiary or joint operation, and exclude financial assets and liabilities held by equity accounted units. These balances will not remain constant throughout 2021, and therefore the following information should be used with care.

At 31 December 2021
Gains/(losses) associated with 10% strengthening of the US dollar

Currency exposure	**Closing exchange rate US cents**	**Effect on net earnings US$m**	**Of which amount impacting underlying earnings US$m**	**Impact directly on equity US$m**
Australian dollar	**73**	**379**	**(18)**	**(1,044)**
Canadian dollar	**78**	**(111)**	**(3)**	**—**

At 31 December 2020
Gains/(losses) associated with 10% strengthening of the US dollar

Currency exposure	Closing exchange rate US cents	Effect on net earnings US$m	Of which amount impacting underlying earnings US$m	Impact directly on equity US$m
Australian dollar	77	625	(11)	(1,105)
Canadian dollar	78	(167)	6	—

(v) Interest rate risk

Our interest rate management policy is generally to borrow and invest at floating interest rates. The approach to floating rate borrowing is based upon; i) the lower cost of borrowing historically observed from maintaining a floating rate exposure and ii) the historical correlation between interest rates and commodity prices. In certain circumstances, we may elect to maintain a higher proportion of fixed-rate funding.

Hedging strategy

We enter into interest rate swaps to hedge the interest rate exposure from our fixed rate borrowings, and review these positions on a regular basis. The tenor of the interest rate swaps is sometimes shorter than the tenor of the bond which means, we remain exposed to long term fixed rate funding. In 2020 we entered into US$1.5 billion of interest rate swaps with a tenor of five years to hedge the Alcan bonds which had been historically held at fixed rates. In 2021, we issued a 30-year US$1.25 billion bond which was swapped to floating rates for a tenor of seven years. As interest rate swaps mature, new medium dated swaps are generally transacted to maintain this floating rate exposure. The economic characteristics of the interest rate swaps are shown in the table below.

The interest rates swaps transacted in 2020 and 2021, were designated into fair value hedge relationships with the respective tranches of debt. For the fair value movements, in relation to all of our fair value hedged items and instruments, refer to note 8.

At 31 December 2021, US$6.0 billion (2020: US$5.9 billion) US dollar notional fixed-rate US dollar borrowings continue to be swapped to floating US dollar rates and €417 million (2020: €417 million) euro notional fixed-rate borrowings continue to be fully swapped to floating US dollar interest rates at an effective exchange rate of 1.3105. These swaps are designated in fair value hedge relationships.

Since 2012, we have also held cross-currency interest rate swaps to convert the principal and annual fixed interest coupons of the Rio Tinto Finance plc £500 million Sterling Bond to a US dollar notional with fixed US dollar annual interest coupons. We applied cash flow hedge accounting to this relationship to limit our US dollar cash flow exposure on the principal and interest payments. The hedge was fully effective in the 2021 and 2020 financial years as the notional amount, maturity, payment and reset dates match.

Nominal amount of the bond	Nominal amount of the hedging instrument	Maturity	Effective exchange rate	**2021** Loss in fair value of the hedged item US$m	**2021** Gain in fair value of the hedging instrument US$m	2020 Gain in fair value of the hedged item US$m	2020 Loss in fair value of the hedging instrument US$m
£500 million	US$807 million	November 2029	1.6132	**(1)**	**1**	7	(7)

In 2019, we swapped the resulting fixed US dollar annual interest coupon payments to floating rates. Fair value hedge accounting has been applied to this relationship in addition to the pre-existing cash flow hedge.

The effective interest rates of our borrowings, impacted by swaps, are summarised below. All nominal values are fully hedged unless otherwise stated:

Borrowings in a hedge relationship	**Nominal value 2021 US$m**	Nominal value 2020 US$m	Weighted average interest rate after swaps	Swap maturity	**Carrying value 2021 US$m**	Carrying value 2020 US$m
Rio Tinto Finance plc Euro Bonds 2.875% due 2024	**546**	546	3 month LIBOR +1.64%	2024	**497**	555
Rio Tinto Finance (USA) Limited Bonds 3.75% 2025[(a)]	**—**	1,200	3 month LIBOR +1.39%	2025	**—**	1,299
Rio Tinto Finance (USA) Limited Bonds 7.125% 2028	**750**	750	3 month LIBOR +3.27%	2028	**934**	1,005
Alcan Inc. Debentures 7.25% due 2028	**100**	100	3 month LIBOR +5.43%	2024	**105**	109
Rio Tinto Finance plc Sterling Bonds 4.0% due 2029	**807**	807	3 month LIBOR +2.65%	2024	**682**	717
Alcan Inc. Debentures 7.25% due 2031[(b)]	**400**	400	3 month LIBOR +5.72%	2025	**420**	438
Alcan Inc. Global Notes 6.125% due 2033[(b)]	**750**	750	3 month LIBOR +5.67%	2025	**722**	744
Alcan Inc. Global Notes 5.75% due 2035[(b)]	**300**	300	3 month LIBOR +5.18%	2025	**283**	292
Rio Tinto Finance (USA) Limited Bonds 5.2% 2040	**1,150**	1,150	3 month LIBOR +3.79%	2022	**1,156**	1,173
Rio Tinto Finance (USA) plc Bonds 4.75% 2042	**500**	500	3 month LIBOR +3.42%	2023	**495**	501
Rio Tinto Finance (USA) plc Bonds 4.125% 2042	**750**	750	3 month LIBOR +2.83%	2023	**735**	743
Rio Tinto Finance (USA) Limited Bonds 2.75% 2051[(a)]	**1,250**	—	6 month SOFR + 1.57%	2028	**1,225**	—

(a) On 28 October 2021, the Group issued US$1.25 billion of 30-year fixed rate debt with a coupon of 2.75%. On settlement of the bond, we entered into interest rate swaps to convert the interest payable on these bonds from fixed to floating rates rate for the next seven years. The bond and the swaps are in a fair value hedge relationship. The proceeds of the new issuance were used to fund the early redemption and extinguishment of the company's US$1.20 billion 3.75% bonds due to mature in June 2025.

(b) In 2020 we entered into new swaps to convert the interest payable in relation to these bonds from fixed to floating rates.

The fair value of interest rate and cross currency interest rate swaps at 31 December 2021 was US$139 million (2020: US$388 million) asset and US$240 million (2020: US$140 million) liability, respectively. These are included within "Other financial assets" and "Other financial liabilities" in the balance sheet.

The main sources of ineffectiveness of the fair value hedges include changes in the timing of the cash flows of the hedging instrument compared to the underlying hedged item, and changes in the credit risk of parties to the hedging relationships. Refer to note 8 for the changes in fair value of the bonds and the swaps as well as the ineffectiveness recognised in the period. Refer to note 1 "New standards Issued not yet effective" for the impacts of IBOR reform.

Taking into account the interest and currency interest rate swaps, at 31 December 2021, US$11.6 billion (2020: US$11.7 billion) of our adjusted gross borrowings were at floating rates. This has resulted in a floating to fixed debt ratio of 85% floating to 15% fixed (2020: 86% floating to 14% fixed). Our weighted average debt maturity was approximately 11 years (2020: nine years) based on current interest rates and the carrying value of gross borrowings at the year end.

Sensitivities

Based on our floating rate financial instruments outstanding at 31 December 2021, the effect on our net earnings of a 100 basis point increase in US dollar LIBOR or SOFR (where applicable) interest rates, with all other variables held constant, would be an income of US$13 million (2020: expense of US$7 million), reflecting the net cash position in 2021 compared to a net debt position in prior year. We have an exposure to interest rate volatility within shareholders' equity arising from fair value movements on derivatives in the cash flow hedge reserve. These derivatives have an underlying exposure to sterling and US dollars. With all factors remaining constant, and based on the composition of derivatives impacting the cash flow reserve at 31 December 2021, the sensitivity of a 100 basis point increase in interest rates in each of the currencies in isolation would impact equity, before tax, by a charge of US$55 million (2020: US$68 million charge) for sterling and a credit of US$65 million (2020: US$78 million credit) for US dollars. A 100 basis point decrease would have broadly the same impact in the opposite direction.

Notes to the 2021 financial statements

29 Financial instruments and risk management continued

B Derivative financial instruments

In the table below we summarise our derivatives, including embedded derivatives, as at 31 December.

	Total fair value			
	2021		2020	
	Asset US$m	**Liability US$m**	Asset US$m	Liability US$m
Derivatives designated as hedges				
Interest rate swaps[(a)]	**139**	**(34)**	386	(1)
Cross-currency interest rate swaps[(b)]	**—**	**(206)**	2	(139)
Aluminium embedded derivatives[(c)]	**—**	**(125)**	66	(20)
Currency forward contracts	**—**	**—**	7	—
Total derivatives designated as hedges	**139**	**(365)**	461	(160)
Derivatives not designated as hedges				
Currency forward contracts and swaps	**1**	**(39)**	63	(1)
Aluminium embedded derivatives[(c)]	**53**	**(121)**	80	—
Other embedded derivatives	**39**	**(1)**	28	(16)
Other commodity contracts[(d)]	**40**	**(92)**	33	(7)
Total derivatives not designated as hedges	**133**	**(253)**	204	(24)
Total derivative instruments	**272**	**(618)**	665	(184)
Analysed by maturity:				
Less than 1 year	**62**	**(225)**	134	(23)
Between 1 and 5 years	**60**	**(211)**	330	(14)
More than 5 years	**150**	**(182)**	201	(147)
Total	**272**	**(618)**	665	(184)
Total net derivative instruments		**(346)**	481	

Reconciliation to balance sheet	Note	**2021 US$m**	2020 US$m
Non-current assets	19	**210**	531
Current assets	19	**62**	134
Current liabilities	21	**(225)**	(23)
Non-current liabilities	21	**(393)**	(161)
Total net derivative instruments		**(346)**	481

(a) The interest rate swaps are used to convert certain fixed rate borrowings to a floating rate.
(b) The cross-currency interest rate swaps are used to convert non-US dollar denominated borrowings to either fixed or floating US dollar borrowings.
(c) Aluminium embedded derivatives (forward contracts and options) are contained within certain aluminium smelter electricity purchase contracts. These contracts reduce our margin exposure to movements in the aluminium price.
(d) Other commodity derivatives mainly relate to forward contracts which we have entered into to swap some of our fixed priced product sales to prevailing market prices at the point of revenue recognition. None of these derivatives is in a hedge relationship.

C Fair values

The following table shows the carrying amounts and fair values of our borrowings including those which are not carried at an amount which approximates their fair value at 31 December 2021 and 31 December 2020. The fair values of our cash equivalents, loans to equity accounted units and other financial liabilities approximate their carrying values because of their short maturity, or because they carry floating rates of interest.

		2021		2020	
	Note	**Carrying value US$m**	**Fair value US$m**	Carrying value US$m	Fair value US$m
Borrowings (including overdrafts)	21	**12,168**	**13,904**	12,653	15,076

Total borrowings with a carrying value of US$7.3 billion (2020: US$7.6 billion) relate to listed bonds with a fair value of US$8.7 billion (2020: US$9.5 billion) and are categorised as level 1 in the fair value hierarchy.

Borrowings with a carrying value of US$4.2 billion (2020: US$4.2 billion) relate to project finance drawn down by Oyu Tolgoi, with a fair value of US$4.4 billion (2020: US$4.7 billion) and are categorised as level 3 in the fair value hierarchy. We use different valuation inputs for the pre-and post-completion phases to reflect Rio Tinto's completion support guarantee during the pre-completion phase. To measure the fair value of the project finance pre-completion our valuation input includes market yield over the pre-completion period, the variability of which we consider a reasonable indicator of fair value movements on amounts outstanding under the project finance facility. Post-completion, we estimate the fair value with reference to the annual interest rate on each tranche of the facility, and after considering factors that could indicate a change in the credit assessment of Oyu Tolgoi LLC as a counterparty to project finance. These factors include in-country risk relating to the Oyu Tolgoi project, and the assumed date of transition from pre-completion to post-completion. These valuation inputs are considered to be level 3. Transition from pre-completion to post-completion is determined by a set of tests for both completion of physical infrastructure and the ability to extract and process ore of defined grades over a defined period.

Our remaining borrowings have a fair value measured by discounting estimated cash flows with an applicable market quoted yield, and are categorised as level 2 in the fair value hierarchy.

C (a) Valuation hierarchy

The tables below show the financial instruments by fair value measurement method in accordance with IFRS 13 at 31 December 2021 and 31 December 2020.

			Held at fair value			
At 31 December 2021	Note	**Total US$m**	**Level 1[(a)] US$m**	**Level 2[(b)] US$m**	**Level 3[(c)] US$m**	**Held at amortised cost US$m**
Assets						
Cash and cash equivalents[(d)]		**12,807**	**4,138**	**—**	**—**	**8,669**
Investments in equity shares and funds		**117**	**64**	**—**	**53**	**—**
Other investments, including loans[(e)]	19	**2,682**	**2,422**	**—**	**238**	**22**
Trade and other financial receivables[(f)]	18	**2,762**	**1**	**1,163**	**—**	**1,598**
Derivatives (net)						
Forward contracts and option contracts: designated as hedges[(g)] (Section B)		**(125)**	**—**	**—**	**(125)**	**—**
Forward contracts and option contracts, not designated as hedges[(g)] (Section B)		**(120)**	**—**	**(131)**	**11**	**—**
Derivatives related to net debt[(h)] (Section B)		**(101)**	**—**	**(101)**	**—**	**—**
Liabilities						
Trade and other financial payables	24	**(6,356)**	**—**	**(67)**	**—**	**(6,289)**
Total		**11,666**	**6,625**	**864**	**177**	**4,000**

			Held at fair value			
At 31 December 2020	Note	Total US$m	Level 1[(a)] US$m	Level 2[(b)] US$m	Level 3[(c)] US$m	Held at amortised costs US$m
Assets						
Cash and cash equivalents[(d)]		10,381	6,411	—	—	3,970
Investments in equity shares and funds		75	35	—	40	—
Other investments, including loans[(e)]	19	2,899	2,563	—	198	138
Trade and other financial receivables[(f)]	18	3,286	5	1,802	—	1,479
Derivatives (net)						
Forward contracts and option contracts: designated as hedges[(g)] (Section B)		53	—	7	46	—
Forward contracts and option contracts, not designated as hedges[(g)] (Section B)		180	—	69	111	—
Derivatives related to net debt[(h)] (Section B)		248	—	248	—	—
Liabilities						
Trade and other financial payables	24	(5,847)	—	(30)	—	(5,817)
Total		11,275	9,014	2,096	395	(230)

(a) Valuation is based on unadjusted quoted prices in active markets for identical financial instruments. This category includes listed equity shares and other quoted funds.
(b) Valuation is based on inputs that are observable for the financial instruments, which include quoted prices for similar instruments or identical instruments in markets which are not considered to be active, or inputs, either directly or indirectly based on observable market data.
(c) Valuation is based on inputs that are not based on observable market data (unobservable inputs).
(d) Cash and cash equivalents include money market funds which are treated as fair value through profit or loss (FVPL) under IFRS 9 with the fair value movements going into finance income.
(e) Other investments, including loans, comprise: cash deposits in rehabilitation funds, government bonds, managed investment funds and royalty receivables. The royalty receivables are valued based on future expected output as well as forward commodity prices.
(f) Trade receivables include provisionally priced invoices. The related revenue is initially based on forward market selling prices for the quotation periods stipulated in the contracts with changes between the provisional price and the final price recorded separately within "Other revenue". The selling price can be measured reliably for the Group's products, as it operates in active and freely traded commodity markets. At 31 December 2021, US$1,114 million (31 December 2020: US$1,671 million) of provisionally priced receivables were recognised.
(g) Level 3 derivatives consist of derivatives embedded in electricity purchase contracts linked to the LME with terms expiring between 2025 and 2036 (2020: 2025 and 2029). The embedded derivatives are measured using discounted cash flows and option model valuation techniques.
(h) Interest rate and currency interest rate swaps are valued using applicable market quoted swap yield curves adjusted for relevant basis and credit default spreads. Currency interest rate swap valuations also use market quoted foreign exchange rates. A discounted cash flow approach is used to derive fair value from these inputs to the underlying cash flows.

Notes to the 2021 financial statements

29 Financial instruments and risk management continued

There were no material transfers between level 1 and level 2, or between level 2 and level 3 in the year ended 31 December 2021 or in the year ended 31 December 2020.

C (b) Level 3 financial assets and financial liabilities

The table below shows the summary of changes in the fair value of the Group's level 3 financial assets and financial liabilities.

	2021 Level 3 financial assets and financial liabilities US$m	2020 Level 3 financial assets and financial liabilities US$m
Opening balance	**395**	383
Currency translation adjustments	**(6)**	16
Total realised gains/(losses) included in:		
– consolidated sales revenue	**27**	11
– net operating costs	**(50)**	(39)
Total unrealised gains included in:		
– net operating costs	**68**	24
Total unrealised (losses)/gains transferred into other comprehensive income through cash flow hedges	**(212)**	26
Additions to (financial liabilities)/assets	**(21)**	1
Disposals/maturity of financial instruments	**(6)**	(27)
Transfers	**(18)**	—
Closing balance	**177**	395
Net gains for the year included in the income statement for assets and liabilities held at year end[(a)]	**20**	—

(a) In 2020 gains and losses included in the income statement offset each other to the extent that the net result is less than US$1 million.

Sensitivity analysis in respect of level 3 derivatives

Forward contracts and options whose fair value is determined using unobservable inputs are calculated using appropriate discounted cash flow and option model valuation techniques.

To value the long-term aluminium embedded derivatives, we use unobservable inputs when the term of the derivative extends beyond observable market prices. In 2021 and 2020, changing the level 3 inputs to reasonably possible alternative assumptions does not change the fair value significantly, taking into account the expected remaining term of contracts. The fair value of our level 3 aluminium embedded derivatives is US$146 million at 31 December 2021 (2020: US$126 million).

We also have receivables, with a carrying value of US$136 million (2020: US$113 million), that relate to royalties arising from the sale of coal from our previously divested businesses. These are classified as “Other investments”, including loans within “Other financial assets”. The fair values are determined using level 3 unobservable inputs. This royalty receivable includes US$53 million from forecast production beyond 2030. This has not been adjusted for potential changes in production rates that could occur due to climate change targets impacting the operator.

The main unobservable input is the long-term coal price used over the life of the royalty receivable. A 15% increase in the coal spot price would result in a US$63 million increase (2020: US$198 million increase) in the carrying value. A 15% decrease in the coal spot price would result in a US$53 million decrease (2020: US$46 million decrease) in the carrying value. We have used a 15% assumption to calculate our exposure as it represents the annual coal price movement that we deem to be reasonably probable (on an annual basis over the long run).

30 Contingencies and commitments

	2021 US$m	2020 US$m
Capital commitments excluding the Group's share of joint venture capital commitments		
Within 1 year	**2,324**	3,021
Between 1 and 3 years	**116**	97
Between 3 and 5 years	**38**	—
After 5 years	**73**	34
Total	**2,551**	3,152
Group's share of joint venture capital commitments		
Within 1 year	**11**	9
Between 1 and 3 years	**—**	—
Total	**11**	9

Our capital commitments include open purchase orders for managed operations and expenditure on major projects already authorised by our Investment Committee for non-managed operations. It does not include the estimated incremental capital expenditure relating to decarbonisation projects referred to in the climate section earlier. On a legally enforceable basis, capital commitments would be approximately US$1.1 billion (2020: US$1.5 billion) as many of the contracts relating to the Group's projects have various cancellation clauses.

Other Commitments

On 21 December 2021, the Group entered into a binding agreement to acquire the Rincon lithium project in Argentina for US$825 million. The transaction will be treated as an asset purchase. Completion, expected in 2022, is subject to regulatory approval in Australia.

Unrecognised commitments to contribute funding or resources to joint ventures

We have a commitment to purchase and market a portion (in excess of the Group's ownership interest) of the output of Sohar Aluminium Company L.L.C., an aluminium smelter in which the Group is a joint venture partner. The Group immediately sells the purchased products to third parties.

Along with the other joint venture partners, we have commitments to provide emergency funding (ie funding required to preserve the life or assets of the company or to comply with applicable laws) if required by Sohar Aluminium Company L.L.C., subject to approved thresholds.

At 31 December 2021, Minera Escondida Ltda held an undrawn shareholder line of credit for US$225 million (Rio Tinto share) (31 December 2020: US$225 million). The current facility will mature in September 2022.

Purchase obligations

The aggregate amount of future payment commitments under purchase obligations outstanding at 31 December was:

	2021 US$m	2020 US$m
Within 1 year	**3,483**	3,100
Between 1 and 2 years	**1,660**	1,715
Between 2 and 3 years	**1,345**	1,291
Between 3 and 4 years	**1,080**	1,242
Between 4 and 5 years	**1,020**	848
After 5 years	**7,125**	8,437
Total	**15,713**	16,633

Purchase obligations are enforceable and legally binding agreements to buy goods or services. They specify all significant terms, including: fixed or minimum quantities to be purchased or consumed; fixed, minimum or variable price provisions; and the approximate timing of the transactions.

Purchase obligations for goods mainly relate to purchases of raw materials and consumables and purchase obligations for services mainly relate to charges for the use of infrastructure, commitments to purchase power and freight contracts. These goods and services are expected to be used in the business. To the extent that this changes, a provision for onerous obligations may be made as described in note 1- critical policy (vii).

Purchases from joint arrangements or associates are included if the quantity purchased is in excess of our ownership interest in the entity. However, purchase obligations exclude contracted purchases of bauxite, alumina and aluminium from joint arrangements and associates and contracted purchases of alumina from third parties. This is because these purchases are made for commercial reasons and the Group is, overall, a net seller of these commodities.

As described above, we also have a commitment to buy and market a portion (in excess of our ownership interest) of the output of Sohar Aluminium Company L.L.C.

Contingent liabilities (subsidiaries and joint operations)

	2021 US$m	2020 US$m
Contingent liabilities, Indemnities and other performance guarantees[a][b]	**441**	146

(a) Contingent liabilities, indemnities and other performance guarantees represent the potential outflow of funds from the Group for the satisfaction of obligations including those under contractual arrangements (for example undertakings related to supplier agreements) not provided for in the balance sheet, where the likelihood of the contingent liabilities, guarantees or indemnities being called is assessed as possible rather than probable or remote.

(b) There were no material contingent liabilities arising in relation to the Group's joint ventures and associates.

The Group has not established provisions for certain additional legal claims in cases where we have assessed that a payment is either not probable or cannot be reliably estimated. A number of Group companies are, and will likely continue to be, subject to various legal proceedings and investigations that arise from time to time. As a result, the Group may become subject to substantial liabilities that could affect our business, financial position and reputation. Litigation is inherently unpredictable and large judgments may at times occur. The Group may incur, in the future, judgments or enter into settlements of claims that could lead to material cash outflows. We do not believe that any of these proceedings will have a materially adverse effect on our financial position.

Notes to the 2021 financial statements

30 Contingencies and commitments continued

Contingent liabilities – not quantifiable

The current status of the following contingent liabilities means it is not practicable to provide a reliable estimate of possible financial exposure:

Litigation disputes

In October 2017, Rio Tinto announced that it had been notified by the U.S. Securities and Exchange Commission (SEC) that the SEC had filed a complaint in relation to Rio Tinto's disclosures and timing of the impairment of Rio Tinto Coal Mozambique (RTCM). The impairment was reflected in Rio Tinto's 2012 year-end accounts. The SEC alleges that Rio Tinto, a former chief executive, Tom Albanese, and a former chief financial officer, Guy Elliott, committed violations of the antifraud, reporting, books and records and internal control provisions of the federal securities law by not accurately disclosing the value of RTCM and not impairing it when Rio Tinto published its 2011 year-end accounts in February 2012 or its 2012 interim results in August 2012. In June 2019, the trial court dismissed an associated US class action on behalf of securities holders. In August 2020, the appeals court partially overturned the court's dismissal and the case is with the trial court for further consideration.

In March 2018, the Australian Securities and Investments Commission (ASIC) filed civil proceedings in the NSW District Registry of the Federal Court of Australia against Rio Tinto Limited, Albanese, and Elliott. On 1 May 2018, ASIC expanded its proceedings. ASIC alleges that Rio Tinto committed violations of the disclosure, accounting, and misleading or deceptive conduct provisions of the Corporations Act by making misleading or deceptive statements related to RTCM in its 2011 Annual Report and its 2012 interim financial statements, not complying with accounting standards in respect of its 2012 interim financial statements, and not disclosing an impairment of RTCM in its 2012 interim financial statements. ASIC further alleges Albanese and Elliott breached their duties as directors or officers, and failed to take all reasonable steps to comply with relevant accounting requirements.

Rio Tinto believes that the SEC case and the ASIC proceedings are unwarranted and will defend the allegations vigorously. Hence, no provisions have been recognised for these cases.

Rio Tinto continues to co-operate fully with relevant authorities in connection with their investigations in relation to contractual payments totalling US$10.5 million made to a consultant who had provided advisory services in 2011 on the Simandou project in Guinea. In August 2018, the court dismissed a related US class action commenced on behalf of securities holders. No provision has been recognised for this case.

At 31 December 2021, the outcomes of these matters remained uncertain, but they could ultimately expose the Group to material financial cost. The Board is giving these matters its full and proper attention and a dedicated Board committee continues to monitor the progress of these matters, as appropriate.

Other contingent liabilities

The Group is in the process of modernising agreements with Traditional Owner groups as outlined in our response to the Juukan Gorge incident. We have provided for our best estimate of historical claims; however, the process is incomplete and it is possible that further claims could arise relating to past events.

As described in note 1(l), close-down and restoration provisions are not recognised for those operations that have no known restrictions on their lives as the date of closure cannot be reliably estimated. This applies primarily to Canadian aluminium smelters which are not dependent upon a specific orebody and have access to indefinite-lived power from owned hydro-power stations with water rights permitted by local governments. In these instances a closure obligation may exist at the reporting date; however, due to the indefinite nature of asset lives it is not possible to arrive at a sufficiently reliable estimate for the purposes of recognising a provision. Close-down and restoration provisions are recognised at these operations for separately identifiable closure activities which can be reasonably estimated, such as the demolition and removal of fixed structures after a pre-determined period. Any contingent liability for these assets will crystallise into a closure provision if and when a decision is taken to cease operations.

Guarantees by parent companies

Rio Tinto plc and Rio Tinto Limited have, jointly and severally, fully and unconditionally guaranteed the following securities issued by the following 100% owned finance subsidiaries: US$4.4 billion (31 December 2020: US$4.4 billion) Rio Tinto Finance (USA) Limited and Rio Tinto Finance (USA) plc bonds with maturity dates up to 2051; and US$1.1 billion (31 December 2020: US$1.2 billion) on the European Debt Issuance Programme. In addition, Rio Tinto Finance plc and Rio Tinto Finance Limited have entered into facility arrangements for an aggregate amount of US$7.5 billion (31 December 2020: US$7.5 billion). The facilities are guaranteed by Rio Tinto plc and Rio Tinto Limited.

Rio Tinto plc has provided a guarantee, known as the completion support undertaking (CSU), in favour of the Oyu Tolgoi LLC project finance lenders. At 31 December 2021, US$4.3 billion of project finance debt was outstanding under this facility (2020: US$4.3 billion). Oyu Tolgoi LLC is jointly owned by Erdenes Oyu Tolgoi LLC (34%), which is controlled by the Government of Mongolia, and Turquoise Hill Resources Ltd (66%, of which Rio Tinto owns 51%). The project finance has been raised for development of the underground mine and the CSU will terminate on the completion of the underground mine according to a set of completion tests set out in the project finance facility.

The Rio Tinto guarantee applies to the extent that Turquoise Hill Resources Ltd cannot satisfy Oyu Tolgoi LLC's project finance debt servicing obligations under its own guarantee to the lenders, called the sponsor debt service undertaking (DSU). Both the CSU and DSU contain a carve-out for certain political risk events.

Contingent assets

The Group has, from time to time, various insurance claims outstanding with reinsurers.

31 Average number of employees

	Subsidiaries and joint operations			Equity accounted units (Rio Tinto share)			Group total		
	2021	2020	2019	**2021**	2020	2019	**2021**	2020	2019
Principal locations of employment:									
Australia and New Zealand	**21,861**	20,482	19,195	**648**	634	619	**22,509**	21,116	19,814
Canada	**12,270**	11,814	11,576	**—**	—	—	**12,270**	11,814	11,576
UK	**189**	172	190	**—**	—	—	**189**	172	190
Europe	**1,003**	1,020	959	**—**	—	—	**1,003**	1,020	959
Africa	**2,484**	2,559	3,121	**1,253**	1,214	1,250	**3,737**	3,773	4,371
US	**3,471**	3,543	3,400	**—**	—	—	**3,471**	3,543	3,400
Mongolia	**3,513**	3,465	3,215	**—**	—	—	**3,513**	3,465	3,215
South America	**213**	220	243	**1,353**	1,293	1,270	**1,566**	1,513	1,513
India	**354**	324	272	**—**	—	—	**354**	324	272
Singapore	**450**	456	430	**—**	—	—	**450**	456	430
Other countries[(a)]	**283**	278	267	**—**	—	—	**283**	278	267
Total	**46,091**	44,333	42,868	**3,254**	3,141	3,139	**49,345**	47,474	46,007

(a) "Other countries" primarily includes employees in the Middle East (excluding Oman which is included in Africa), and other countries in Asia which are not shown separately in the table above.

Employee numbers, which represent the average for the year, include 100% of employees of subsidiary companies. Employee numbers for joint operations and equity accounted units are proportional to the Group's interest under contractual agreements. Average employee numbers include a part-year effect for companies acquired or disposed of during the year.

Part-time employees are included on a full-time-equivalent basis. Temporary employees are included in employee numbers.

People employed by contractors are not included.

Notes to the 2021 financial statements

32 Principal subsidiaries

At 31 December 2021

Company and country of incorporation/operation	Principal activities	Class of shares held	Proportion of class held (%)	Group interest (%)	Non-controlling interest (%)
Australia					
Argyle Diamonds Limited	Mining and processing of diamonds (until November 2020)	Ordinary	100	100	—
Dampier Salt Limited	Salt and gypsum production	Ordinary	68.36	68.36	31.64
Energy Resources of Australia Ltd	Uranium processing (until January 2021)	Ordinary	86.33	86.33	13.67
Hamersley Iron Pty Limited	Iron ore mining	Ordinary	100	100	—
North Mining Limited[(a)]	Iron ore mining	Ordinary	100	100	—
Rio Tinto Aluminium (Holdings) Limited	Bauxite mining; alumina production; primary aluminium smelting	Ordinary	100	100	—
Robe River Mining Co Pty Ltd[(a)]	Iron ore mining	Class A	40	60	40
		Class B	76.36		
Brazil					
Alcan Alumina Ltda.[(b)]	Alumina production and bauxite mining	Quota	100	100	—
Canada					
Iron Ore Company of Canada[(c)]	Iron ore mining; iron ore pellets production	Common	58.72	58.72	41.28
Rio Tinto Fer et Titane Inc.	Titanium dioxide feedstock; high purity iron and steel production	Common	100	100	—
		Class B preference	100	100	—
		CAD 0.01 preferred	100	100	—
Rio Tinto Alcan Inc.	Bauxite mining; alumina refining; aluminium smelting	Common	100	100	—
Diavik Diamond Mines (2012) Inc.[(d)]	Diamond mining and processing	Common	100	100	—
Guinea					
Simfer Jersey Limited[(e)]	Iron ore project	Ordinary	53	53	47
Madagascar					
QIT Madagascar Minerals SA[(f)]	Ilmenite mining	Common	80	80	15
		Investment certificates	100	100	
		Voting certificates	80	80	20
Mongolia					
Turquoise Hill Resources Ltd (including Oyu Tolgoi LLC)[(g)]	Copper and gold mining	Common	50.79	50.79	49.21
South Africa					
Richards Bay Titanium (Proprietary) Limited[(h)]	Titanium dioxide; high purity iron production	B Ordinary	100	74	26
		B preference	100		
		Parent Preference	100		
Richards Bay Mining (Proprietary) Limited[(h)]	Ilmenite, rutile and zircon mining	B Ordinary	100	74	26
		B preference	100		
		Parent Preference	100		
US					
Kennecott Holdings Corporation (including Kennecott Utah Copper and Kennecott Exploration)	Copper and gold mining, smelting and refining and exploration activities	Common US$0.01	100	100	—
U.S. Borax Inc.	Mining, refining and marketing of borates	Common US$0.10	100	100	—

This list includes only those companies that have a more significant impact on the profit or operating assets of the Group. Refer to note 44 for a list of related undertakings.

The Group's principal subsidiaries are mostly held by intermediate holding companies and not directly by Rio Tinto plc or Rio Tinto Limited.

(a) Robe River Mining Co Pty Ltd (which is 60% owned by the Group) holds a 30% interest in Robe River Iron Associates (Robe River). North Mining Ltd (which is wholly owned by the Group) holds a 35% interest in Robe River. Through these companies the Group recognises a 65% share of the assets, liabilities, revenues and expenses of Robe River, with a 12% non-controlling interest. The Group therefore has a 53% beneficial interest in Robe River.

(b) Alcan Alumina Ltda holds the Group's 10% interest in Consórcio De Alumínio Do Maranhão, a joint operation in which the Group participates but is not a joint operator. The Group recognises its share of assets, liabilities, revenues and expenses relating to this arrangement.

(c) Iron Ore Company of Canada is incorporated in the US, but operates in Canada.

(d) On 18 November 2021, Diavik Diamond Mines (2012) Inc. (DDMI) purchased the 40% share in the Diavik Diamond Mine, an unincorporated arrangement, held by Dominion Diamond Mines, becoming sole owner as a result; refer to note 36. Prior to purchase the Group held a 60% interest in Diavik and recognised its share of assets, revenue and expenses relating to this arrangement. Liabilities were recognised according to DDMI's contractual obligations, with a corresponding 40% receivable or contingent asset representing the co-owner's share where applicable.

(e) Simfer Jersey Limited, a company incorporated in Jersey in which the Group has a 53% interest, has an 85% interest in Simfer S.A., the company that operates the Simandou mining project in Guinea. The Group therefore has a 45.05% indirect interest in Simfer S.A. These entities are consolidated as subsidiaries and together referred to as the Simandou iron ore project.

(f) The Group's shareholding in QIT Madagascar Minerals SA carries an 80% economic interest and 80% of the total voting rights; a further 5% economic interest is held through non-voting investment certificates to give an economic interest of 85%. The non-controlling interests have a 15% economic interest and 20% of the total voting rights.

(g) The Group has a 50.79% interest in Turquoise Hill Resources Ltd, which holds a 66% interest in Oyu Tolgoi LLC (OT) which is a subsidiary of Turquoise Hill Resources Ltd. The Group therefore has a 33.5% indirect interest in OT. Turquoise Hill Resources Ltd is incorporated in Canada but operates principally in Mongolia.

(h) Additional classes of shares issued by Richards Bay Titanium (Proprietary) Limited and Richards Bay Mining (Proprietary) Limited representing non-controlling interests are not shown. The Group's total legal and beneficial interest in Richards Bay Titanium (Proprietary) Limited and Richards Bay Mining (Proprietary) Limited is 74%.

Summary financial information for subsidiaries that have non-controlling interests that are material to the Group

This summarised financial information is shown on a 100% basis. It represents the amounts shown in the subsidiaries' financial statements prepared in accordance with IFRS under Group accounting policies, including fair value adjustments, and before intercompany eliminations.

Income statement summary for the year ended 31 December	**Iron Ore Company of Canada 2021 US$m**	Iron Ore Company of Canada 2020 US$m	**Turquoise Hill[(i)(j)(k)] 2021 US$m**	Turquoise Hill[(i)(j)(k)] 2020 US$m
Revenue	**3,308**	2,269	**1,971**	1,078
Profit after tax	**1,193**	611	**893**	357
– attributable to non-controlling interests	**493**	252	**496**	130
– attributable to Rio Tinto	**700**	359	**397**	227
Other comprehensive income	**39**	56	**3**	2
Total comprehensive income	**1,232**	667	**896**	359

Balance sheet summary as at 31 December	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m
Non-current assets	**2,974**	2,733	**12,250**	10,930
Current assets	**599**	670	**1,129**	1,496
Current liabilities	**(581)**	(462)	**(954)**	(540)
Non-current liabilities	**(1,020)**	(993)	**(4,085)**	(4,404)
Net assets	**1,972**	1,948	**8,340**	7,482
– attributable to non-controlling interests	**818**	804	**2,846**	2,424
– attributable to Rio Tinto	**1,154**	1,144	**5,494**	5,058

Cash flow statement summary for the year ended 31 December	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m
Cash flow from operations	**2,119**	1,027	**825**	380
Dividends paid to non-controlling interests	**(495)**	(180)	**—**	—

(i) Turquoise Hill Resources Ltd holds a controlling interest in Oyu Tolgoi LLC.

(j) Under the terms of the project finance facility held by Oyu Tolgoi LLC, there are certain restrictions on the ability of Oyu Tolgoi LLC to make shareholder distributions.

(k) Since 2011, Turquoise Hill has funded common share investments in Oyu Tolgoi LLC on behalf of Erdenes Oyu Tolgoi LLC ("Erdenes"). In accordance with the Amended and Restated Shareholders Agreement dated 8 June 2011, such funded amounts earn interest at an effective annual rate of LIBOR plus 6.5% and are repayable to them via a pledge over Erdenes' share of future OT common share dividends. Erdenes also has the right to reduce the outstanding balance by making payments directly to Turquoise Hill. Common share investments funded on behalf of Erdenes, including accrued interest, are recorded as a reduction to the net carrying value of their component of non-controlling interests. As at 31 December 2021, the cumulative amount of such funding was US$1,399 million (31 December 2020: US$1,378 million), excluding accrued interest of US$953 million (31 December 2020: US$804 million) relating to this funding. On 25 January 2022, Turquoise Hill agreed to waive the full amount of funding balances and interest; refer to note 45.

Income statement summary for the year ended 31 December	**Robe River Mining Co Pty 2021 US$m**	Robe River Mining Co Pty 2020 US$m	**Other companies and eliminations[(l)] 2021 US$m**	Other companies and eliminations[(l)] 2020 US$m	**Robe River 2021 US$m**	Robe River 2020 US$m
Revenue	**2,454**	1,738	**2,863**	2,028	**5,317**	3,766
Profit after tax	**1,352**	939	**1,518**	1,019	**2,870**	1,958
– attributable to non-controlling interests	**541**	376	**—**	—	**541**	376
– attributable to Rio Tinto	**811**	563	**1,518**	1,019	**2,329**	1,582
Other comprehensive (loss)/income	**(183)**	294	**(97)**	136	**(280)**	430
Total comprehensive income	**1,169**	1,233	**1,421**	1,155	**2,590**	2,388

Balance sheet summary as at 31 December	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m
Non-current assets	**3,472**	3,452	**4,166**	4,247	**7,638**	7,699
Current assets	**495**	865	**2,118**	2,239	**2,613**	3,104
Current liabilities	**(371)**	(380)	**(329)**	(414)	**(700)**	(794)
Non-current liabilities	**(421)**	(255)	**(4,378)**	(4,752)	**(4,799)**	(5,007)
Net assets	**3,175**	3,682	**1,577**	1,320	**4,752**	5,002
– attributable to non-controlling interests	**1,268**	1,397	**—**	—	**1,268**	1,397
– attributable to Rio Tinto	**1,907**	2,285	**1,577**	1,320	**3,484**	3,605

Notes to the 2021 financial statements

32 Principal subsidiaries continued

Cash flow statement summary for the year ended 31 December	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m	**2021 US$m**	2020 US$m
Cash flow from operations	**2,130**	1,491	**2,512**	1,771	**4,642**	3,262
Dividends paid to non-controlling interests	**(589)**	(332)	**—**	(165)	**(589)**	(497)

(l) "Other companies and eliminations" includes North Mining Limited (a wholly-owned subsidiary of the Group which accounts for its interest in Robe River) and goodwill of US$362 million (2020: US$383 million) that arose on the Group's acquisition of its interest in Robe River.

33 Principal joint operations

At 31 December 2021

Company and country of incorporation/operation	Principal activities	Group interest (%)
Australia		
Tomago Aluminium Joint Venture	Aluminium smelting	51.6
Gladstone Power Station	Power generation	42.1
Hope Downs Joint Venture	Iron ore mining	50
Queensland Alumina Limited(a)(b)	Alumina production	80
Pilbara Iron Arrangements	Infrastructure, corporate and mining services	(c)
New Zealand		
New Zealand Aluminium Smelters Limited(a)(b)	Aluminium smelting	79.4
Canada		
Aluminerie Alouette Inc.	Aluminium production	40
US		
Pechiney Reynolds Quebec Inc(b)(d)	Aluminium smelting	50.2

This list includes only those joint operations that have a more significant impact on the profit or operating assets of the Group. Refer to note 44 for a list of related undertakings.

The Group's joint operations are held by intermediate holding companies and not directly by Rio Tinto plc or Rio Tinto Limited.

(a) Although the Group has a 79.4% interest in New Zealand Aluminium Smelters Limited and an 80% interest in Queensland Alumina Limited, decisions about activities that significantly affect the returns that are generated require agreement of both parties to the arrangements, giving rise to joint control.

(b) Queensland Alumina Limited, New Zealand Aluminium Smelters Limited and Pechiney Reynolds Quebec Inc. are joint arrangements that are primarily designed for the provision of output to the parties sharing joint control; this indicates that the parties have rights to substantially all the economic benefits of the assets. The liabilities of the arrangements are in substance satisfied by cash flows received from the parties; this dependence indicates that the parties in effect have obligations for the liabilities. It is these facts and circumstances that give rise to the classification of these entities as joint operations.

(c) A number of arrangements are in place between the Australian Iron Ore operations managed by Rio Tinto which allow their respective assets to be operated as a single integrated network across the Pilbara region. The arrangements are managed through two wholly owned subsidiaries: Pilbara Iron (Company) Services Pty Ltd and Pilbara Iron Pty Ltd. In assessing the Pilbara Iron Arrangements, it has been concluded that they collectively constitute a joint operation on the basis that decisions about relevant activities require unanimous consent. The resulting efficiencies are shared between Rio Tinto and Robe River Iron Associates (Robe River), and the parties fund all of the cash flow requirements of Pilbara Iron (Company) Services Pty Ltd and Pilbara Iron Pty Ltd.

(d) Pechiney Reynolds Quebec Inc. has a 50.1% interest in the Aluminerie de Bécancour, Inc. aluminium smelter, which is located in Canada. As Rio Tinto owns 50.2% of Pechiney Reynolds Quebec Inc our effective ownership of the Becancour smelter is 25.1%.

34 Principal joint ventures

At 31 December 2021

Company and country of incorporation/operation	Principal activities	Number of shares held	Class of shares held	Proportion of class held (%)	Group interest (%)
Chile					
Minera Escondida Ltda[(a)]	Copper mining and refining	—	—	—	30
Oman					
Sohar Aluminium Co. L.L.C.[(b)]	Aluminium smelting; power generation	37,500	Ordinary	20	20

This list includes only those joint ventures that have a more significant impact on the profit or operating assets of the Group. Refer to note 44 for a list of related undertakings.

The Group's principal joint ventures are held by intermediate holding companies and not directly by Rio Tinto plc or Rio Tinto Limited.

(a) Although the Group has a 30% interest in Minera Escondida Ltda, participant and management agreements provide for an Owners' Council whereby significant commercial and operational decisions about the relevant activities that significantly affect the returns that are generated in effect require the joint approval of both Rio Tinto and BHP (holders of a 57.5% interest). It is therefore determined that Rio Tinto has joint control.
The year-end of Minera Escondida Ltda is 30 June. The amounts included in the consolidated financial statements of Rio Tinto are, however, based on financial statements of Minera Escondida Limitada that are coterminous with those of the Group.

(b) Although the Group holds a 20% interest in Sohar Aluminium Co. L.L.C, decisions about relevant activities that significantly affect the returns that are generated require agreement of all parties to the arrangement. It is therefore determined that Rio Tinto has joint control.

Summary information for joint ventures that are material to the Group

This summarised financial information is shown on a 100% basis. It represents the amounts shown in the joint ventures' financial statements prepared in accordance with IFRS under Group accounting policies, including fair value adjustments and amounts due to and from Rio Tinto.

	Minera Escondida Ltda[(c)] 2021 US$m	Minera Escondida Ltda[(c)] 2020 US$m	**Sohar Aluminum Co.L.L.C.[(d)] 2021 US$m**	Sohar Aluminum Co.L.L.C.[(d)] 2020 US$m
Revenue	**9,783**	7,650	**900**	640
Depreciation and amortisation	**(1,160)**	(1,427)	**(115)**	(115)
Impairment charges (note 6)	**—**	—	**—**	(1,100)
Other operating costs	**(3,066)**	(2,756)	**(510)**	(430)
Operating profit/(loss)	**5,557**	3,467	**275**	(1,005)
Finance expense	**(134)**	(137)	**(30)**	(20)
Income tax	**(2,133)**	(1,197)	**(35)**	(15)
Profit/(loss) after tax	**3,290**	2,133	**210**	(1,040)
Other comprehensive profit/(loss)	**40**	(40)	**—**	—
Total comprehensive income/(loss)	**3,330**	2,093	**210**	(1,040)
Non-current assets	**11,490**	11,833	**1,765**	1,850
Current assets	**2,857**	3,107	**360**	270
Current liabilities	**(2,017)**	(1,813)	**(175)**	(675)
Non-current liabilities	**(4,633)**	(4,560)	**(730)**	(200)
Net assets	**7,697**	8,567	**1,220**	1,245
Assets and liabilities above include:				
– cash and cash equivalents	**857**	1,103	**45**	30
– current financial liabilities	**(550)**	(790)	**(40)**	(565)
– non-current financial liabilities	**(2,660)**	(2,560)	**(560)**	(30)
Dividends received from joint venture (Rio Tinto share)	**1,374**	585	**47**	—

Reconciliation of the above amounts to the investment recognised in the Group balance sheet

Group interest	**30 %**	30 %	**20 %**	20 %
Net assets	**7,697**	8,567	**1,220**	1,245
Group's ownership interest	**2,309**	2,570	**244**	249
Carrying value of Group's interest	**2,309**	2,570	**244**	249

(c) In addition to its "Investment in equity accounted units", the Group recognises deferred tax liabilities of US$322 million (2020: US$358 million) relating to tax on unremitted earnings of equity accounted units.

(d) As part of the project financing agreements, there are certain restrictions on the ability of Sohar Aluminium Co. L.L.C to make shareholder distributions.

Notes to the 2021 financial statements

35 Principal associates

At 31 December 2021

Company and country of incorporation/operation	Principal activities	Number of shares held	Class of shares held	Proportion of class held (%)	Group interest (%)
Australia					
Boyne Smelters Limited[a]	Aluminium smelting	153,679,560	Ordinary	59.4	59.4
Brazil					
Mineração Rio do Norte S.A.[b]	Bauxite mining	25,000,000,000	Ordinary	12.5	12
		47,000,000,000	Preferred	11.75	
US					
Halco (Mining) Inc.[c]	Bauxite mining	4,500	Common	45	45

This list includes only those associates that have a more significant impact on the profit or operating assets of the Group. Refer to note 44 for a list of related undertakings.

The Group's principal associates are held by intermediate holding companies and not directly by Rio Tinto plc or Rio Tinto Limited.

(a) The parties that collectively control Boyne Smelters Limited do so through decisions that are determined on an aggregate voting interest that can be achieved by several combinations of the parties. Although each combination requires Rio Tinto's approval, this is not joint control as defined under IFRS 11 "Joint Arrangements". Rio Tinto is therefore determined to have significant influence over this company.
(b) Although the Group holds only 12% of Mineração Rio do Norte S.A., it has representation on its board of directors and a consequent ability to participate in the financial and operating policy decisions. It is therefore determined that Rio Tinto has significant influence.
(c) Halco (Mining) Inc. has a 51% indirect interest in Compagnie des Bauxites de Guinée, a bauxite mine, the core assets of which are located in Guinea.

Summary information for associates that are material to the Group

This summarised financial information is shown on a 100% basis. It represents the amounts shown in the associate's financial statements prepared in accordance with IFRS under Group accounting policies, including fair value adjustments and amounts due to and from Rio Tinto.

	Boyne Smelters Limited[a] 2021 US$m	Boyne Smelters Limited[a] 2020 US$m
Revenue	**—**	—
Profit/(loss) after tax[b]	**61**	(198)
Other comprehensive (loss)/income[c]	**(24)**	30
Total comprehensive income/(loss)	**37**	(168)
Non-current assets	**993**	1,037
Current assets	**135**	98
Current liabilities	**(195)**	(146)
Non-current liabilities	**(675)**	(779)
Net assets	**258**	210

Reconciliation of the above amount to the investment recognised in the Group balance sheet

Group interest	**59.4%**	59.4%
Net assets	**258**	210
Group's ownership interest	**153**	125
Loans to equity accounted units	**97**	112
Carrying value of Group's interest	**250**	237

(a) Boyne Smelters Limited is a tolling operation; as such it is dependent on its participants for funding which is provided through cash calls. Rio Tinto has made certain prepayments to Boyne for toll processing of alumina. These are charged to Group operating costs as processing takes place.
(b) In 2020, includes US$200 million of impairment charges. Refer to note 6.
(c) "Other comprehensive (loss)/income" is net of amounts recognised by subsidiaries in relation to quasi equity loans.

Summary information for joint ventures and associates that are not individually material to the Group

	Associates 2021 US$m	Associates 2020 US$m
Carrying value of Group's interest	**700**	708
Profit after tax	**(22)**	—
Other comprehensive income	**(5)**	(5)
Total comprehensive income	**(27)**	(5)

36 Purchases and sales of subsidiaries, joint ventures, associates and other interests in businesses

Acquisitions

We have made no material acquisitions over the last three years.

On 18 November 2021, we announced completion of a transaction to acquire the 40% share in the Diavik Diamond Mine in the Northwest Territories of Canada held by Dominion Diamond Mines, becoming sole owner as a result. The transaction did not meet the definition of a business combination and therefore the incremental assets and liabilities were treated as an asset purchase. Prior to purchase the Group recognised its existing 60% share of assets, revenues and expenses, with liabilities recognised according to its contractual obligations, and a corresponding 40% receivable or contingent asset representing the co-owner's share where applicable. Receivables relating to the co-owner's share were de-recognised and treated as part of the net purchase consideration on completion.

On 21 December 2021, the Group entered into a binding agreement to acquire the Rincon lithium project in Argentina for US$825 million. The Rincon lithium project does not meet the definition of a business as defined by IFRS 3 "Business Combinations" and the transaction will be treated as an asset purchase; completion is subject to regulatory approval in Australia.

Disposals

We have made no material disposals in 2021 or 2020.

On 16 July 2019 we disposed of our entire 68.62% interest in Rössing Uranium to China National Uranium Corporation Limited for gross cash proceeds of US$6.5 million. After adjusting for cash held on Rössing's balance sheet at the date of disposal and included in the sale, we reported a net cash outflow of US$118 million and recognised a loss on disposal of US$289 million. This includes cumulative currency translation losses of US$212 million recycled from the currency translation reserve on sale of the business.

37 Directors' and key management remuneration

Aggregate remuneration, calculated in accordance with the UK Companies Act 2006, of the directors of the parent companies was as follows:

	2021 US$'000	2020 US$'000	2019 US$'000
Emoluments	**6,568**	6,686	7,524
Long-term incentive plans	**1,587**	8,974	4,748
	8,155	15,660	12,272
Pension contributions: defined contribution plans	**9**	29	42
Gains made on exercise of share options	**—**	—	—

The Group defines key management personnel as the directors and certain members of the Executive Committee, as described on page 171. The Executive Committee comprises the executive directors, product group chief executive officers and Group executives. Details of the directors and members of the Executive Committee identified as key management are shown in the Directors' Report on pages 134 to 137.

The aggregate remuneration including pension contributions incurred by Rio Tinto plc in respect of its directors was US$7,522,000 (2020: US$14,983,000; 2019: US$11,565,000). The aggregate pension contribution to defined contribution plans was US$9,000 (2020: US$29,000; 2019: US$42,000). The aggregate remuneration, including pension contributions and other retirement benefits, incurred by Rio Tinto Limited in respect of its directors was US$642,000 (2020: US$707,000; 2019: US$749,000). The aggregate pension contribution to defined contribution plans was US$nil (2020: US$nil; 2019: US$nil).

During 2021, no director (2020:nil; 2019:nil) accrued retirement benefits under defined benefit arrangements, and two directors (2020: two; 2019: two) accrued retirement benefits under defined contribution arrangements.

Emoluments included in the table above have been translated from local currency at the average exchange rate for the year with the exception of bonus payments, which have been translated at the year-end rate.

Detailed information concerning directors' remuneration, shareholdings and options is shown in the Remuneration Report, including tables 1 to 3, on pages 160 to 198.

Notes to the 2021 financial statements

37 Directors' and key management remuneration continued

Aggregate compensation, representing the expense recognised under IFRS, as defined in note 1, of the Group's key management, including directors, was as follows:

	2021 US$'000	2020 US$'000	2019 US$'000
Short-term employee benefits and costs	**18,184**	21,685	22,075
Post-employment benefits	**300**	369	477
Employment termination benefits	**—**	2,789	310
Share-based payments	**10,303**	34,954	17,632
Total	**28,787**	59,797	40,494

The figures shown above include employment costs which comprise social security and accident premiums in Canada, the UK and payroll taxes in Australia paid by the employer as a direct additional cost of hire. In total, they amount to US$1,511,000 (2020: US$2,130,000; 2019: US$2,066,000) and, although disclosed here, are not included in table 1 of the Remuneration Report.

More detailed information concerning the remuneration of key management is shown in the Remuneration Report, including tables 1 to 3 on pages 160 to 198.

38 Auditors' remuneration

Group auditors' remuneration[(a)]

	2021 US$m	2020 US$m	2019 US$m
Audit of the Group	**13.7**	11.0	9.6
Audit of subsidiaries	**7.5**	6.3	6.8
Total audit	**21.2**	17.3	16.4
Audit-related assurance service	**1.0**	0.8	0.8
Other assurance services[(b)]	**2.7**	1.4	1.9
Total assurance services	**3.7**	2.2	2.7
Tax compliance	**—**	—	0.1
Other non-audit services not covered above	**0.2**	0.1	0.0
Total non-audit services	**3.9**	2.3	2.8
Total Group auditors' remuneration	**25.1**	19.6	19.2
Audit fees payable to other accounting firms			
Audit of the financial statements of the Group's subsidiaries[(c)]	**0.3**	0.6	1.4
Fees in respect of pension scheme audits	**0.1**	0.1	0.1
Total audit fees payable to other accounting firms	**0.4**	0.7	1.5

(a) In 2021 and 2020, all amounts were paid to member firms of KPMG. In 2019, all amounts were paid to member firms of PwC, being the Group's auditors for these financial years. The remuneration payable to KPMG, the Group auditors, is approved by the Audit Committee. The Committee sets the policy for the award of non-audit work to the auditors and approves the nature and extent of such work, and the amount of the related fees, to ensure that independence is maintained. The fees disclosed above consolidate all payments made to member firms of KPMG by the companies and their subsidiaries, along with fees in respect of joint operations paid for by the Group and in 2021 includes incremental overruns subsequently paid to KPMG in respect of the 2020 audit. Non-audit services arise largely from assurance and/or regulation related work.
(b) Other assurance services relates to the review of non-statutory financial information including sustainability reporting.
(c) In 2019 these amounts include fees payable to KPMG in respect of subsidiaries whose statutory auditor was KPMG prior to their appointment as the Group's auditor.

39 Related-party transactions

Information about material related-party transactions of the Rio Tinto Group is set out below.

Subsidiary companies and joint operations

Details of investments in principal subsidiary companies are disclosed in note 32. Information relating to joint operations can be found in note 33.

Equity accounted units

Transactions and balances with equity accounted units are summarised below. Purchases, trade and other receivables, and trade and other payables relate largely to amounts charged by equity accounted units for toll processing of alumina and purchasing of bauxite and aluminium. Sales relate largely to sales of alumina to equity accounted units for smelting into aluminium.

	Note	2021 US$m	2020 US$m	2019 US$m
Income statement items				
Purchases from equity accounted units		**(1,167)**	(960)	(1,155)
Sales to equity accounted units		**432**	271	268
Cash flow statement items				
Dividends from equity accounted units		**1,431**	594	669
Net receipts/(funding) from/of equity accounted units		**6**	(43)	(33)
Balance sheet items				
Investments in equity accounted units[a]	15	**3,504**	3,764	3,971
Loans to equity accounted units	19	**—**	41	39
Trade and other receivables: amounts due from equity accounted units[b]	18	**251**	251	259
Trade and other payables: amounts due to equity accounted units	24	**(253)**	(241)	(271)

(a) Investments in equity accounted units include quasi equity loans. Further information about investments in equity accounted units is set out in notes 34 and 35.
(b) This includes prepayments of tolling charges.

Pension funds

Information relating to pension fund arrangements is set out in note 42.

Directors and key management

Details of directors' and key management's remuneration are set out in note 37 and in the Remuneration Report on pages 160 to 198.

40 Exchange rates in US$

The principal exchange rates used in the preparation of the 2021 financial statements were:

	Full-year average			Year-end		
	2021	2020	2019	**2021**	2020	2019
Pound sterling	**1.38**	1.28	1.28	**1.35**	1.36	1.31
Australian dollar	**0.75**	0.69	0.70	**0.73**	0.77	0.70
Canadian dollar	**0.80**	0.75	0.75	**0.78**	0.78	0.77
Euro	**1.18**	1.14	1.12	**1.13**	1.23	1.12
South African rand	**0.068**	0.061	0.069	**0.063**	0.068	0.071

41 Share-based payments

Rio Tinto plc and Rio Tinto Limited have a number of share-based incentive plans, which are described in detail in the Remuneration Report. These plans have been accounted for in accordance with the fair value recognition provisions of IFRS 2 "Share-based Payment".

The charge that has been recognised in the income statement for Rio Tinto's share-based incentive plans, and the related liability (for cash-settled awards), is set out in the table below.

	Charge recognised for the year			Liability at the end of the year	
	2021 US$m	2020 US$m	2019 US$m	**2021 US$m**	2020 US$m
Equity-settled awards	**122**	131	118	**—**	—
Cash-settled awards	**4**	7	5	**6**	7
Total	**126**	138	123	**6**	7

The main Rio Tinto plc and Rio Tinto Limited share-based incentive plans are as follows:

UK Share Plan

The fair values of Matching and Free Shares made by Rio Tinto plc are taken to be the market value of the shares on the date of purchase. These awards are settled in equity.

Equity Incentive Plan

In 2018, shareholders approved the introduction of the Rio Tinto 2018 Equity Incentive Plan (the "EIP"). From 2018, all long-term incentive awards have been granted under this umbrella plan which allows for awards in the form of Performance Share Awards (PSA), Management Share Awards (MSA) and Bonus Deferral Awards (BDA) to be granted.

Notes to the 2021 financial statements

41 Share-based payments continued

Performance Share Awards (Performance Share Plans prior to 2018)

Participants are generally assigned shares in settlement of their PSA on vesting and therefore the awards are accounted for in accordance with the requirements applying to equity-settled share-based payment transactions, including the dividends accumulated from date of award to vesting.

For the parts of awards with Total Shareholder Return (TSR) performance conditions, the fair value of the awards is calculated using a Monte Carlo simulation model taking into account the TSR performance conditions. One third of the awards granted up to 2017 (inclusive) are subject to an earnings margin performance target relative to ten global mining comparators. As this is a non-market related performance condition, under IFRS 2, the fair value recognised is reviewed at each accounting date based on the directors' expectations for the proportion vesting. Forfeitures prior to vesting are assumed at 5% per annum of outstanding awards (2020: 5% per annum).

For grants made from 2018, the earnings margin performance target applying to the PSA was removed and instead all of the awards are subject to the TSR performance conditions set out in the Remuneration Report.

Management Share Awards (Management Share Plans prior to 2018)

The vesting of these awards is dependent on service conditions being met; no performance conditions apply. In general, the awards will be settled in equity, including the dividends accumulated from date of award to vesting and therefore the awards are accounted for in accordance with the requirements applying to equity-settled share-based payment transactions.

The fair value of each award on the day of grant is equal to the share price on the day of grant. Forfeitures prior to vesting are assumed at 7% per annum of outstanding awards (2020: 7% per annum).

Bonus Deferral Awards (Bonus Deferral Plans prior to 2018)

Bonus Deferral Awards (BDA) provide for the mandatory deferral of 50% of the bonuses for executive directors and Executive Committee members and 25% of the bonuses for other executives.

The vesting of these awards is dependent only on service conditions being met. In general, the awards will be settled in equity including the dividends accumulated from date of award to vesting and therefore the awards are accounted for in accordance with the requirements applying to equity-settled share-based payment transactions. The fair value of each award on the day of grant is equal to the share price on the day of grant. Forfeitures prior to vesting are assumed at 3% per annum of outstanding awards (2020: 3% per annum).

Global Employee Share Plans

The Global Employee Share Plans were introduced in 2012 and re-approved by shareholders in 2021. Under these Plans, the companies provide a matching share award for each investment share purchased by a participant. The vesting of these matching awards is dependent on service conditions being met and the continued holding of investment shares by the participant until vesting. These awards are settled in equity including the dividends accumulated from date of award to vesting. The fair value of each matching share on the day of grant is equal to the share price on the date of purchase less a deduction of 15% for estimated cancellations (caused by employees electing to withdraw their investment shares before vesting of their matching shares). Forfeitures prior to vesting are assumed at 5% per annum of outstanding awards (2020: 5% per annum).

The Management Share Awards, Performance Share Awards, Bonus Deferral Awards, Equity Incentive Plan, Global Employee Share Plans and UK Share Plan together represent 100% (2020: 100%) of the total IFRS 2 charge for Rio Tinto plc and Rio Tinto Limited plans in 2021.

Performance Share Awards (granted under either the Performance Share Plans or the Equity Incentive Plans)

	Rio Tinto plc awards				**Rio Tinto Limited awards**			
	2021 number	**Weighted average fair value at grant date 2021 £**	2020 number	Weighted average fair value at grant date 2020 £	**2021 number**	**Weighted average fair value at grant date 2021 A$**	2020 number	Weighted average fair value at grant date 2020 A$
Unvested awards at 1 January	**3,778,041**	**21.01**	3,803,394	22.20	**1,391,373**	**44.40**	1,636,517	45.11
Awarded	**676,296**	**29.63**	716,111	13.55	**217,178**	**60.67**	198,863	33.56
Forfeited	**(474,878)**	**20.85**	(136,030)	21.13	**(59,291)**	**46.42**	(178,921)	46.37
Failed performance conditions	**(189,799)**	**19.43**	(145,661)	16.64	**(89,448)**	**44.07**	(63,852)	33.38
Vested	**(413,588)**	**9.48**	(459,773)	20.55	**(183,118)**	**20.96**	(201,234)	41.21
Unvested awards at 31 December	**3,376,072**	**24.26**	3,778,041	21.01	**1,276,694**	**50.46**	1,391,373	44.40

	Rio Tinto plc awards				Rio Tinto Limited awards			
	2021 number	Weighted average share price at vesting 2021 £	2020 number	Weighted average share price at vesting 2020 £	2021 number	Weighted average share price at vesting 2021 A$	2020 number	Weighted average share price at vesting 2020 A$
Vested awards settled in shares during the year (including dividend shares applied on vesting)	**431,682**	**62.63**	476,602	43.13	**184,876**	**127.37**	217,287	93.48
Vested awards settled in cash during the year (including dividend shares applied on vesting)	**63,144**	**62.35**	108,887	43.13	**29,737**	**127.5**	28,208	93.82

In addition to the equity-settled awards shown above, there were 20,548 Rio Tinto plc and 27,476 Rio Tinto Limited cash-settled awards outstanding at 31 December 2021 (2020: 48,191 Rio Tinto plc and 15,164 Rio Tinto Limited cash-settled awards outstanding). The total liability for these awards at 31 December 2021 was US$2 million (2020: US$3 million).

Management Share Awards, Bonus Deferral Awards (granted under the Management Share Plans or Equity Incentive Plans), Global Employee Share Plans and UK Share Plan (combined)

	Rio Tinto plc awards[a]				Rio Tinto Limited awards			
	2021 number	Weighted average fair value at grant date 2021 £	2020 number	Weighted average fair value at grant date 2020 £	2021 number	Weighted average fair value at grant date 2021 A$	2020 number	Weighted average fair value at grant date 2020 A$
Unvested awards at 1 January[b]	**2,650,861**	**37.50**	2,613,013	37.14	**2,216,734**	**82.52**	2,273,669	75.46
Awarded	**987,665**	**52.07**	1,190,528	36.27	**887,022**	**105.47**	921,070	83.20
Forfeited	**(202,248)**	**23.84**	(99,038)	44.42	**(130,990)**	**90.01**	(60,935)	85.01
Cancelled	**(42,812)**	**45.09**	(33,955)	37.72	**(46,624)**	**87.08**	(50,354)	71.45
Vested	**(899,640)**	**39.44**	(1,019,687)	34.46	**(761,574)**	**79.86**	(866,716)	65.19
Unvested awards at 31 December[b]	**2,493,826**	**43.55**	2,650,861	37.50	**2,164,568**	**92.31**	2,216,734	82.52
Comprising:								
– Management Share Awards	**1,241,695**	**43.63**	1,352,759	38.73	**1,178,538**	**95.70**	1,291,203	85.80
– Bonus Deferral Awards	**158,572**	**42.31**	211,905	36.14	**46,660**	**96.08**	53,324	85.53
– Global Employee Share Plan	**1,060,394**	**43.49**	1,050,608	36.06	**939,370**	**87.86**	872,207	77.47
– UK Share Plan	**33,165**	**47.94**	35,589	41.54	**—**	**—**	—	—

	2021 number	Weighted average share price at vesting 2021 £	2020 number	Weighted average share price at vesting 2020 £	2021 number	Weighted average share price at vesting 2021 A$	2020 number	Weighted average share price at vesting 2020 A$
Vested awards settled in shares during the year (including dividend shares applied on vesting):								
– Management Share Awards	**547,487**	**60.74**	707,133	42.26	**550,161**	**122.89**	640,948	97.74
– Bonus Deferral Awards	**100,368**	**47.96**	111,233	49.71	**34,279**	**105.55**	63,404	101.96
– Global Employee Share Plan	**407,314**	**54.61**	401,169	43.82	**312,109**	**112.33**	299,381	98.60
– UK Share Plan	**20,111**	**57.15**	2,392	45.73	**—**	**—**	—	—
Vested awards settled in cash during the year (including dividend shares applied on vesting):								
– Bonus Deferral Awards	**23,371**	**46.12**	19,617	48.34	**19,607**	**93.5**	—	—

(a) Awards of Rio Tinto American Depository Receipts (ADRs) under the Global Employee Share Plan are included within the totals for Rio Tinto plc awards for the purpose of these tables.
(b) These numbers are presented and calculated in accordance with IFRS 2 and represent awards for which an IFRS 2 charge continues to be accrued for.

In addition to the equity-settled awards shown above, there were 89,239 Rio Tinto plc and 12,217 Rio Tinto Limited cash-settled awards outstanding at 31 December 2021 (2020: 89,253 Rio Tinto plc and 14,878 Rio Tinto Limited cash-settled awards outstanding). The total liability for these awards at 31 December 2021 was US$4 million (2020: US$4 million).

Notes to the 2021 financial statements

42 Post-retirement benefits

Description of plans

The Group operates a number of pension and post-retirement healthcare plans around the world. Some of these plans are defined contribution and some are defined benefit, with assets held in separate trusts, foundations and similar entities.

Defined benefit pension and post-retirement healthcare plans expose the Group to a number of risks:

Uncertainty in benefit payments	The value of the Group's liabilities for post-retirement benefits will ultimately depend on the amount of benefits paid out. This in turn will depend on the level of future pay increases, the level of inflation (for those benefits that are subject to some form of inflation protection) and how long individuals live.
Volatility in asset values	The Group is exposed to future movements in the values of assets held in pension plans to meet future benefit payments.
Uncertainty in cash funding	Movements in the values of the obligations or assets may result in the Group being required to provide higher levels of cash funding, although changes in the level of cash required can often be spread over a number of years. In some countries control over the rate of cash funding or over the investment policy for pension assets might rest to some extent with a trustee body or other body that is not under the Group's direct control. In addition the Group is also exposed to adverse changes in pension regulation.

For these reasons the Group has a policy of moving away from defined benefit pension provisions and towards defined contribution arrangements instead. The defined benefit pension plans for salaried employees are closed to new entrants in almost all countries. For unionised employees, some plans remain open.

The Group does not usually participate in multi-employer plans in which the risks are shared with other companies using those plans. The Group's participation in such plans is immaterial and consequently no detailed disclosures are provided in this note.

Pension plans

The majority of the Group's defined benefit pension obligations are in Canada, the UK, the US and Switzerland.

In Canada the benefits for salaried staff are generally linked to final average pay and the plans are generally closed to new entrants. Benefits for bargaining employees are reviewed in negotiation with unions and are typically linked either to final average pay or to a flat monetary amount per year of service. New employees join arrangements which are defined contribution from the Group's perspective, with any required additional funding being provided by employees. The plans are subject to the regulatory requirements that apply to Canadian pension plans in the relevant provinces and territories (predominantly Quebec). Pension Committees are responsible for ensuring that the plans operate in a manner that is compliant with the relevant regulations. The Pension Committees generally have a number of members appointed by the sponsor and a number appointed by the plan participants. In some cases, there is also an independent Committee member.

The defined benefit sections of the UK arrangements are linked to final pay. New employees are admitted to defined contribution sections. The plans are subject to the regulatory requirements that apply to UK pension plans. Trustees are responsible for ensuring that the plans operate in a manner that is compliant with UK regulations. The trustee board governing the main UK plans has a number of directors appointed by the sponsor, a number appointed by the plan participants and an independent trustee director.

A number of defined benefit pension plans are sponsored by the US entities. Benefits for salaried staff are generally linked to final average pay. Benefits for bargaining employees are reviewed in negotiation with unions and are typically a flat monetary amount per year of service. New employees are admitted to defined contribution plans. A Benefits Governance Committee is responsible for ensuring that the plans are compliant with US regulations. Members of that Committee are appointed by the sponsor.

The Swiss plan provides benefits linked to final average pay. The Swiss plan is overseen by a foundation board which is responsible for ensuring that the plan complies with Swiss regulations. Foundation board members are appointed by the plan sponsor, by employees and by retirees.

In Australia, the main arrangements are principally defined contribution in nature but there are sections providing defined benefits linked to final pay, typically paid in lump sum form. These arrangements are managed by an independent financial institution. Rio Tinto may nominate candidates to be considered for appointment to the governing board, as may other employers. One third of the board positions are nominated by employers, with the remaining positions being filled by independent directors and directors nominated by participants.

The Group also operates a number of unfunded defined benefit plans, which are included in the figures below.

Post-retirement healthcare plans

Certain subsidiaries of the Group, mainly in the US and Canada, provide health and life insurance benefits to retired employees and in some cases to their beneficiaries and covered dependants. Eligibility for cover is dependent upon certain age and service criteria. These arrangements are generally unfunded, and are included in the figures below.

Plan assets

The assets of the pension plans are invested predominantly in a diversified range of equities, bonds and property. Consequently, the funding level of the pension plans is affected by movements in the level of equity markets and also by movements in interest rates. The Group monitors its exposure to changes in interest rates and equity markets and also measures its balance sheet pension risk using a value at risk approach. These measures are considered when deciding whether significant changes in investment strategy are required. Investment strategy reviews are conducted on a periodic basis for the main pension plans to determine the optimal investment mix bearing in mind the Group's tolerance for risk, the risk tolerance of the local sponsor companies and the views of the Pension Committees and trustee boards who are legally responsible for the investments of the plans. The assets of the pension plans may also be invested in Qualifying Insurance Policies which provide a stream of payments to match the benefits being paid out by the plans, thereby removing investment, inflation and longevity risks.

In Canada, the UK and Switzerland, the Group works with the governing bodies to ensure that the investment policy adopted is consistent with the Group's tolerance for risk. In the US the Group has direct control over the investment policy, subject to local investment regulations.

The proportions of the total fair value of assets in the pension plans for each asset class at the balance sheet date were:

	2021		2020	
Equities	**17.6%**		21.1%	
– Quoted		**13.4%**		17.9%
– Private		**4.2%**		3.2%
Bonds	**60.2%**		55.8%	
– Government fixed income		**23.2%**		17.7%
– Government inflation-linked		**9.5%**		9.6%
– Corporate and other publicly quoted		**20.6%**		22.6%
– Private		**6.9%**		5.9%
Property	**7.9%**		7.5%	
– Quoted property funds		**3.4%**		3.1%
– Unquoted property funds		**4.5%**		4.4%
Qualifying insurance policies	**10.5%**		11.3%	
Cash & other	**3.8%**		4.3%	
Total	**100.0%**		100.0%	

The assets of the plans are managed on a day-to-day basis by external specialist fund managers. These managers may invest in the Group's securities subject to limits imposed by the relevant fiduciary committees and local legislation. The approximate total holding of Group securities within the plans is US$2 million (2020: US$4 million).

The holdings of quoted equities are invested either in pooled funds or segregated accounts held in the name of the relevant pension funds. These equity portfolios are well diversified in terms of the geographic distribution and market sectors.

The holdings of government bonds are generally invested in the debt of the country in which a pension plan is situated. Corporate and other quoted bonds are usually of investment grade. Private debt is mainly held in the North American and UK pension funds and is invested in North American and European companies.

The property funds are invested in a diversified range of properties.

The holdings of cash & other are predominantly cash and short-term money market instruments.

Investments in private equity, private debt and property are less liquid than the other investment classes listed above and therefore the Group's investment in those asset classes is restricted to a level that does not endanger the liquidity of the pension plans.

Qualifying insurance policies are held with insurance companies that are regulated by the relevant local authorities. The value of those policies is calculated by the local actuaries using assumptions consistent with those adopted for valuing the insured obligations.

The Group makes limited use of futures, repurchase agreements and other instruments to manage the interest rate risk in some of its plans. Fund managers may also use derivatives to hedge currency movements within their portfolios and, in the case of bond managers, to take positions that could be taken using direct holdings of bonds but more efficiently.

Maturity of defined benefit obligations

An approximate analysis of the maturity of the obligations is given in the table below:

	Pension benefits	Other benefits	**2021 Total**	2020 Total	2019 Total
Proportion relating to current employees	20 %	17 %	**20 %**	21 %	20 %
Proportion relating to former employees not yet retired	12 %	0 %	**11 %**	11 %	12 %
Proportion relating to retirees	68 %	83 %	**69 %**	68 %	68 %
Total	100 %	100 %	**100 %**	100 %	100 %
Average duration of obligations (years)	13.8	13.1	**13.8**	14.3	14.4

Notes to the 2021 financial statements

42 Post-retirement benefits continued

Geographical distribution of defined benefit obligations

An approximate analysis of the geographic distribution of the obligations is given in the table below:

	Pension benefits	Other benefits	**2021 Total**	2020 Total	2019 Total
Canada	56 %	48 %	**55 %**	53 %	53 %
UK	29 %	2 %	**28 %**	28 %	28 %
US	8 %	47 %	**10 %**	10 %	10 %
Switzerland	5 %	0 %	**5 %**	5 %	5 %
Other	2 %	3 %	**2 %**	4 %	4 %
Total	100 %	100 %	**100 %**	100 %	100 %

Total expense recognised in the income statement

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m	2019 Total US$m
Current employer service cost for defined benefit plans	(159)	(8)	**(167)**	(137)	(125)
Past service cost	—	(2)	**(2)**	(2)	—
Settlement (losses)/gains	(3)	—	**(3)**	(1)	51
Net interest on net defined benefit liability	(28)	(24)	**(52)**	(49)	(58)
Non-investment expenses paid from the plans	(15)	—	**(15)**	(16)	(14)
Total defined benefit expense	(205)	(34)	**(239)**	(205)	(146)
Current employer service cost for defined contribution and industry-wide plans	(313)	(2)	**(315)**	(264)	(238)
Total expense recognised in the income statement	(518)	(36)	**(554)**	(469)	(384)

The above expense amounts are included as an employee cost within net operating costs. No amounts have been excluded from underlying earnings in 2021, 2020 or 2019.

The settlement loss in 2021 resulted from pension obligations in France being transferred to an external insurance company. The settlement gains in 2019 were the result of certain US obligations being transferred to external insurance companies and of certain US obligations being settled through a lump sum window exercise being offered to members with a deferred pension. A past service cost of US$1 million was recognised in 2020 in relation to the Lloyds Banking Group court judgment addressing the need to equalise historical transfer values in relation to Guaranteed Minimum Pensions.

Total amount recognised in other comprehensive income before tax

	2021 US$m	2020 US$m	2019 US$m
Actuarial gains/(losses)	**655**	(1,242)	(1,295)
Return on assets, net of interest on assets	**371**	768	1,033
Re-measurement gains/(losses) on pension and post-retirement healthcare plans	**1,026**	(474)	(262)

Amounts recognised in the balance sheet

The following amounts were measured in accordance with IAS 19 at 31 December:

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m
Total fair value of plan assets	14,700	—	**14,700**	14,905
Present value of obligations – funded	(14,462)	—	**(14,462)**	(15,731)
Present value of obligations – unfunded	(432)	(834)	**(1,266)**	(1,447)
Present value of obligations – total	(14,894)	(834)	**(15,728)**	(17,178)
Net deficit to be shown in the balance sheet	(194)	(834)	**(1,028)**	(2,273)
Comprising:				
– Deficits	(1,264)	(834)	**(2,098)**	(3,055)
– Surpluses	1,070	—	**1,070**	782
Net deficits on pension plans	(194)	—	**(194)**	(1,305)
Unfunded post-retirement healthcare obligation	—	(834)	**(834)**	(968)

The surplus amounts shown above are included in the balance sheet as “Receivables and other assets”. See note 18.

Deficits are shown in the balance sheet within “Provisions (including post-retirement benefits)”. See note 25.

Funding policy and contributions to plans

The Group reviews the funding position of its major pension plans on a regular basis and considers whether to provide funding above the minimum level required in each country. In Canada and the US the minimum level is prescribed by legislation. In the UK and Switzerland the minimum level is negotiated with the local trustee or foundation in accordance with the funding guidance issued by the local regulators. In deciding whether to provide funding above the minimum level the Group takes into account other possible uses of cash within the Group, the tax situation of the local sponsoring entity and any strategic advantage that the Group might obtain by accelerating contributions. The Group does not generally pre-fund post-retirement healthcare arrangements.

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m	2019 Total US$m
Contributions to defined benefit plans	425	39	**464**	201	257
Contributions to defined contribution plans	309	2	**311**	261	235
Total	734	41	**775**	462	492

The level of surplus in the Rio Tinto Pension Fund in the UK is such that it may be used to pay for the employer contributions to the defined contribution section of that Fund, in accordance with the funding arrangements agreed with the Trustee of that Fund. Consequently, the cash paid to defined contribution plans is lower than the defined contribution service cost by US$4 million. Contributions to defined benefit pension plans are kept under regular review and actual contributions will be determined in line with the Group's wider financing strategy, taking into account relevant minimum funding requirements. In 2021 additional cash of US$294 million was paid in order to settle pension obligations in France. This amount was paid to an external insurer, along with the transfer of existing pension assets in order to transfer the obligations to that insurer. As contributions to many plans are reviewed on at least an annual basis, the contributions for 2022 and subsequent years cannot be determined precisely in advance. Most of the Group's largest pension funds are fully funded on their local funding basis and do not require long-term funding commitments at present. Contributions to defined benefit pension plans for 2022 are estimated to be around US$180 million but may be higher or lower than this depending on the evolution of financial markets and voluntary funding decisions taken by the Group. Contributions for subsequent years are expected to be at similar levels. Healthcare plans are generally unfunded and contributions for future years will be equal to benefit payments net of participant contributions. The Group's contributions in 2022 are expected to be similar to the amounts paid in 2021.

Movements in the net defined benefit liability

A summary of the movement in the net defined benefit liability is shown in the first table below. The subsequent tables provide a more detailed analysis of the movements in the present value of the obligations and the fair value of assets.

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m
Change in the net defined benefit liability				
Net defined benefit liability at the start of the year	(1,305)	(968)	**(2,273)**	(1,730)
Amounts recognised in income statement	(205)	(34)	**(239)**	(205)
Amounts recognised in other comprehensive income	898	128	**1,026**	(474)
Employer contributions	425	39	**464**	201
Assets transferred to defined contribution section	(4)	—	**(4)**	(3)
Currency exchange rate (loss)/gain	(3)	1	**(2)**	(62)
Net defined benefit liability at the end of the year	(194)	(834)	**(1,028)**	(2,273)

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m
Change in present value of obligation				
Present value of obligation at the start of the year	(16,210)	(968)	**(17,178)**	(15,653)
Current employer service costs	(159)	(8)	**(167)**	(137)
Past service cost	—	(2)	**(2)**	(2)
Settlements	380	—	**380**	6
Interest on obligation	(304)	(24)	**(328)**	(384)
Contributions by plan participants	(22)	—	**(22)**	(22)
Benefits paid	798	39	**837**	778
Experience gains	27	62	**89**	61
Changes in financial assumptions gain/(loss)	454	67	**521**	(1,442)
Changes in demographic assumptions gain/(loss)	46	(1)	**45**	139
Currency exchange rate gain/(loss)	96	1	**97**	(522)
Present value of obligation at the end of the year	(14,894)	(834)	**(15,728)**	(17,178)

Notes to the 2021 financial statements

42 Post-retirement benefits continued

	Pension benefits US$m	Other benefits US$m	**2021 Total US$m**	2020 Total US$m
Change in plan assets				
Fair value of plan assets at the start of the year	14,905	—	**14,905**	13,923
Settlements	(383)	—	**(383)**	(7)
Interest on assets	276	—	**276**	335
Contributions by plan participants	22	—	**22**	22
Contributions by employer	425	39	**464**	201
Benefits paid	(798)	(39)	**(837)**	(778)
Non-investment expenses	(15)	—	**(15)**	(16)
Return on plan assets, net of interest on assets	371	—	**371**	768
Assets transferred to defined contribution section	(4)	—	**(4)**	(3)
Currency exchange rate (loss)/ gain	(99)	—	**(99)**	460
Fair value of plan assets at the end of the year	14,700	—	**14,700**	14,905

The settlement amounts shown above for 2021 relate to France, where assets and obligations for pensions in payment were transferred to an insurance company.

The asset ceiling had no effect during the year. In determining the extent to which the asset ceiling has an effect, the Group considers the funding legislation in each country and the rules specific to each pension plan. The calculation takes into account any minimum funding requirements that may be applicable to the plan, whether any reduction in future Group contributions is available, and whether a refund of surplus may be available. In considering whether any refund of surplus is available the Group considers the powers of trustee boards and similar bodies to augment benefits or wind up a plan. Where such powers are unilateral, the Group does not consider a refund to be available at the end of the life of a plan. Where the plan rules and legislation both permit the employer to take a refund of surplus, the asset ceiling may have no effect, although it may be the case that a refund will only be available many years in the future.

Main assumptions (rates per annum)

The main assumptions for the valuations of the plans under IAS 19 are set out below. Where there are multiple plans in a country the rates below are weighted-average figures.

	Canada	UK	US	Switzerland
At 31 December 2021				
Discount rate	**2.9%**	**1.9%**	**2.8%**	**0.3%**
Inflation[(a)]	**1.9%**	**3.4%**	**2.4%**	**0.9%**
Rate of increase in pensions	**0.3%**	**2.9%**	**—%**	**1.8%**
Rate of increase in salaries	**3.1%**	**4.2%**	**3.9%**	**1.9%**
At 31 December 2020				
Discount rate	2.5%	1.2%	2.2%	0.1%
Inflation[(a)]	1.6%	2.9%	2.1%	0.9%
Rate of increase in pensions	0.1%	2.5%	—%	0.5%
Rate of increase in salaries	2.8%	3.6%	3.6%	1.9%

(a) The inflation assumption shown for the UK is for the Retail Price Index. The assumption for the Consumer Price Index at 31 December 2021 was 2.7% (2020: 2.1%).

The main financial assumptions used for the healthcare plans, which are predominantly in the US and Canada, were: discount rate: 3.1% (2020: 2.5%); medical trend rate: 6.3% reducing to 4.7% by the year 2031 broadly on a straight line basis (2020: 6.3%, reducing to 4.6% by the year 2031); claims costs based on individual company experience.

For both the pension and healthcare arrangements the post-retirement mortality assumptions allow for future improvements in longevity. The mortality tables used imply that a man aged 60 at the balance sheet date has a weighted average expected future lifetime of 27 years (2020: 27 years) and that a man aged 60 in 2041 would have a weighted average expected future lifetime of 28 years (2020: 28 years). The mortality tables are generally based upon the latest standard tables published in each country, adjusted appropriately to reflect the actual mortality experience of the plan participants where credible data is available. No adjustment has been made for the potential future impact of the Covid-19 pandemic; this will be kept under review.

Sensitivity

The values reported for the defined benefit obligations are sensitive to the actuarial assumptions used for projecting future benefit payments and discounting those payments. In order to estimate the sensitivity of the obligations to changes in assumptions, we calculate what the obligations would be if we were to make changes to each of the key assumptions in isolation. The difference between this figure and the figure calculated using our stated assumptions is an indication of the sensitivity to changes in each assumption. The results of this sensitivity analysis are summarised in the table below. Note that this approach is valid for small changes in the assumptions but will be less accurate for larger changes in the assumptions. The sensitivity to inflation includes the impact on pension increases, which are generally linked to inflation where they are granted.

Assumption	Change in assumption	2021 Approximate (increase)/ decrease in obligations		2020 Approximate (increase)/ decrease in obligations	
		Pensions US$m	Other US$m	Pensions US$m	Other US$m
Discount rate	Increase of 0.5 percentage points	854	51	988	62
	Decrease of 0.5 percentage points	(915)	(55)	(1,186)	(66)
Inflation	Increase of 0.5 percentage points	(393)	(14)	(484)	(19)
	Decrease of 0.5 percentage points	374	13	450	17
Salary increases	Increase of 0.5 percentage points	(55)	(1)	(81)	(1)
	Decrease of 0.5 percentage points	54	1	72	1
Demographic – allowance for future improvements in longevity	Participants assumed to have the mortality rates of individuals who are one year older	441	15	520	19
	Participants assumed to have the mortality rates of individuals who are one year younger	(441)	(15)	(562)	(19)

43 Rio Tinto Limited parent company disclosures

As at 31 December

	2021 A$m	2020 A$m
Assets		
Current assets	13,935	12,024
Non-current assets	3,413	3,167
Total assets	17,348	15,191
Liabilities		
Current liabilities	(2,296)	(2,665)
Non-current liabilities	(806)	(541)
Total liabilities	(3,102)	(3,206)
Net assets	14,246	11,985
Shareholders' equity		
Share capital	3,504	3,504
Other reserves	309	345
Retained earnings	10,433	8,136
Total equity	14,246	11,985
Profit of the parent company	24,037	11,890
Total comprehensive income of the parent company	24,037	11,890

Prepared under Australian Accounting Standards (AAS) and in accordance with Australian Corporations Act (see page 321). In relation to Rio Tinto Limited there are no significant measurement differences between AAS and IFRS as defined in note 1.

Rio Tinto Limited guarantees

Rio Tinto Limited provides a number of guarantees in respect of Group companies.

Rio Tinto plc and Rio Tinto Limited have jointly guaranteed the Group's external listed debt under the US Shelf Programme, European Debt Issuance Programme and Commercial Paper Programme which totalled A$7.6 billion at 31 December 2021 (31 December 2020: A$7.2 billion); in addition these entities also jointly guarantee the Group's undrawn credit facility which was A$10.3 billion at 31 December 2021 (31 December 2020: A$9.8 billion).

Rio Tinto Limited has guaranteed other external debt held by Rio Tinto Group entities which totalled A$0.1 billion at 31 December 2021 (31 December 2020: A$0.1 billion).

In addition, Rio Tinto Limited has provided a guarantee of all third-party obligations, including contingent obligations, of Rio Tinto Finance Limited, a wholly owned subsidiary.

Pursuant to the DLC Merger, both Rio Tinto plc and Rio Tinto Limited issued deed poll guarantees by which each company guaranteed contractual obligations incurred by the other or guaranteed by the other.

Notes to the 2021 financial statements

44 Related undertakings

In accordance with section 409 of the UK Companies Act 2006, disclosed below is a full list of related undertakings of the Group. Related undertakings include “subsidiaries”, “associated undertakings”, and “significant holdings in undertakings other than subsidiary companies”. The registered office address, country of incorporation, classes of shares and the effective percentage of equity owned by the Group calculated by reference to voting rights, is disclosed as at 31 December 2021.

The definition of a subsidiary undertaking in accordance with the UK Companies Act 2006 is different from the definition under IFRS. As a result, the related undertakings included within this list may not be the same as the related undertakings consolidated in the Group IFRS financial statements. Unless otherwise disclosed, all undertakings with an effective equity holding of greater than 50% are considered subsidiary undertakings for the purpose of this note.

Refer to notes 32-35 for further information on accounting policies, basis of consolidation, principal subsidiaries, joint operations, joint ventures and associates.

An explanation of the dual listed companies structure of Rio Tinto plc and Rio Tinto Limited can be found on pages 410 to 412. For completeness, the effective ownership by the Group relates to effective holdings by both entities either together or individually.

Wholly owned subsidiary undertakings

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
1043802 Ontario Ltd; Canada	CAD Ordinary shares	100	100	5300-66 Wellington Street West, Toronto ON M5K 1E6, Canada
10676276 Canada Inc.; Canada	CAD Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
1109723 B.C. Ltd.; Canada	CAD Common shares	100	100	1800-510 West Georgia Street, Vancouver BC V6B 0M3, Canada
46106 YUKON INC.; Canada	CAD Common shares	100	100	200-204 Lambert Street, Whitehorse YT Y1A 3T2, Canada
46117 YUKON INC.; Canada	CAD Common shares	100	100	200-204 Lambert Street, Whitehorse YT Y1A 3T2, Canada
535630 YUKON INC.; Canada	CAD Common shares	100	100	200-204 Lambert Street, Whitehorse YT Y1A 3T2, Canada
7999674 CANADA INC.; Canada	CAD Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Alcan Alumina Ltda.; Brazil	BRL1.00 Quota shares	100	100	Avenida Engenheiro Emiliano Macieira, 1 - km 18, Pedrinhas, Sao Luis, MA, 65095-603, Brazil
Alcan Asia Limited; Hong Kong	HKD Ordinary shares	100	100	6/F, Luk Kwok Centre, 72 Gloucester Road, Wan Chai, Hong Kong
Alcan Betriebs- und Verwaltungsgesellschaft GmbH; Germany	€51.13 Ordinary shares	100	100	Alusingenplatz 1, D-78221, Singen, Germany
Alcan Chemicals Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Alcan Composites Brasil Ltda; Brazil	BRL0.01 Ordinary shares	100	100	Avenida das Nações Unidas, 12.551 - 19th floor - Suite 1.911, São Paulo, SP, 04578-00, Brazil
Alcan Corporation; United States	US$0.01 Ordinary shares	100	100	211 East 7th Street, Suite 620, Austin TX 78701-3218, United States

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Alcan Farms Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Alcan Gove Development Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Alcan Holdings Australia Pty Limited; Australia	AUD Class A shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Ordinary shares	100		
Alcan Holdings Europe B.V.; Netherlands	€4,570,000,000.00 Common shares	100	100	Welplaatweg 104, 3197 KS , Botlek, Rotterdam, Netherlands
Alcan Holdings Nederland B.V.; Netherlands	€4,555.00 Ordinary shares	100	100	Welplaatweg 104, 3197 KS , Botlek, Rotterdam, Netherlands
Alcan Holdings Switzerland AG (SA/Ltd.); Switzerland	CHF0.01 Registered shares	100	100	Badenerstrasse 549, CH-8048, Zürich, Switzerland
Alcan International Network U.S.A. Inc.; United States	US$ Ordinary shares	100	100	80 State Street, Albany NY 12207-2543, United States
Alcan Lebensmittelverpackungen GmbH; Germany	€51.12918 Ordinary shares	100	100	Alusingenplatz 1, D-78221, Singen, Germany
Alcan Management Services (Shanghai) Co., Ltd.; China[(d)]	US$1.00 Ordinary shares	100	100	Unit E, 40F Wheelock Square, No. 1717 West Nanjing Road, Jing'an District, Shanghai, 200040, China
Alcan Management Services Canada Limited / Societe de Services de Gestion Alcan Canada Limitee; Canada	CAD Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Alcan Northern Territory Alumina Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Alcan Packaging Mühltal Gmbh & Co. KG; Germany	€51.129188 Ordinary shares	100	100	Alusingenplatz 1, D-78221, Singen, Germany
Alcan Primary Metal Australia Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Alcan Primary Products Company LLC; United States	US$ Unit shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Alcan Primary Products Corporation; United States	US$0.01 Ordinary shares	100	100	211 East 7th Street, Suite 620, Austin TX 78701-3218, United States
Alcan Realty Limited / Societe Immobiliere Alcan Limitee; Canada	CAD Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Alcan South Pacific Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Alcan Trading AG (SA/Ltd.); Switzerland	CHF1,000.00 Registered shares	100	100	Badenerstrasse 549, CH-8048, Zürich, Switzerland
AML Properties Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Anglesey Aluminium Metal Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
AP Service; France	€15.00 Ordinary shares	100	100	725 rue Aristide Bergès, 38340, Voreppe, France
Argyle Diamond Mines Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Argyle Diamonds Limited; Australia[(a)]	AUD Class A shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
	AUD Class B shares	100		

Notes to the 2021 financial statements

44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Ashton Mining Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Ashton Nominees Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Australian Coal Holdings Pty. Limited; Australia[(a)]	AUD A shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Ordinary shares	100		
Australian Mining & Smelting Pty Ltd; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Borax España, S.A.; Spain	€150.00 Ordinary shares	100	100	CN 340, Km 954, 12520 NULES, Castellon, Spain
Borax Europe Limited; United Kingdom	£0.25 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Borax Francais; France	€2.75 Ordinary shares	100	100	89 Route de Bourbourg, 59210, Coudekerque-Branche, France
Borax Malaysia Sdn Bhd; Malaysia	RM1.00 Ordinary shares	100	100	Level 7, Menara Milenium, Jalan Damanlela, Pusat Bandar Damansara, Damansara Heights 50490 Kuala Lumpur, Malaysia
Borax Rotterdam N.V.; Netherlands	€453.78 Ordinary shares	100	100	Welplaatweg 104, 3197 KS , Harbour 4130, Botlek Rotterdam, Netherlands
British Alcan Aluminium Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Canning Resources Pty Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Capricorn Diamonds Investments Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Cathjoh Holdings Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Channar Management Services Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Channar Mining Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
CIA. Inmobiliaria e Inversiones Cosmos S.A.C.; Peru	PEN1,000.00 Ordinary shares	100	100	Calle Santa Maria No. 110 Urb., Miraflores, Lima, Peru
Compania de Transmision Sierraoriente S.A.C.; Peru	PEN1,000.00 Ordinary shares	100	100	Calle Santa Maria No. 110 Urb., Miraflores, Lima, Peru
CRA Investments Pty. Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
CRA Pty Ltd; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Daybreak Development LLC; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Daybreak Property Holdings LLC; United States[(c)]	-	-	100	15 West South Temple, Suite 600, Salt Lake City UT 84101, United States
Daybreak Secondary Water Distribution Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Daybreak Water Holding LLC; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
DB Medical I LLC; United States	US$ Unit shares	100	100	15 West South Temple, Suite 600, Salt Lake City UT 84101, United States

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
DBVC1 LLC; United States[(a)]	-	-	100	15 West South Temple, Suite 600, Salt Lake City UT 84101, United States
Diavik Diamond Mines (2012) Inc.; Canada	CAD Common shares	100	100	300-5201 50th Avenue, Yellowknife NT X1A 2P8, Canada
Eastland Management Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Electric Power Generation Limited; New Zealand[(a)]	NZD1.00 Ordinary shares	100	100	1530 Tiwai Road, Tiwai Point, Invercargill, 9877, New Zealand
Element North 21 GP Inc. / Element Nord 21 GP Inc.; Canada	CAD1.00 Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Element North 21 Limited Partnership / Elément Nord 21 Société en Commandite; Canada	CAD10.00 Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Empresa de Mineracao Finesa Ltda.; Brazil	BRL Quotas shares	100	100	SIG, QUADRA 04, Lote 75, Sala 109 Parte C, Edificio Capital Financial Center, Brasilia DF, CEP, 71.610-440, Brazil
Flambeau Mining Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Fondation Rio Tinto; Guinea[(c)]	-	-	100	Manquépas - Commune de Kaloum, République de Guinée, Guinea
Fundsprops Pty. Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Gladstone Infrastructure Pty Ltd; Australia	AUD Class G redeemable preference shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Ordinary shares	100		
Gove Aluminium Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
GPS Energy Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
GPS Nominee Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
GPS Power Pty. Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Hamersley Exploration Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Hamersley HMS Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Hamersley Holdings Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Hamersley Iron - Yandi Pty Limited; Australia[(a)]	AUD Class B shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
	AUD Class C shares	100		
	AUD Ordinary shares	100		
Hamersley Iron Pty. Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Hamersley Resources Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
	AUD Z Class Ordinary shares	100		

Notes to the 2021 financial statements

44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Hamersley WA Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Henlopen Manufacturing Co., Inc.; United States	US$100.00 Ordinary shares	100	100	80 State Street, Albany NY 12207-2543, United States
High Purity Iron Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
HIsmelt Corporation Pty Limited; Australia[(a)]	AUD A Class shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Hunter Valley Resources Pty Ltd; Australia	AUD Class A shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Class B shares	100		
IEA Coal Research Limited; United Kingdom	£1.00 Ordinary shares	100	100	International Centre for Sustainable Carbon, 27 Old Gloucester Street, London, England, WC1N 3AX, United Kingdom
IEA Environmental Projects Limited; United Kingdom	£1.00 Ordinary shares	100	100	Pure Offices Cheltenham Office Park, Hatherley Lane, Cheltenham, GL51 6SH, United Kingdom
Industrias Metalicas Castello S.A.; Spain	€6.01 Ordinary shares	100	100	Calle Tuset 10, 08006, Barcelona, Catalogna, Spain
Integrity Land and Cattle LLC; United States	US$ Unit shares	100	100	8825 N. 23rd Avenue, Suite 100, Phoenix AZ 85021, United States
IOC Sales Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Jadar Free Zone Management Company DOO Beograd - Novi Beograd; Serbia	RSD1.00 Ordinary shares	100	100	Bulevar Milutina Milankovica 1i, 5th Floor, Novi Beograd, 11070, Serbia
Johcath Holdings Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Juna Station Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Kalimantan Gold Pty Limited; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Kelian Pty. Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Kembla Coal & Coke Pty. Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Kennecott Barneys Canyon Mining Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Exploration Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Exploration Mexico, S.A. de C.V.; Mexico[(d)]	MXN1,000.00 Ordinary shares	100	100	Felix Berenguer 125 - 4, Col. Lomas Virreyes, Distrito Federal, 11000, Mexico
Kennecott Holdings Corporation; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Land Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Land Investment Company LLC; United States[(c)]	-	-	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Molybdenum Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Nevada Copper Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Ridgeway Mining Company; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Kennecott Royalty Company; United States	US$100.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Services Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Uranium Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kennecott Utah Copper LLC; United States	US$ Unit shares	100	100	15 West South Temple, Suite 600, Salt Lake City UT 84101, United States
Kennecott Water Distribution LLC; United States	US$ Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Kutaibar Holdings Pty Ltd; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Lawson Mardon Flexible Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Lawson Mardon Smith Brothers Ltd.; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Metallwerke Refonda AG; Switzerland	CHF125.00 Bearer shares	100	100	Badenerstrasse 549, CH-8048, Zürich, Switzerland
Metals & Minerals Insurance Pte. Limited; Singapore	SGD Ordinary shares	100	100	50 Raffles Place, #19-00 Singapore Land Tower, 048623, Singapore
	SGD Redeemable preference shares	100		
Minera Kennecott, S.A. de C.V.; Mexico[(d)]	MXN1.00 Series "B" shares	100	100	Florencia 57, Piso 3, Col. Juarez, Delegacion Cuauhtemoc, Mexico, D.F., 06600, Mexico
Mineracao Tabuleiro Ltda; Brazil	BRL Quotas shares	100	100	SIG, QUADRA 04, Lote 75, Sala 109 Parte D, Edificio Capital Financial Center, Brasilia DF, CEP, 71.610-440, Brazil
Mitchell Plateau Bauxite Co. Pty. Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Mount Bruce Mining Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Mount Pleasant Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Mutamba Mineral Sands S.A.; Mozambique	MZN100.00 Ordinary shares	100	100	Av. da Marginal Nº 4985, 1º andar – Prédio ZEN, Maputo, Mozambique
NBH Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Nhulunbuy Corporation Limited; Australia[(c)]	-	-	100	19 Westal Street, Nhulunbuy NT 0880, Australia
Norgold Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
North Gold (W.A.) Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
North Insurances Pty. Ltd.; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
North IOC (Bermuda) Holdings Limited; Bermuda	US$1.00 Ordinary shares	100	100	Park Place, 55 Par La Ville Road, Third Floor, Hamilton, HM11, Bermuda
North IOC (Bermuda) Limited; Bermuda	US$143.64 Class A ordinary shares	100	100	Park Place, 55 Par La Ville Road, Third Floor, Hamilton, HM11, Bermuda
	US$100,000.00 Preference shares	100		
	US$1.00 Ordinary shares	100		
North IOC Holdings Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
North Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia

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44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
North Mining Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Pacific Aluminium (New Zealand) Limited; New Zealand	NZD1.00 Ordinary shares	100	100	1530 Tiwai Road, Tiwai Point, Invercargill, 9877, New Zealand
	NZD2.00 Ordinary shares	100		
Pacific Aluminium Pty. Limited; Australia[a]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Pacific Coast Mines, Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Aviatube Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Pechiney Bâtiment; France	€15.00 Ordinary shares	100	100	60 Avenue Charles de Gaulle, 92200, Neuilly-Sur-Seine, France
Pechiney Bécancour, Inc.; United States	US$1.00 Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Cast Plate, Inc.; United States	US$1.00 Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Consolidated Australia Pty Limited; Australia	US$1.00 Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	US$1.00 Preference shares	100		
Pechiney Holdings, Inc.; United States	US$1.00 Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Metals LLC; United States[c]	-	-	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Philippines Inc.; Philippines	PHP10.00 Ordinary shares	100	100	Room 306, ITC Building, 337 Sen Gil Puyat Avenue, Markati, Metro Manila, Philippines
Pechiney Plastic Packaging, Inc.; United States	US$ Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Pechiney Sales Corporation; United States	US$1.00 Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Peko Exploration Pty Ltd.; Australia	AUD Ordinary shares	100	100	37 Belmont Avenue, Belmont WA 6104, Australia
Peko-Wallsend Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Pilbara Iron Company (Services) Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Pilbara Iron Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Project Generation Group Pty Ltd; Australia[a]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
QIT Madagascar Minerals Ltd; Bermuda	US$1.00 Ordinary shares	100	100	Victoria Place, 5th Floor, 31 Victoria Street, Hamilton, 10, Bermuda
Queensland Coal Pty. Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Química e Metalúrgica Mequital Ltda.; Brazil	BRL Ordinary shares	100	100	Av. das Nacoes Unida, 12551 19o, andar, CJ 1911, 04578-000, Sao Paulo, SP, Brazil
Ranges Management Company Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Ranges Mining Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Resolution Copper Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Richards Bay Mining Holdings (Proprietary) Limited; South Africa	ZAR1.00 A Ordinary shares	100	100	The Farm RBM, Number 16317, KwaZulu-Natal, 3900, South Africa
	ZAR1.00 B Ordinary shares	100		

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Richards Bay Titanium Holdings (Proprietary) Limited; South Africa	ZAR1.00 A Ordinary shares	100	100	The Farm RBM, Number 16317, KwaZulu-Natal, 3900, South Africa
	ZAR1.00 B Ordinary shares	100		
Rio de Contas Desenvolvimentos Minerais Ltda; Brazil	BRL Quota shares	100	100	Rua Coronel Durval Matos, S/N Centro, Municipio de Jaguaquara, Estado da Bahia, CEP, 45345-000, Brazil
Rio Santa Rita Empreenimentos e-Particiacoes Ltda; Brazil	BRL Quota shares	100	100	SIG, QUADRA 04, Lote 75, Sala 109 Parte E, Edificio Capital Financial Center, Brasilia DF, CEP, 71.610-440, Brazil
Rio Sava Exploration DOO; Serbia	US$ Founder's shares	100	100	Bulevar Milutina Milankovića 1i, 11070 Novi Beograd, Serbia
Rio Tinto (Commercial Paper) Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Advisory Services Pty Limited; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Alcan Fund Inc.; Canada	CAD Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Rio Tinto Alcan Inc.; Canada	CAD Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Rio Tinto Alcan International Ltd. / Rio Tinto Alcan International Ltee; Canada	CAD Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Rio Tinto Alcan Technology Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Aluminium (Bell Bay) Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Aluminium (Holdings) Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Aluminium Bell Bay Sales Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Aluminium Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Aluminium Pechiney; France	€10.00 Ordinary shares	100	100	725 rue Aristide Bergès, 38340, Voreppe, France
Rio Tinto Aluminium Services Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto America Holdings Inc.; United States	US$0.01 Class A Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
	US$100.00 Series A Preferred stock	100		
Rio Tinto America Inc.; United States	US$100.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Angola (SU), LDA.; Angola	AOK Common shares	100	100	Edificio Kilamba, 20. andar, Avenida 4 de Fevereiro, Marginal de Luanda, Luanda, Angola
Rio Tinto Asia Ltd; Hong Kong	HKD Ordinary shares	100	100	6/F, Luk Kwok Centre, 72 Gloucester Road, Wan Chai, Hong Kong
Rio Tinto Asia Pty. Limited; Australia[(a)]	AUD Class A shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
	AUD Ordinary shares	100		
Rio Tinto AuM Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Australian Holdings Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$0.32 Ordinary shares	100		
Rio Tinto Bahia Holdings Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Base Metals Pty Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia

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44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Rio Tinto Brazilian Holdings Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Brazilian Investments Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Canada Finance Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Canada Inc; Canada	CAD Class B shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
	CAD Class C shares	100		
	CAD Class D shares	100		
	CAD Class J shares	100		
Rio Tinto Canada Management Inc./ Rio Tinto Gestion Canada Inc.; Canada	CAD Common shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Rio Tinto Chile SpA; Chile	US$1.00 Ordinary shares	100	100	Av. Presidente Riesco 5435, Of. 1302, Las Condes, Santiago, Chile
Rio Tinto Coal (Clermont) Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Coal Australia Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Coal Investments Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Coal NSW Holdings Limited; Australia[(a)]	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Rio Tinto Commercial Americas Inc.; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Commercial GmbH; Germany	€1.00 Common shares	100	100	Alfred-Herrhausen-Allee 3-5, 65760, Eschborn, Germany
Rio Tinto Commercial Pte. Ltd.; Singapore	US$1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
Rio Tinto Desenvolvimentos Minerais Ltda.; Brazil	BRL Quotas shares	100	100	SIG Quadra 04, Lote 175, Torre A, Salas 106 a 109, Edificio Capital Financial Center, Brasilia, CEP 70610-440, Brazil
Rio Tinto Diamonds Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Diamonds Netherlands B.V.; Netherlands	€500.00 Ordinary shares	100	100	Welplaatweg 104, 3197 KS , Botlek, Rotterdam, Netherlands
Rio Tinto Diamonds NV; Belgium	€ Ordinary shares	100	100	Hoveniersstraat 53, 2018 Antwerp, Belgium, Belgium
Rio Tinto Eastern Investments B.V.; Netherlands	US$12,510,234,217.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Energy America Inc.; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Energy Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Escondida Limited; Bermuda	US$1.00 Common shares	100	100	22 Canon's Court, Victoria Street, Hamilton, HM 12, Bermuda
Rio Tinto European Holdings Limited; United Kingdom[(b)]	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Exploration (Asia) Holdings Pte. Ltd.; Singapore	US$1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Rio Tinto Exploration (PNG) Limited; Papua New Guinea[(a)]	PGK1.00 Ordinary shares	100	100	Section 15, Lot 15, Bernal Street, National Capital District, Port Moresby, Papua New Guinea
Rio Tinto Exploration and Mining (India) Private Limited; India[(d)]	INR10.00 Ordinary shares	100	100	21st Floor, DLF Building No. 5, Tower A, DLF Cyber City Phase III, Gurgaon, Haryana, 122002, India
Rio Tinto Exploration Canada Inc.; Canada	CAD Class B shares	100	100	300-815 West Hastings Street, Vancouver BC V6C 1B4, Canada
	CAD Class C shares	100		
	CAD Class D shares	100		
Rio Tinto Exploration Dunav d.o.o. Beograd - Novi Beograd; Serbia[(c)]	-	-	100	1i Bulevar Milutina Milankovica, Belgrade, 11000, Serbia
Rio Tinto Exploration Finland OY; Finland	€ Ordinary shares	100	100	PL 18, Helsinki, 00271, Finland
Rio Tinto Exploration India Private Limited; India[(d)]	INR10.00 Ordinary shares	100	100	21st Floor, DLF Building No. 5, Tower A, DLF Cyber City Phase III, Gurgaon, Haryana, 122002, India
Rio Tinto Exploration Kazakhstan LLP; Kazakhstan[(c)]	-	-	100	Dostyk 310/G, Almaty, 050020, Kazakhstan
Rio Tinto Exploration Pty Limited; Australia[(a)]	AUD Class B shares	100	100	37 Belmont Avenue, Belmont WA 6104, Australia
	AUD Class C shares	100		
	AUD Ordinary shares	100		
Rio Tinto Exploration Zambia Limited; Zambia	ZMW1.00 Ordinary shares	100	100	Suit FF08, No.4 Bishops Road, Kabulonga, Lusaka, Zambia
Rio Tinto FalCon Diamonds Inc.; Canada	CAD1,000.00 Common shares	100	100	300-815 West Hastings Street, Vancouver BC V6C 1B4, Canada
Rio Tinto Fer et Titane inc.; Canada	CAD Common shares	100	100	1625 Route Marie-Victorin, Sorel-Tracy QC J3R 1M6, Canada
Rio Tinto Finance (USA) Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Finance (USA) Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Finance (USA) plc; United Kingdom	£1.00 Ordinary Shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Finance Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Finance plc; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto France S.A.S.; France	€10.00 Ordinary shares	100	100	60 Avenue Charles de Gaulle, 92200, Neuilly-Sur-Seine, France
Rio Tinto Global Employment Company Pte. Ltd.; Singapore	US$1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
Rio Tinto Guinée S.A.; Guinea	GNF100,000.00 Ordinary shares	100	100	Manquépas - Commune de Kaloum, République de Guinée, Guinea
Rio Tinto Holdings LLC; Mongolia	MNT20,000.00 Ordinary shares	100	100	Floor 17, Shangri-La Center, Olympic Street-19, Khoroo 1, Sukhbaatar District, Ulaanbaatar, 14241, Mongolia
Rio Tinto Hydrogen Energy LLC; United States[(c)]	-	-	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Iceland Ltd.; Iceland	ISK1.00 Registered shares	100	100	P.O. Box 244, IS-222, Hafnarfjördur, Iceland
Rio Tinto India Private Limited; India	INR10.00 Ordinary shares	100	100	21st Floor, DLF Building No. 5, Tower A, DLF Cyber City, Phase-III, Gurugram, Haryana, 122022, India
Rio Tinto Indonesian Holdings Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto International Holdings Limited; United Kingdom[(b)]	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Investments One Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Rio Tinto Investments Two Pty Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia

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44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Rio Tinto Iron & Titanium (Suzhou) Co., Ltd; China	US$1.00 Ordinary shares	100	100	418 Nanshi Street, Suzhou Industrial Park, Suzhou, 215021, China
Rio Tinto Iron & Titanium GmbH; Germany[c]	-	-	100	Alfred-Herrhausen-Allee 3-5, 65760, Eschborn, Germany
Rio Tinto Iron & Titanium Holdings GmbH; Germany[c]	-	-	100	Alfred-Herrhausen-Allee 3-5, 65760, Eschborn, Germany
Rio Tinto Iron & Titanium Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Iron and Titanium Canada Inc. / Rio Tinto Fer et Titane Canada Inc.; Canada	CAD Common shares	100	100	1625 Route Marie-Victorin, Sorel-Tracy QC J3R 1M6, Canada
Rio Tinto Iron Ore Atlantic Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Iron Ore Europe S.A.S.; France	€100.00 Ordinary shares	100	100	60 Avenue Charles de Gaulle, 92200, Neuilly-Sur-Seine, France
Rio Tinto Iron Ore Trading China Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Japan Ltd; Japan	JPY500.00 Ordinary shares	100	100	8th Floor, Kojimachi Diamond Building, 1 Kojimachi 4-chome, Chiyoda-ku, Tokyo 102-0083, Japan
Rio Tinto Jersey Holdings 2010 Limited; Jersey	US$ Ordinary shares	100	100	22 Grenville Street, St Helier, Channel Islands, JE4 8PX, Jersey
Rio Tinto Korea Ltd; Korea, Republic of	KRW10,000.00 Ordinary shares	100	100	2nd Floor, JS Tower, 6 Teheran-ro 79-gil, Gangnam-Gu, Seoul, 135-877, Korea
Rio Tinto London Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Management Services South Africa (Proprietary) Ltd; South Africa	ZAR2.00 Ordinary shares	100	100	1 Harries Road, Illovo, Sandton, 2196, South Africa
Rio Tinto Marketing Pte. Ltd.; Singapore	SGD1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
	US$1.00 Ordinary share	100		
Rio Tinto Marketing Services Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Medical Plan Trustees Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Metals Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary share	100		
Rio Tinto Minera Peru Limitada SAC; Peru	PEN100.00 Ordinary shares	100	100	Av. La Paz 1049, Oficina 503, Miraflores, Lima, 18, Peru
Rio Tinto Mineracao do Brasil Ltda; Brazil	BRL1.00 Quotas shares	100	100	SIG Quadra 04, Lote 75, Torre A Sala, 109 Parte B, Edificio Capital Financial Center, , Brasilia, CEP, 70610-440, Brazil
Rio Tinto Minerals Asia Pte Ltd; Singapore	SGD1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
	US$1.00 Ordinary shares	100		
Rio Tinto Minerals Development Limited; United Kingdom	£0.25 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Minerals Exploration (Beijing) Co., Ltd; China	US$1.00 Ordinary shares	100	100	Units 15 - 16, 18/F, China World Office Building 2, No. 1 Jianguomenwai Dajie, Chaoyang District, Beijing, China
Rio Tinto Minerals Inc.; United States	US$0.01 Common shares	100	100	15 West South Temple, Suite 600, Salt Lake City UT 84101, United States
Rio Tinto Minerals Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Rio Tinto Mining and Exploration Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Mining and Exploration Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Mining and Exploration S.A.C.; Peru	PEN0.50 Ordinary shares	100	100	Av. La Paz 1049, Oficina 503, Miraflores, Lima, 18, Peru
Rio Tinto Mining Commercial (Shanghai) Co., Ltd.; China	CNY1.00 Ordinary shares	100	100	Room 328, 3rd Floor, Unit 2, 231 Shibocun Road, Shanghai, Pilot Free Trade Zone, 200125 , China
Rio Tinto Mongolia LLC; Mongolia	MNT1,240.00 Common shares	100	100	Level 17, Shangri-La Center , Olympic Street 19A, Sukhbaatar District, Ulaanbaatar, 14214, Mongolia
Rio Tinto Nominees Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto OT Management Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Overseas Holdings Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto PACE Australia Pty Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Rio Tinto PACE Canada Inc. / Gestion Rio Tinto PACE Canada Inc.; Canada	CAD Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Rio Tinto Peru Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Potash Management Inc. / Rio Tinto Potasse Management Inc.; Canada	CAD Common shares	100	100	300-815 West Hastings Street, Vancouver BC V6C 1B4, Canada
Rio Tinto Procurement (Singapore) Pte Ltd; Singapore	US$1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
Rio Tinto Pte Ltd; Singapore	SGD1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
Rio Tinto Saskatchewan Management Inc.; Canada	CAD Common shares	100	100	300-815 West Hastings Street, Vancouver BC V6C 1B4, Canada
Rio Tinto Saskatchewan Potash Holdings General Partner Inc.; Canada	CAD Common shares	100	100	5300-66 Wellington Street West, Toronto ON M5K 1E6, Canada
Rio Tinto Saskatchewan Potash Holdings Limited Partnership; Canada[(c)]	-	-	100	5300-66 Wellington Street West, Toronto ON M5K 1E6, Canada
Rio Tinto Secretariat Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Services Inc.; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Services Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Shared Services Pty Limited; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Shipping (Asia) Pte. Ltd.; Singapore	US$1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
Rio Tinto Shipping Pty. Limited.; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Simfer UK Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Singapore Holdings Pte Ltd; Singapore	SGD1.00 Ordinary shares	100	100	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
	US$ Ordinary shares	100		

Notes to the 2021 financial statements

44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Rio Tinto South East Asia Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Staff Fund (Retired) Pty Limited; Australia[a]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Sulawesi Holdings Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Technological Resources Inc.; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Rio Tinto Technological Resources UK Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Trading (Shanghai) Co., Ltd.; China	US$1.00 Ordinary shares	100	100	41/F Wheelock Square, No. 1717 West Nanjing Road, Jing' an District, Shanghai, 200040, China
Rio Tinto Uranium Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Rio Tinto Western Holdings Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$1.00 Ordinary shares	100		
Rio Tinto Winu Pty Limited; Australia[a]	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Riversdale Connections (Proprietary) Ltd; South Africa	ZAR1.00 Ordinary shares	100	100	Ground Floor-Cypress Place North, Woodmead Business Park, 140/142 Western Service Road, Woodmead, 2191, South Africa
Robe River Limited; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Rocklea Station Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
RTA AAL Australia Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Boyne Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Gove Pty Limited; Australia	AUD Class A shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD1.00 Class B shares	100		
RTA Holdco 1 Limited; United Kingdom	US$0.0001 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
RTA Holdco 4 Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
	US$0.732815 Ordinary shares	100		
RTA Holdco 7 Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
RTA Holdco 8 Limited; United Kingdom	US$1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
RTA Holdco Australia 1 Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Holdco Australia 3 Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
RTA Holdco Australia 5 Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Holdco Australia 6 Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA HOLDCO FRANCE 1 S.A.S.; France	€10.00 Ordinary shares	100	100	60 Avenue Charles de Gaulle, 92200, Neuilly-Sur-Seine, France
RTA HOLDCO FRANCE 2 S.A.S.; France	€10.00 Ordinary shares	100	100	60 Avenue Charles de Gaulle, 92200, Neuilly-Sur-Seine, France
RTA Pacific Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Sales Pty Ltd; Australia	AUD Class A shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Class B shares	100		
RTA Smelter Development Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Weipa Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTA Yarwun Pty Ltd; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
RTAlcan 2 LLC; United States	US$ Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
RTAlcan 3 LLC; United States	US$ Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
RTLDS Aus Pty Ltd; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
RTLDS UK Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
RTPDS Aus Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Scheuch Unterstuetzungskasse GmbH; Germany	€51.129 Ordinary shares	100	100	Alusingenplatz 1, D-78221, Singen, Germany
Skymont Corporation; United States	US$ Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Sohio Western Mining Company; United States	US$100.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Solwezi Metals Exploration Limited; Zambia	ZMW1.00 Ordinary shares	100	100	Block A, Suites GF05-GF08, 4 Bishops Office Park, Bishops Road, Kabulonga, Lusaka, Zambia
Southern Copper Pty. Limited; Australia	AUD A shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
	AUD B shares	100		
	AUD Ordinary shares	100		
Swift Current Land & Cattle LLC; United States[(c)]	-	-	100	8825 N. 23rd Avenue, Suite 100, Phoenix AZ 85021, United States
Swiss Aluminium Australia Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD Stock Unit A shares	100		
	AUD Stock Unit B shares	100		
	AUD Stock Unit C shares	100		
TBAC Limited; United Kingdom	£1.00 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Technological Resources Pty. Limited; Australia[(a)]	AUD A shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
	AUD B shares	100		

Notes to the 2021 financial statements

44 Related undertakings continued

Wholly owned subsidiary undertakings continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
The Barrier Corporation (Vic.) Pty. Limited; Australia[(a)(d)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
The Kelian Community and Forest Protection Trust; Singapore[(c)]	-	-	100	10 Collyer Quay, #10-01 Ocean Financial Centre, 049315, Singapore
The Pyrites Company, Inc.; United States	US$1.00 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
The Roberval and Saguenay Railway Company/ La Compagnie du Chemin de Fer Roberval Saguenay; Canada	CAD100.00 Ordinary shares	100	100	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
	CAD100.00 Preference shares 6% non-cumulative	100		
The Zinc Corporation Pty Ltd; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
	AUD Z Class Ordinary shares	100		
Thos. W. Ward Limited; United Kingdom	£0.25 Ordinary shares	100	100	6 St James's Square, London, SW1Y 4AD, United Kingdom
Three Crowns Insurance Company; United States	US$2.00 Common shares	100	100	1108 E. South Union Avenue, Midvale UT 84047, United States
Tinto Holdings Australia Pty. Limited; Australia	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Trans Territory Pipeline Pty Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
U.S. Borax Inc.; United States	US$0.10 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Victoria Technology Inc.; United States[(a)]	US$1.00 Ordinary shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
Waste Solutions and Recycling LLC; United States	US$ Unit shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States
West Kutai Foundation Limited; Singapore[(c)]	-	-	100	10 Collyer Quay, #10-01 Ocean Financial Centre, 049315, Singapore
Wimmera Industrial Minerals Pty. Limited; Australia[(a)]	AUD Ordinary shares	100	100	Level 7, 360 Collins Street, Melbourne VIC 3000, Australia
Winchester South Development Company Proprietary Limited; Australia	AUD Ordinary shares	100	100	155 Charlotte Street, Brisbane QLD 4000, Australia
Wyoming Coal Resources Company; United States	US$0.01 Common shares	100	100	251 Little Falls Drive, Wilmington DE 19808, United States

Other Group entities including subsidiaries where the effective ownership is less than 100%, associated undertakings and significant holdings in undertakings other than subsidiary companies

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
201 Logistics Center, LLC; United States[(c)]	-	-	50	1209 Orange Street, Wilmington DE 19801, United States
7600 West Center, LLC; United States[(c)]	-	-	50	9090 S. Sandy Parkway, Sandy UT 84070, United States
AGM Holding Company Pte. Ltd.; Singapore	US$ Ordinary shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
Alufluor AB; Sweden	SEK1,000.00 Ordinary shares	50	50	Industrigatan 70, Box 902, S-25109, Helsingborg, Sweden
Aluminerie Alouette Inc.; Canada	CAD Ordinary shares	40	40	400, Chemin de la Pointe-Noire, C.P. 1650, Sept-Îles Québec G4R 5M9, Canada
Aluminerie De Bécancour, Inc.; Canada	CAD1.00 Ordinary shares	50.1	25.2	5555 Pierre Thibault Street, PO 30, Becancour, Quebec G0X 1B, Canada
Aluminium & Chemie Rotterdam B.V.; Netherlands	€4,555.00 Ordinary shares	65.8	65.8	Oude Maasweg 80, NL-3197 KJ, Botlek, Rotterdam, The Netherlands
Asia Gold Mongolia LLC; Mongolia	MNT1,250.00 Common shares	100	50.8	Floor 17, Shangri-La Center, Olympic Street-19, Khoroo 1, Sukhbaatar District, Ulaanbaatar, 14241, Mongolia
Asia Naran Bulag LLC; Mongolia	MNT1,000.00 Common shares	100	50.8	Floor 17, Shangri-La Center, Olympic Street-19, Khoroo 1, Sukhbaatar District, Ulaanbaatar, 14241, Mongolia
Balkhash Saryshagan LLP; Kazakhstan[(c)]	-	-	75	Dostyk 310/G, Almaty, 050020, Kazakhstan
Bektau B.V.; Netherlands	€200.00 Ordinary shares	75	75	Welplaatweg 104, 3197 KS , Botlek, Rotterdam, Netherlands
Boyne Smelters Limited; Australia	AUD A1 Class shares	100	59.4	155 Charlotte Street, Brisbane QLD 4000, Australia
	AUD A2 Class shares	100		
	AUD B1 Class shares	100		
CanPacific Potash Inc.; Canada[(c)]	-	-	32	374 Third Avenue South, Saskatoon SK S7K 1M5, Canada
Carol Lake Company Ltd.; Canada	CAD100.00 Ordinary shares	100	59	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Chlor Alkali Unit Pte Ltd; Singapore	SGD1.00 Ordinary shares	100	68.4	12 Marina Boulevard, #20-01 MBFC Tower 3, 018982, Singapore
	US$1.00 Ordinary shares	68.4		
Dampier Salt Limited; Australia	AUD Ordinary shares	68.4	68.4	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Elysis Limited Partnership / Elysis Societe en Commandite; Canada	US$1,000.00 Class B shares	100	48.2	2323-1, Place Ville Marie, Montréal QC H3B 5M5, Canada
Enarotali Gold Project Limited; Jersey	£0.001 Ordinary shares	25	25	IFC 5, St Helier, JE1 1ST, Jersey
Energy Resources of Australia Ltd; Australia	AUD A Class Ordinary shares	86.3	86.3	Level 5 NICTA Building B, 7 London Circuit, Canberra City ACT 2601, Australia
Fabrica De Plasticos Mycsa, S.A.; Venezuela, Bolivarian Republic of[(d)]	VEF1.00 Common shares	49	49	Urbanización Industrial San Ignacio, parcela 2-A, vía San Pedro, Los Teques, Estado Miranda, Venezuela
Global Hubco BV; Netherlands	€1.00 Ordinary shares	33.3	33.3	Luna Arena, Herikerbergweg 238, 1101, CM, Amsterdam Zuidoost, Netherlands
Gulf Power Company / La Compagnie Gulf Power; Canada	CAD100.00 Ordinary shares	100	58.7	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Halco (Mining) Inc.; United States	US$100.00 Ordinary shares	45	45	30 Isabella Street, 3rd Floor, Pittsburgh, Pennsylvania, 15212, U.S.A.

Notes to the 2021 financial statements

44 Related undertakings continued

Other Group entities including subsidiaries where the effective ownership is less than 100%, associated undertakings and significant holdings in undertakings other than subsidiary companies continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Heruga Exploration LLC; Mongolia	MNT12,500.00 Common shares	100	50.8	Floor 17, Shangri-La Center, Olympic Street-19, Khoroo 1, Sukhbaatar District, Ulaanbaatar, 14241, Mongolia
Hope Downs Marketing Company Pty Ltd; Australia	AUD A Class shares	100	50	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
IAL Holdings Singapore Pte. Ltd.; Singapore	US$ Ordinary shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
Iron Ore Company of Canada; United States	US$1,000.00 Series A shares	91.4	58.7	1209 Orange Street, Wilmington DE 19801, United States
	US$1,000.00 Series E shares	100		
	US$1,000.00 Series F shares	100		
Korgantas LLP; Kazakhstan[(c)]	-	-	75	Dostyk 310/G, Almaty, 050020, Kazakhstan
Lao Sanxai Minerals Company Limited; Lao People's Democratic Republic	US$1.00 Ordinary shares	70	70	5th Floor, AGL Building, 33 Lane Xang Avenue, Hatsady Village, Chanthaboury District, Vientiane Capital, Lao People's Democratic Republic
Magma Arizona Railroad Company; United States	US$100.00 Common shares	100	55	8825 N. 23rd Avenue, Suite 100, Phoenix AZ 85021, United States
Minera Escondida Ltda; Chile[(c)]	-	-	30	Cerro el Plomo 6000, Piso 15, Santiago, 7560623, Chile
Minmetals Rio Tinto Exploration Company Limited; China	CNY1.00 Ordinary shares	50	50	422-2, 4th Floor, Building #1 of Yongyou Industrial Park, Yazhou Bay Science & Technology City, Yazhou District, Sanya City, Hainan Province, China
New Zealand Aluminium Smelters Ltd; New Zealand	NZD1.00 Class A Ordinary shares	100	79.4	1530 Tiwai Road, Tiwai Point, Invercargill, 9877, New Zealand
Northern Land Company Ltd; Canada	CAD1.00 Ordinary shares	100	59	2 Avalon Drive, Labrador City NL A2V 2V6, Canada
NZAS Retirement Fund Trustee Limited; New Zealand	NZD Ordinary shares	100	79.4	Level 2, 20 Customhouse Quay, Wellington, 6011, New Zealand
Oyu Tolgoi LLC; Mongolia[(e)]	MNT10,000.00 Common shares	66	33.5	Level 12 Monnis Tower, Chinggis Avenue-15, 1st khoroo, Sukhbaatar District, Ulaanbaatar, 14240, Mongolia
Oyu Tolgoi Netherlands BV; Netherlands	€100.00 Ordinary shares	100	50.8	Unit 02.01, Kingsforweg 151, 1043 GR, Amsterdam , Netherlands
Pechiney Reynolds Quebec, Inc.; United States	US$10.00 Common shares	50	50.2	233 South 13th Street, Suite 1900, Lincoln NE 68508, United States
	US$100.00 Preferred shares	100		
Port d'Ehoala S.A.; Madagascar	US$100.00 Ordinary shares	100	80	Immeuble ASSIST, Ivandry, Lot N°35, 5ème étage, Antananarivo, 101 , Madagascar
Procivis Savoie; France	€19.00 Ordinary shares	22.1	22.1	116 Quai Charles Roissard, 73000, Chambéry, France
PT Hutan Lindung Kelian Lestari; Indonesia	IDR9,803.00 Ordinary shares	99	99	Kelian Mine Site, West Kutai, East Kalimantan, Indonesia
PT Kelian Equatorial Mining; Indonesia	IDR1,080.00 Ordinary shares	90	90	Sampoerna Strategic Square, South Tower, Level 30, Jl. Jenderal Sudirman Kav. 45-46, Jakarta, 12930, Indonesia
QIT Madagascar Minerals SA; Madagascar	US$10.00 Common shares	84.2	80	Immeuble ASSIST, Ivandry, Lot N°35, 5ème étage, Antananarivo, 101 , Madagascar
	US$ Certificats de droit de vote	0		
Quebec North Shore and Labrador Railway Company / Compagnie de Chemin de Fer du Littoral Nord de Quebec et du Labrador Inc.; Canada	CAD27.59 Ordinary shares	100	58.7	400-1190 Avenue des Canadiens-de-Montréal, Montréal QC H3B 0E3, Canada
Queensland Alumina Limited; Australia	AUD Class B shares	100	80	Plant Operations Building, Parsons Point, Gladstone QLD 4680, Australia
	AUD Class C shares	100		
	AUD Class D shares	100		
Regeneration Enterprises, Inc.; United States	US$ Class A shares	25	25	2657 Windmill Parkway #302, Henderson NV 89074, United States
Resolution Copper Mining LLC; United States[(c)]	-	-	55	251 Little Falls Drive, Wilmington DE 19808, United States
Richards Bay Mining (Proprietary) Limited; South Africa	ZAR0.01 B Ordinary shares	100	74	The Farm RBM, Number 16317, KwaZulu-Natal, 3900, South Africa

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Richards Bay Titanium (Proprietary) Limited; South Africa	ZAR0.01 B Ordinary shares	100	74	The Farm RBM, Number 16317, KwaZulu-Natal, 3900, South Africa
Rightship Pty Ltd; Australia	AUD Ordinary shares	33.3	33.3	Level 20, 500 Collins Street, Melbourne VIC 3000, Australia
Rio Tinto Orissa Mining Private Ltd; India	INR100.00 Ordinary shares	51	51	220, 2nd Floor, DLF Cyber City, Chandaka Industrial Area, Patia, Bhubneshwar, Odisha, 751024, India
Rio Tinto Sohar Logistics LLC; Oman[d]	OMR1.00 Ordinary shares	70	70	P.O. Box 686, Ruwi, 112, Oman
Robe River Mining Co. Pty. Ltd.; Australia	AUD A shares	40	73.6	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
	AUD B shares	76.4		
Robe River Ore Sales Pty. Ltd.; Australia	AUD Ordinary shares	65	57.1	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia
Saryarka B.V.; Netherlands	€200.00 Ordinary shares	75	75	Welplaatweg 104, 3197 KS , Botlek, Rotterdam, Netherlands
SGLS LLC; Mongolia	MNT10,000.00 Common shares	100	50.8	Floor 17, Shangri-La Center, Olympic Street-19, Khoroo 1, Sukhbaatar District, Ulaanbaatar, 14241, Mongolia
Sharp Strategic Funding Pte. Ltd.; Singapore	US$ Common shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
Simfer Jersey Limited; Jersey	US$ Ordinary shares	53	53	PO Box 536, 13-14 Esplanade, St Helier, JE4 5UR, Jersey
Simfer Jersey Nominee Limited; United Kingdom	£1.00 Ordinary shares	100	53	6 St James's Square, London, SW1Y 4AD, United Kingdom
SIMFER S.A.; Guinea[e]	GNF100,000.00 Ordinary shares	85	45	Immeuble Camayenne, Corniche Nord , Commune de Dixinn, BP 848, Conakry, République de Guinée, Guinea
Singapore Metals Pte. Ltd.; Singapore	US$ Ordinary shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
Société Minière Et De Participations Guinée-Alusuisse; Guinea[c]	-	-	50	Tougue, Guinea
Sohar Aluminium Co. L.L.C.; Oman	OMR1.00 Ordinary shares	20	20	Sohar Industrial Estate, P.O. Box 80, PC 327, Sohar, Sultanate of Oman
THR Aruba Holdings LLC A.V.V.; Aruba	US$1.00 Common shares	100	50.8	Caya Dr. J.E.M. (Loy) Arends, 18-A, Oranjestad, Aruba
THR Delaware Holdings, LLC; United States[c]	-	-	50.8	615 South DePont Highway, Kent County, Dover DE 19901, United States
THR Kharmagtai Pte. Ltd.; Singapore	US$ Ordinary shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
THR MINES (BC) LTD.; Canada	CAD Common shares	100	50.8	1800-510 West Georgia Street, Vancouver BC V6B 0M3, Canada
	US$ Common shares	100		
THR Mines Services Co. Ltd.; Canada	CAD Common shares	100	50.8	301-303 Alexander Street, Whitehorse YT Y1A 2L5, Canada
THR OYU TOLGOI LTD.; Virgin Islands, British	US$1.00 Ordinary shares	100	50.8	Road Town, Tortolla, VG1110, Virgin Islands, British
THR Ulaan Pte. Ltd.; Singapore	US$ Ordinary shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore

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44 Related undertakings continued

Other Group entities including subsidiaries where the effective ownership is less than 100%, associated undertakings and significant holdings in undertakings other than subsidiary companies continued

Name of undertaking and country of incorporation	Share class	% of share class held by Group companies	Effective Group % ownership	Registered office address
Tomago Aluminium Company Pty Limited; Australia	AUD Ordinary shares	51.6	51.6	638 Tomago Road, Tomago NSW 2322, Australia
TRQ Australia Pty. Ltd.; Australia	AUD Ordinary shares	100	50.8	Level 25, Suite 2, 100 Miller Street, North Sydney NSW 2060, Australia
Turquoise Hill (Beijing) Services Company Ltd; China(c)	-	-	50.8	Unit 304-21, 3rd Floor, Building B, Workers Stadium North Road, Chaoyang District, Beijing, JIA NO. 2, China
Turquoise Hill Netherlands Cooperatief U.A.; Netherlands(c)	-	-	50.8	Unit 02.01, Kingsforweg 151, 1043 GR, Amsterdam , Netherlands
Turquoise Hill Resources Ltd.; Canada	CAD Common shares	50.8	50.8	301-303 Alexander Street, Whitehorse YT Y1A 2L5, Canada
Turquoise Hill Resources Philippines Inc.; Philippines(d)	PHP100.00 Common shares	99.996	50.8	21st Floor, Philamlife Tower, 8767 Paswo de Roxas, Makati City, 1226, Philippines
Turquoise Hill Resources Singapore Pte Ltd.; Singapore	SGD1.00 Common shares	100	50.8	2 Venture Drive, #24-01, Vision Exchange, 608526, Singapore
Wright Mgmt Services Pte. Ltd.; Singapore	US$ Common shares	100	50.8	77 Robinson Road #13-00, Robinson 77, 068896, Singapore
Yalleen Pastoral Co. Pty. Ltd.; Australia	AUD Ordinary shares	65.7	57.4	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia

In addition, the Group participates in the following unincorporated arrangements:

Name of undertaking and country of incorporation	Address or principal place of business	Interest % owned by the Group
Bao-HI Ranges Joint Venture; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	54
Cape Bougainville Joint Venture; Australia	155 Charlotte Street, Brisbane QLD 4000, Australia	67.5
Channar Mining Joint Venture; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	60
Gladstone Power Station Joint Venture; Australia	NRG Gladstone Operating Service, Power Station, Gladstone QLD 4680, Australia	42.1
Green Mountain Mining Venture; United States	251 Little Falls Drive, Wilmington DE 19808, United States	100
Hope Downs Joint Venture; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	50
Mitchell Plateau Joint Venture; Australia	155 Charlotte Street, Brisbane QLD 4000, Australia	65.6
Rhodes Ridge Joint Venture; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	50
Robe River Iron Associates Joint Venture; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	57.1
Tomago Aluminium Joint Venture; Australia	638 Tomago Road, Tomago NSW 2322, Australia	51.6
Winter Road Joint Venture; Canada	300-5201 50th Avenue, Yellowknife NT X1A 2P9, Canada	33.3
Yarraloola Pastoral Co; Australia	Level 18, Central Park, 152-158 St Georges Terrace, Perth WA 6000, Australia	57.1

(a) Directly held by Rio Tinto Limited.
(b) Directly held by Rio Tinto plc.
(c) Group ownership is held through an interest in capital. The entity has no classes of shares.
(d) In liquidation or application for dissolution filed.
(e) Classed as a subsidiary in accordance with section 1162 (4)(a) of the UK Companies Act 2006 on the grounds of dominant influence.

45 Events after the balance sheet date

Oyu Tolgoi: approval for commencement of underground operations

On 25 January 2022, Rio Tinto, Turquoise Hill Resources Ltd (Turquoise Hill) and the Government of Mongolia announced their agreement, and unanimous approval by the Board of Oyu Tolgoi, to commencement of underground operations.

As part of a comprehensive project budget and funding package undertaken between the parties in reaching this agreement, Turquoise Hill agreed to waive in full, funding balances arising from a carry account loan with Erdenes Oyu Tolgoi (Erdenes) of US$2.4 billion, comprising the amount of common share investments in Oyu Tolgoi LLC funded by Turquoise Hill on behalf of Erdenes to build the project to date, plus US$1.0 billion of accrued interest. The waiver took effect on 25 January 2022. Rio Tinto and Turquoise Hill have also agreed a plan to deliver the funding required until sustainable underground production is reached.

Prior to the waiver agreement, the funding balances owing from Erdenes to Turquoise Hill were expected to be repaid via a pledge over Erdenes' share of future Oyu Tolgoi common share dividends. For this reason, and because the arrangement is between Turquoise Hill and Erdenes rather than with Oyu Tolgoi LLC itself, both the principal and interest are treated as transactions with owners acting in their capacity as owners. Consequently, at 31 December 2021, related amounts are recorded as a reduction in the share of equity attributable to non-controlling interests, resulting in an increase to the effective interest in Oyu Tolgoi attributable to owners of Rio Tinto. Refer to note 1 (xii) on page 236 and note 32 (k) on page 277.

Funding balances owing from Erdenes to Turquoise Hill are not classified as loan receivables in the Group Balance Sheet, and there is no interest income shown in the Group Income Statement. Accumulation of interest on the funding balances increases the share of retained earnings attributable to Rio Tinto as it is accrued.

Waiving the funding balances owing from Erdenes to Turquoise Hill increases Erdenes' economic share arising through entitlement to cash flows from future dividends of Oyu Tolgoi. In the 2022 Group results, there will be no Income Statement charge for loan forgiveness or write-off as a result of the waiver, and net assets and liabilities for Oyu Tolgoi included in the Group Balance sheet remained unchanged. There is no exchange of cash or other financial assets between parties and there will be no change to the underlying free cash flows of the Oyu Tolgoi operations and development project. The waiver does not have an impact on the Group's assessment of impairment indicators for either 2021 or 2022, since it relates to the project shareholders' funding arrangements rather than the economic capability of the Cash Generating Unit itself, refer to note 6. A reallocation of the net asset value allocation between the owners of Oyu Tolgoi will be recorded in the Group Statement of Changes in Equity for 2022 reporting periods by reducing equity attributable to owners of Rio Tinto and increasing equity attributable to non-controlling interests:

	Retained earnings US$m	Non-controlling interests US$m
Change in equity interest held by Rio Tinto	(490)	490
Equity issued to owners of non-controlling interests	(711)	711

There were no other significant events after the balance sheet date requiring disclosure.

Rio Tinto plc
Company Balance Sheet

As at 31 December	Note	2021 US$m	2020 US$m
Non-current assets			
Investments	B	**36,280**	36,320
Trade and other receivables		**140**	206
		36,420	36,526
Current assets			
Trade and other receivables	C	**16,388**	5,710
Cash at bank and in hand		**36**	11
		16,424	5,721
Total assets		**52,844**	42,247
Current liabilities			
Trade and other payables	D	**(13,196)**	(13,205)
Dividends payable		**(40)**	(24)
Other financial liabilities	G	**(61)**	(67)
		(13,297)	(13,296)
Non-current liabilities			
Other financial liabilities	G	**(96)**	(156)
Total liabilities		**(13,393)**	(13,452)
Net assets		**39,451**	28,795
Capital and reserves			
Share capital	E	**207**	207
Share premium account		**4,320**	4,313
Other reserves	F	**12,005**	12,005
Retained earnings		**22,919**	12,270
Total equity		**39,451**	28,795

The Rio Tinto plc financial statements have been prepared in accordance with Financial Reporting Standard 101 "Reduced Disclosure Framework" (FRS 101). Note A explains the principal accounting policies.

Profit after tax and total comprehensive income for the year amounted to US$22,442 million (2020: US$4,027 million). As permitted by section 408 of the UK Companies Act 2006, no statement of comprehensive income for the Rio Tinto plc parent company is shown.

The Rio Tinto plc company balance sheet, statement of comprehensive income and the related notes were approved by the directors on 23 February 2022 and the balance sheet is signed on their behalf by

Simon Thompson
Chairman

Jakob Stausholm
Chief Executive

Peter Cunningham
Chief Financial Officer

Rio Tinto plc

Registered number: 719885

Rio Tinto plc (the "Company") is incorporated in the United Kingdom, registered in England and Wales, and domiciled in the United Kingdom.

Rio Tinto plc
Company Statement of Changes in Equity

Year ended 31 December 2021	**Share capital US$m**	**Share premium account US$m**	**Other reserves US$m**	**Retained earnings US$m**	**Total equity US$m**
Opening balance	**207**	**4,313**	**12,005**	**12,270**	**28,795**
Profit for the financial year (comprehensive income)	**—**	**—**	**—**	**22,442**	**22,442**
Dividends	**—**	**—**	**—**	**(11,859)**	**(11,859)**
Proceeds from issue of shares	**—**	**7**	**—**	**—**	**7**
Share-based payments	**—**	**—**	**—**	**66**	**66**
Total	**207**	**4,320**	**12,005**	**22,919**	**39,451**

Year ended 31 December 2020	Share capital US$m	Share premium account US$m	Other reserves US$m	Retained earnings US$m	Total equity US$m
Opening balance	207	4,312	12,005	12,896	29,420
Profit for the financial year (comprehensive income)	—	—	—	4,027	4,027
Dividends	—	—	—	(4,720)	(4,720)
Proceeds from issue of shares	—	1	—	—	1
Share-based payments	—	—	—	67	67
Total	207	4,313	12,005	12,270	28,795

Notes to the Rio Tinto plc Financial Statements

A Principal accounting policies

a. Basis of preparation

The Rio Tinto plc company financial statements have been prepared using the historical cost convention, as modified by the revaluation of certain financial liabilities and in accordance with the UK Companies Act 2006 and Financial Reporting Standard 101 Reduced Disclosure Framework ("FRS 101"). The financial statements have been prepared on a going concern basis. Further information is disclosed on page 219 within note 1 of the Consolidated financial statements.

In preparing these financial statements, the company applies the recognition, measurement and disclosure requirements of UK-adopted international accounting standards, but makes amendments where necessary in order to comply with Companies Act 2006.

The accounting policies set out below have been applied consistently to all periods presented in these financial statements. The following exemptions available under FRS 101 have been applied:

- Paragraphs 45(b) and 46 to 52 of IFRS 2, "Share-based Payment" (details of the number and weighted average exercise prices of share options and how the fair value of goods and services received was determined).
- Paragraphs 91-99 of IFRS 13 "Fair Value Measurement" (disclosure of valuation techniques and inputs used for fair value measurement of assets and liabilities).
- IFRS 7 "Financial Instruments: Disclosures".
- Paragraph 38 of IAS 1 "Presentation of financial statements", comparative information requirements in respect of Paragraph 79(a)(iv) of IAS 1.
- The following paragraphs of IAS 1 "Presentation of financial statements":
  - 10 (d) (statement of cash flows);
  - 16 (statement of compliance with all IFRS);
  - 38A (requirement for minimum of two primary statements, including cash flow statements);
  - 38B-D (additional comparative information);
  - 111 (cash flow statement information); and
  - 134-136 (capital management disclosures).
- IAS 7 "Statement of Cash Flows".
- Paragraph 30 and 31 of IAS 8 "Accounting policies, changes in accounting estimates and errors" (requirement for the disclosure of information when an entity has not applied a new IFRS that has been issued and is not yet effective).
- Paragraph 17 of IAS 24 "Related party disclosures" (key management compensation).
- The requirements of IAS 24, "Related party disclosures" to disclose related party transactions entered into between two or more members of a group.

b. Judgments in applying accounting policies and key sources of estimation uncertainty

The preparation of the financial statements requires management to make assumptions, judgments and estimates and to use judgment in applying accounting policies and making critical accounting estimates. These judgments, estimates and assumptions are based on management's best knowledge of the relevant facts and circumstances, having regard to previous experience, but actual results may differ materially from the amounts included in the financial statements.

The key area of judgment that has the most significant effect on the amounts recognised in the financial statements is the review for impairment of investment carrying values.

Investments in subsidiaries are reviewed for impairment where events or changes in circumstances indicate that the carrying amount of the investment may not be recoverable. The unit of account being the equity of the subsidiary taken as a whole, which may comprise interests in multiple cash-generating units.

If any such indication exists, Rio Tinto plc makes an assessment of the recoverable amount. If the asset is determined to be impaired, an impairment loss will be recorded and the asset written down based on the amount by which the asset carrying amount exceeds the higher of fair value less cost of disposal and value in use. An impairment loss is recognised immediately in the income statement.

c. Currency translation

Items included in the financial statements are measured using the currency of the primary economic environment in which the Company operates (the functional currency). The financial statements are presented in US dollars, which is the Company's functional and presentation currency. Transactions denominated in other currencies, including the issue of shares, are translated into the functional currency using the exchange rates prevailing at the date of the transaction.

Foreign exchange gains and losses resulting from the settlement of such transactions, and from the translation at year-end exchange rates of monetary assets and liabilities denominated in foreign currencies, are recognised in the profit and loss account.

Exchange rates used are consistent with the rates used by the Group as disclosed in the consolidated financial statements (note 40).

d. Investments

Investments in Group companies are valued at cost less accumulated impairment losses. Investments are reviewed for impairment if events or changes in circumstances indicate that the carrying amount may not be recoverable.

e. Financial guarantees

Financial guarantees are recognised initially at fair value. Subsequently, the liability is measured at the higher of the best estimate of the expenditure required to settle the present obligation and the amount initially recognised less cumulative amortisation.

f. Share-based payments

The Company operates a number of share-based payment plans for Group employees, the details of which are included in the consolidated financial statements (note 41). The fair value of the Company's share plans is recognised as an addition to the cost of the investment in the subsidiary in which the relevant employees work over the expected vesting period, with a corresponding entry to retained earnings. Payments received from the Company's subsidiaries in respect of these share-based payments are recognised as a reduction in the cost of the investment. The Company uses fair values provided by independent actuaries calculated using either a lattice-based option valuation model or a Monte Carlo simulation model. The fair value of the share plans is determined at the date of grant, taking into account any market-based vesting conditions attached to the award.

Non-market based vesting conditions (eg relative EBIT margin performance targets) are taken into account in estimating the number of awards likely to vest. The estimate of the number of awards likely to vest is reviewed at each balance sheet date up to the vesting date, at which point the estimate is adjusted to reflect the actual awards issued. No adjustment is made after the vesting date even if the awards are forfeited or not exercised.

g. Dividend income

Dividend income is recognised when the right to receive payment is established.

h. Treasury shares

The consideration paid for shares repurchased by the Company and held as treasury shares is recognised as a reduction in shareholders' funds through retained earnings.

Notes to the Rio Tinto plc Financial Statements

B Investments

	2021 US$m	2020 US$m
Investments in Group companies:		
At 1 January	**36,320**	36,250
Additions	**67**	70
Other adjustments	**(107)**	—
At 31 December	**36,280**	36,320

At 31 December 2021, the Company had the following principal subsidiaries:

Company	Principal activity	Country of incorporation	Percentage shareholding
Rio Tinto International Holdings Limited	Holding company	UK	100%
Rio Tinto European Holdings Limited	Holding company	UK	100%

In accordance with section 409 of the UK Companies Act 2006, a full list of related undertakings is disclosed in the consolidated financial statements (note 44).

C Trade and other receivables

Trade and other receivables includes US$16,260 million (31 December 2020: US$5,656 million), which is subject to interest based on LIBOR, is unsecured and repayable on demand.

D Trade and other payables

Trade and other payables include US$13,162 million (31 December 2020: US$13,042 million) which is subject to interest rates based on LIBOR, is unsecured and repayable on demand.

E Share capital

	2021 US$m	2020 US$m
Issued and fully paid up share capital of 10p each[(a)]		
At 1 January	**207**	207
Ordinary shares purchased and cancelled[(b)]	**—**	—
At 31 December	**207**	207
Special Voting Share of 10p each[(c)]	**1 only**	1 only
DLC Dividend Share of 10p each[(c)]	**1 only**	1 only
Equalisation Share of 10p each[(c)]	**1 only**	1 only

(a) 38,581 new shares (2020: 39,273 new shares) were issued during the year and 1,197,858 shares (2020: 568,863 shares) were reissued from Treasury during the year resulting from the vesting of awards and the exercise of options under Rio Tinto plc employee share-based payment plans, with exercise prices and market values between £44.61 and £64.80 per share.

(b) The authority for the Company to buy back its ordinary shares was renewed at the 2021 annual general meeting. No shares (2020: 3,627,568 shares) were bought back and cancelled in 2021 under the on-market buy-back programme.

(c) The "Special Voting Share" was issued to facilitate the joint voting by shareholders of Rio Tinto plc and Rio Tinto Limited on Joint Decisions, following the DLC Merger. The "DLC Dividend Share" was issued to a subsidiary of Rio Tinto Limited to facilitate the efficient management of funds within the DLC structure. In addition, an Equalisation Share is authorised but not issued and is governed by the terms of the DLC Merger Sharing Agreement.

F Other reserves

Other reserves include US$11,936 million (2020: US$11,936 million) which represents the difference between the nominal value and issue price of the shares issued arising from Rio Tinto plc's rights issue completed in July 2009.

G Rio Tinto plc guarantees

Rio Tinto plc provides a number of guarantees in respect of Group companies.

Rio Tinto plc and Rio Tinto Limited have jointly guaranteed the Group's external listed debt under the US Shelf Programme, European Debt Issuance Programme and Commercial Paper Programme which totalled US$5.5 billion at 31 December 2021 (31 December 2020: US$5.5 billion). In addition, these entities also jointly guarantee the Group's undrawn credit facility which was US$7.5 billion at 31 December 2021 (31 December 2020: US$7.5 billion). Rio Tinto plc has provided guarantees in respect of certain derivative contracts that are in a liability position of US$273 million at 31 December 2021 (31 December 2020: US$141 million).

Rio Tinto plc has provided a guarantee, known as the completion support undertaking (CSU), in favour of the Oyu Tolgoi LLC project finance lenders. At 31 December 2021, US$4.3 billion of project finance debt was outstanding under this facility (31 December 2020: US$4.3 billion). Oyu Tolgoi LLC is owned by Erdenes Oyu Tolgoi LLC (34%), which is controlled by the Government of Mongolia, and Turquoise Hill Resources Ltd (66%, of which Rio Tinto owns 51%). The project finance has been raised for development of the underground mine and the CSU will terminate on the completion of the underground mine according to a set of completion tests set out in the project finance facility.

The Rio Tinto guarantee applies to the extent that Turquoise Hill Resources Ltd cannot satisfy Oyu Tolgoi LLC's project finance debt servicing obligations under its own guarantee to the lenders, called the sponsor debt service undertaking (DSU). Both the CSU and DSU contain a carve-out for certain political risk events.

During 2021, fees of US$108 million (2020: US$108 million) were received from Oyu Tolgoi LLC and Turquoise Hill Resources Ltd as consideration for the provision of the CSU.

Rio Tinto plc has provided a number of guarantees in relation to various pension funds. Subject to certain conditions, Rio Tinto plc would pay any contributions due from Group companies participating in these funds in the event that the companies fail to meet their contribution requirements. The guarantees were not called upon in 2021. The aggregate of company contributions to these plans in 2021 was US$8 million (2020: US$10 million).

Other guarantees issued by Rio Tinto plc in relation to Rio Tinto Group entities as at 31 December 2021 amount to US$426 million (31 December 2020: US$388 million). Included within this balance is US$35 million (31 December 2020: US$35 million) in relation to non-wholly owned subsidiaries.

Pursuant to the DLC Merger, both Rio Tinto plc and Rio Tinto Limited issued deed poll guarantees by which each company guaranteed contractual obligations incurred by the other or guaranteed by the other.

The liability recognised for financial guarantees is US$156 million (31 December 2020: US$223 million) presented in "Other financial liabilities" in the balance sheet.

H Contingent liabilities

Details of contingent liabilities are included in note 30 to the Group financial statements.

I Auditor's remuneration

Amounts receivable by the Company's auditor and its associates in respect of services to the Company and its associates, have not been disclosed as the information is required instead to be disclosed on a consolidated basis in the consolidated financial statements.

J Events after the balance sheet date

There were no significant events after the balance sheet date requiring disclosure.

Rio Tinto Financial Information by Business Unit

		Gross product sales[a] for the year ended 31 December			Underlying EBITDA[b] for the year ended 31 December			Underlying earnings[c] for the year ended 31 December		
			Adjusted	Adjusted		Adjusted	Adjusted		Adjusted	Adjusted
	Rio Tinto interest %	**2021 US$m**	2020 US$m	2019 US$m	**2021 US$m**	2020 US$m	2019 US$m	**2021 US$m**	2020 US$m	2019 US$m
Iron Ore										
Pilbara	(d)	**39,111**	27,027	23,681	**27,837**	18,896	15,936	**17,544**	11,551	9,619
Dampier Salt	68.4	**298**	252	271	**39**	43	75	**10**	12	27
Evaluation projects/other	(e)	**2,147**	657	123	**(81)**	(32)	87	**(79)**	(112)	(8)
Intra-segment	(e)	**(1,974)**	(428)	—	**(203)**	(70)	—	**(152)**	(53)	—
Total Iron Ore		**39,582**	27,508	24,075	**27,592**	18,837	16,098	**17,323**	11,398	9,638
Aluminium										
Bauxite		**2,203**	2,302	2,490	**619**	943	1,045	**174**	434	498
Alumina		**2,743**	2,233	2,720	**569**	262	567	**306**	92	247
Primary Metal		**6,706**	4,489	4,940	**2,592**	904	755	**1,454**	169	40
Pacific Aluminium		**2,947**	1,944	2,204	**693**	112	(22)	**426**	(6)	(137)
Intra-segment and other		**(2,718)**	(2,510)	(3,079)	**14**	6	30	**192**	(159)	21
Integrated operations		**11,881**	8,458	9,275	**4,487**	2,227	2,375	**2,552**	530	669
Other product group items		**814**	856	1,065	**26**	7	16	**17**	(5)	10
Product group operations		**12,695**	9,314	10,340	**4,513**	2,234	2,391	**2,569**	525	679
Evaluation projects/other		**—**	—	—	**(131)**	(82)	(106)	**(101)**	(54)	(80)
Total Aluminium		**12,695**	9,314	10,340	**4,382**	2,152	2,285	**2,468**	471	599
Copper										
Kennecott	100.0	**2,528**	1,529	1,879	**1,142**	588	843	**513**	149	397
Escondida	30.0	**2,935**	2,296	2,136	**2,013**	1,462	1,034	**1,003**	650	325
Oyu Tolgoi and Turquoise Hill	(f)	**1,971**	1,078	1,166	**1,213**	390	357	**325**	160	25
Product group operations		**7,434**	4,903	5,181	**4,368**	2,440	2,234	**1,841**	959	747
Simandou iron ore project	(g)	**—**	—	—	**(58)**	(14)	(12)	**(43)**	(6)	(5)
Evaluation projects/other		**393**	66	15	**(341)**	(342)	(304)	**(219)**	(199)	(167)
Total Copper		**7,827**	4,969	5,196	**3,969**	2,084	1,918	**1,579**	754	575
Minerals										
Iron Ore Company of Canada	58.7	**3,526**	2,444	2,189	**2,026**	1,130	1,024	**734**	383	332
Rio Tinto Iron & Titanium	(h)	**1,791**	1,651	1,938	**470**	476	611	**176**	216	254
Rio Tinto Borates	100.0	**592**	564	593	**89**	126	180	**32**	65	96
Diamonds	(i)	**501**	459	619	**180**	83	151	**99**	9	(21)
Product group operations		**6,410**	5,118	5,339	**2,765**	1,815	1,966	**1,041**	673	661
Evaluation projects/other		**71**	52	55	**(162)**	(105)	(104)	**(153)**	(93)	(96)
Total Minerals		**6,481**	5,170	5,394	**2,603**	1,710	1,862	**888**	580	565
Other operations	(j)	**251**	321	393	**(28)**	24	(22)	**(84)**	(48)	(64)
Inter-segment transactions		**(268)**	(264)	(31)	**42**	(94)	(9)	**19**	(32)	(3)
Product group total		**66,568**	47,018	45,367	**38,560**	24,713	22,132	**22,193**	13,123	11,310
Central pension costs, share-based payments, insurance and derivatives					**110**	117	59	**133**	118	60
Restructuring, project and one-off costs					**(80)**	(133)	(183)	**(51)**	(108)	(94)
Central costs	(k)				**(613)**	(545)	(496)	**(585)**	(455)	(550)
Central exploration and evaluation					**(257)**	(250)	(315)	**(215)**	(216)	(231)
Net interest								**(95)**	(14)	(122)
Underlying EBITDA/earnings					**37,720**	23,902	21,197	**21,380**	12,448	10,373
Items excluded from underlying EBITDA/earnings					**(811)**	(395)	(722)	**(286)**	(2,679)	(2,363)
Reconciliation to Group income statement										
Share of equity accounted unit sales and intra-subsidiary/equity accounted unit sales		**(3,073)**	(2,407)	(2,202)						
Impairment charges net of reversals					**(269)**	(1,272)	(3,487)			
Depreciation and amortisation in subsidiaries excluding capitalised depreciation					**(4,525)**	(4,074)	(4,272)			
Depreciation and amortisation in equity accounted units					**(497)**	(576)	(653)			
Taxation and finance items in equity accounted units					**(759)**	(443)	(296)			
Finance items					**(26)**	(1,751)	(648)			
Consolidated sales revenue/profit before taxation/net earnings		**63,495**	44,611	43,165	**30,833**	15,391	11,119	**21,094**	9,769	8,010

		Capital expenditure[l] for the year ended 31 December			Depreciation and amortisation for the year ended 31 December			Operating assets[m] as at 31 December			Employees for the year ended 31 December		
			Adjusted	Adjusted		Adjusted	Adjusted		Adjusted	Adjusted		Adjusted	Adjusted
	Rio Tinto interest %	2021 US$m	2020 US$m	2019 US$m	2021 US$m	2020 US$m	2019 US$m	2021 US$m	2020 US$m	2019 US$m	2021	2020	2019
Iron Ore													
Pilbara	(d)	3,928	2,919	1,720	2,003	1,819	1,704	16,850	16,253	13,865	12,810	11,522	10,634
Dampier Salt	68.4	19	22	21	20	19	19	159	163	152	388	351	347
Evaluation projects/other	(e)	—	—	—	—	—	—	1,283	338	2	16	10	—
Intra-segment	(e)	—	—	—	—	—	—	(255)	(104)	—	—	—	—
Total Iron Ore		3,947	2,941	1,741	2,023	1,838	1,723	18,037	16,650	14,019	13,214	11,883	10,981
Aluminium													
Bauxite		180	142	387	328	290	286	2,542	2,593	2,597	2,972	2,853	2,940
Alumina		362	228	282	165	138	187	2,258	2,294	2,009	2,463	2,383	2,269
Primary Metal		698	602	658	694	643	682	9,734	9,361	9,674	6,280	6,282	6,357
Pacific Aluminium		133	114	129	103	119	154	228	455	970	2,450	2,469	2,356
Intra-segment and other		(1)	(1)	—	(1)	1	—	839	662	780	185	141	127
Integrated operations		1,372	1,085	1,456	1,289	1,191	1,309	15,601	15,365	16,030	14,350	14,128	14,049
Other product group items		—	—	—	—	—	—	—	—	—	—	—	—
Product group operations		1,372	1,085	1,456	1,289	1,191	1,309	15,601	15,365	16,030	14,350	14,128	14,049
Evaluation projects/other		—	—	—	—	—	3	—	—	—	—	—	—
Total Aluminium		1,372	1,085	1,456	1,289	1,191	1,312	15,601	15,365	16,030	14,350	14,128	14,049
Copper													
Kennecott	100.0	411	618	444	538	472	457	2,404	2,317	2,012	2,051	2,171	2,066
Escondida	30.0	220	178	315	348	428	508	2,515	2,726	2,871	1,166	1,124	1,068
Oyu Tolgoi and Turquoise Hill	(f)	911	1,038	1,289	213	189	208	8,998	8,111	6,780	3,508	3,450	3,152
Product group operations		1,542	1,834	2,048	1,099	1,089	1,173	13,917	13,154	11,663	6,725	6,745	6,286
Simandou iron ore project	(g)	—	(2)	(1)	—	—	—	13	16	20	101	69	74
Evaluation projects/other		6	5	1	4	4	3	210	192	152	228	159	150
Total Copper		1,548	1,837	2,048	1,103	1,093	1,176	14,140	13,362	11,835	7,054	6,973	6,510
Minerals													
Iron Ore Company of Canada	58.7	377	243	255	197	170	172	1,077	1,009	803	2,877	2,716	2,617
Rio Tinto Iron & Titanium	(h)	184	144	249	213	173	193	3,369	3,390	3,507	4,129	4,151	4,115
Rio Tinto Borates	100.0	43	42	43	51	49	60	487	502	525	978	966	924
Diamonds	(i)	25	25	38	12	60	144	(19)	(7)	195	646	885	940
Product group operations		629	454	585	473	452	569	4,914	4,894	5,030	8,630	8,718	8,596
Evaluation projects/other		15	1	—	1	—	—	43	33	37	136	77	53
Total Minerals		644	455	585	474	452	569	4,957	4,927	5,067	8,766	8,795	8,649
Other operations	(j)	(11)	2	1	199	199	180	(1,533)	(550)	(446)	297	488	1,016
Inter-segment transactions								(12)	129	127			
Product group total		7,500	6,320	5,831	5,088	4,773	4,960	51,190	49,883	46,632	43,681	42,267	41,205
Other items		117	79	64	106	82	77	(1,334)	(2,165)	(2,449)	5,664	5,207	4,802
Less: equity accounted units		(294)	(255)	(456)	(497)	(576)	(653)						
Total		7,323	6,144	5,439	4,697	4,279	4,384	49,856	47,718	44,183	49,345	47,474	46,007
Add back: Proceeds from disposal of property, plant and equipment		61	45	49									
Total capital expenditure per cash flow statement		7,384	6,189	5,488									
Add: Net cash/(debt)								1,576	(664)	(3,651)			
Equity attributable to owners of Rio Tinto								51,432	47,054	40,532			

Notes to Financial Information by Business Unit

Business units are classified according to the Group's management structure.

The financial information by business unit has been recast in accordance with the organisational restructure announced on 28 January 2021 and to improve the grouping of central costs according to their nature. The main impacts are as follows: Simandou has moved from the previous Energy & Minerals product group to the Copper product group; Uranium has moved from the previous Energy & Minerals product group to Other Operations; Diamonds has moved from the previous Copper & Diamonds product group to the Minerals product group; the Minerals product group retains the Argyle residual operations and from 1 January 2021, Argyle closure has moved to Other Operations. Argyle Residual operations includes activity relating to the sale of remaining diamond inventory and property held. Argyle closure includes activity relating to the management and execution of the Argyle mine closure obligations and management of entities with interests in state and traditional owner agreements and licences. As a result of these changes, the Copper & Diamonds segment is renamed Copper and the Energy & Minerals segment is renamed Minerals from 2021.

The disclosures in this note include certain alternative performance measures (APMs). For more information on the APMs used by the Group, including definitions and calculations, please refer to pages 343 to 347.

(a) Gross product sales include the sales revenue of equity accounted units on a proportionately consolidated basis (after adjusting for sales to subsidiaries) in addition to consolidated sales. Consolidated sales revenue includes subsidiary sales to equity accounted units, which are not included in gross product sales.

(b) Underlying EBITDA of subsidiaries, joint operations and the Group's share relating to equity accounted units represents profit before: tax, net finance items, depreciation and amortisation charged to the income statement in the period. Underlying EBITDA excludes the EBITDA impact of the same items that are excluded from underlying earnings.

(c) Underlying earnings represent net earnings attributable to the owners of Rio Tinto, adjusted to exclude items which do not reflect the underlying performance of the Group's operations. Business unit earnings are stated before finance items, but after the amortisation of discount related to provisions. Earnings attributed to business units do not include amounts that are excluded in arriving at underlying earnings.

(d) Pilbara represents the Group's 100% holding in Hamersley, 50% holding in Hope Downs Joint Venture and 65% holding in Robe River Iron Associates. The Group's net beneficial interest in Robe River Iron Associates is 53%, as 30% is held through a 60% owned subsidiary and 35% is held through a 100% owned subsidiary.

(e) Gross product sales, Underlying EBITDA, Net Earnings and Operating assets within Evaluation projects/other include activities relating to the shipment and blending of Pilbara and Iron Ore Company of Canada (IOC) iron ore inventories held at portside in China and sold to domestic customers. Transactions between Pilbara and our portside trading business are eliminated through the Iron Ore "intra-segment" line and transactions between IOC and the portside trading business are eliminated through "inter-segment transactions".

(f) Our interest in Oyu Tolgoi is held indirectly through our 50.8% investment in Turquoise Hill Resources Ltd (TRQ), where TRQ's principal asset is its 66% investment in Oyu Tolgoi LLC, which owns the Oyu Tolgoi copper-gold mine.

(g) Simfer Jersey Limited, a company incorporated in Jersey, in which the Group has a 53% interest, has an 85% interest in Simfer S.A., the company that manages the Simandou project in Guinea. The Group therefore has a 45.05% indirect interest in Simfer S.A. These entities are consolidated as subsidiaries and together referred to as the Simandou iron ore project.

(h) Includes our interests in Rio Tinto Fer et Titane (100%), QIT Madagascar Minerals (QMM, 80%) and Richards Bay Minerals (attributable interest of 74%).

(i) Includes our interests in Argyle (100%) residual operations which relates to the sale of remaining inventory and Diavik. Until 18 November we recognised our 60% share of assets, revenue and expenses relating to the Diavik joint venture. Liabilities were recognised according to Diavik Diamond Mine Inc's contractual obligations at 100%, with a corresponding 40% receivable or contingent asset representing the co-owner's share where applicable. Post acquisition, we now consolidate (100%) of the Diavik Diamond Mine. From 1 June 2021, management responsibility for rehabilitation of the Argyle site moved from Minerals to Rio Tinto Closure (RTC), hence, Argyle closure is reported in Other operations effective from 1 January 2021. Refer to (j) below.

(j) Other operations include our 100% interest in the Gove alumina refinery (under rehabilitation), Rio Tinto Marine, and the remaining legacy liabilities of Rio Tinto Coal Australia. These include provisions for onerous contracts, in relation to rail infrastructure capacity, partly offset by financial assets and receivables relating to contingent royalties and disposal proceeds. From 1 January 2021, Uranium moved from Minerals to Other operations. From 1 January 2021, Argyle closure is reported as part of Other Operations.

(k) Mark-to-market movements on commodity derivatives entered into with the commercial objective of achieving spot pricing for the underlying transaction at the date of settlement have been reclassified from Central costs and are now included in Central pensions, share based payments, insurance & derivatives, in order to provide a better understanding of Central costs. The impact of this change on the reported comparatives is insignificant, and therefore the comparatives have not been restated.

(l) Capital expenditure is the net cash outflow on purchases less sales of property, plant and equipment, capitalised evaluation costs and purchases less sales of other intangible assets. The details provided include 100% of subsidiaries' capital expenditure and Rio Tinto's share of the capital expenditure of joint operations and equity accounted units.

(m) Operating assets of the Group represents equity attributable to Rio Tinto adding back net cash/(debt). Operating assets of subsidiaries, joint operations and the Group's share relating to equity accounted units are comprised of net assets excluding net cash/(debt) and post-retirement assets and liabilities, net of tax. Operating assets are stated after the deduction of non-controlling interests, these are calculated by reference to the net assets of the relevant companies (i.e. inclusive of such companies' debt and amounts due to or from Rio Tinto Group companies).

Australian Corporations Act – Summary of ASIC Relief

Pursuant to section 340 of the Australian Corporations Act 2001 (Corporations Act), the Australian Securities and Investments Commission issued an order dated 16 July 2021 that granted relief to Rio Tinto Limited from certain requirements of the Corporations Act in relation to its financial statements and associated reports. The order essentially continues the relief that has applied to Rio Tinto Limited since the formation of the Group's dual listed companies (DLC) structure in 1995. The order applies to Rio Tinto Limited's financial reporting obligations for the financial years up to and including 31 December 2023.

In essence, instead of being required under the Corporations Act to prepare consolidated financial statements covering only itself and its controlled entities, the order allows Rio Tinto Limited to prepare consolidated financial statements in which it, Rio Tinto plc and their respective controlled entities are treated as a single economic entity. In addition, those consolidated financial statements are to be prepared:

- in accordance with the principles and requirements of International Financial Reporting Standards as adopted by the United Kingdom (UK IFRS) rather than the Australian Accounting Standards (AAS) (except for one limited instance in the case of any concise report), and in accordance with UK financial reporting obligations generally;
- on the basis that the transitional provisions of International Financial Reporting Standard 1, First-time Adoption of International Financial Reporting Standards, should be applied using the combined financial statements previously prepared for Rio Tinto Limited, Rio Tinto plc and their respective controlled entities under Generally Accepted Accounting Principles in the United Kingdom, under which the DLC Merger between Rio Tinto Limited and Rio Tinto plc was accounted for using "merger", rather than "acquisition", accounting (reflecting that neither Rio Tinto Limited nor Rio Tinto plc was acquired by, or is controlled by, the other; and meaning that the existing carrying amounts, rather than fair values, of assets and liabilities at the time of the DLC Merger were used to measure those assets and liabilities at formation);
- on the basis that Rio Tinto Limited and Rio Tinto plc are a single company (with their respective shareholders being the shareholders in that single company); and
- with a reconciliation, from UK IFRS to AAS, of the following amounts: consolidated loss/profit for the financial year, total consolidated comprehensive loss/income for the financial year and total consolidated equity at the end of the financial year (see page 217).

Those consolidated financial statements must also be audited in relation to their compliance with relevant Australian and UK requirements. Rio Tinto Limited must also prepare a Directors' Report which satisfies the content requirements of the Corporations Act (applied on the basis that for these purposes the consolidated entity is the Group, and the consolidated financial statements cover the Group). This includes a Remuneration Report (see pages 168 to 198) prepared in accordance with the requirements of the Corporations Act.

Rio Tinto Limited is also required to comply generally with the lodgement and distribution requirements of the Corporations Act (including timing requirements) in relation to those consolidated financial statements (including any concise financial statements), the Auditors' report and the Directors' Report. The Corporations Act also requires that a non-binding resolution to adopt the Remuneration Report be voted on by shareholders at Rio Tinto Limited's annual general meeting.

Rio Tinto Limited is not required to prepare separate consolidated financial statements solely for it and its controlled entities. Rio Tinto Limited is also not required to prepare and lodge parent entity financial statements for itself in respect of each relevant financial year.

Rio Tinto Limited must, however, in accordance with the Corporations Act include in the consolidated financial statements for the Group, as a note, various parent entity information regarding Rio Tinto Limited (including in relation to assets, liabilities, shareholders' equity, profit and loss, income, guarantees, contingent liabilities, and contractual commitments) prepared in accordance with AAS (see page 291).

Directors' Declaration

Directors' statement of responsibilities in relation to the Group financial statements, Rio Tinto plc financial statements and Rio Tinto Limited financial statements

The directors are responsible for preparing the Annual Report, the Remuneration Report and the financial statements in accordance with applicable law and regulations.

UK and Australian company law requires the directors to prepare financial statements for each financial year. Under UK law, the directors have elected to prepare the group financial statements in accordance with UK-adopted international accounting standards and applicable law and have elected to prepare the parent company financial statements in accordance with UK accounting standards and applicable law (UK Generally Accepted Accounting Practice), including FRS 101 Reduced Disclosure Framework. Under Australian law, the directors are also required to prepare certain Rio Tinto Limited parent company financial statements in accordance with Australian Accounting Standards (AAS). In preparing the Group financial statements, the directors have also elected to comply with IFRSs, issued by the International Accounting Standards Board (IASB).

Under UK and Australian company law the directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the Group and the companies as at the end of the financial year, and of the profit or loss of the companies and Group for the period (as applicable).

In preparing these financial statements, the directors are required to:

- select suitable accounting policies and apply them consistently;
- make judgments and estimates that are reasonable, relevant, reliable and prudent;
- state whether applicable UK adopted international accounting standards and AAS have been followed, subject to any material departures disclosed and explained in the Group and parent company financial statements respectively;
- assess the Group and companies' ability to continue as a going concern, disclosing as applicable, matters related to going concern;
- use the going concern basis of accounting unless they either intend to liquidate the Group or the companies or to cease operations, or have no realistic alternative but to do so.

The directors are responsible for keeping adequate accounting records that are sufficient to show and explain the transactions of the companies and the Group and disclose with reasonable accuracy at any time the financial position of the companies and the Group and enable them to ensure that:

- the Group financial statements comply with the UK Companies Act 2006, the Australian Corporations Act 2001 as amended by the Australian Securities and Investments Commission Order dated 16 July 2021;
- the Rio Tinto plc financial statements comply with the UK Companies Act 2006;
- the Rio Tinto Limited parent company disclosures comply with the Corporations Act as amended by the Australian Securities and Investments Commission Order dated 16 July 2021; and
- the Remuneration Report complies with the UK Companies Act 2006 and the Australian Corporations Act 2001 as amended by the Australian Securities and Investments Commission Order dated 16 July 2021.

The directors are also responsible for safeguarding the assets of the companies and the Group and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The directors are responsible for the maintenance and integrity of the Group's website. Legislation governing the preparation and dissemination of financial statements may differ between jurisdictions in which the Group reports.

Each of the current directors, whose names and function are listed on pages 134-135 in the Governance section, confirm that, to the best of their knowledge:

- the Rio Tinto Group financial statements and notes, which have been prepared in accordance with international accounting standards in conformity with the requirements of UK-adopted international accounting standards, the Australian Corporations Act 2001 as amended by the Australian Securities and Investments Commission Order dated 16 July 2021, the UK Companies Act 2006, give a true and fair view of the assets, liabilities, financial position and profit of the Group;
- the Rio Tinto plc financial statements and notes, which have been prepared in accordance with United Kingdom Generally Accepted Accounting Practice, give a true and fair view of the assets, liabilities, financial position and profit of the company;
- the Rio Tinto Limited parent company disclosures, which have been prepared in accordance with the AAS and Australian Corporations Act 2001 as amended by the Australian Securities and Investments Commission Order dated 16 July 2021, give a true and fair view of the assets, liabilities, financial position and profit of the company;
- the Strategic Report section of the Annual Report includes a fair review of the development and performance of the business and the position of the Group, together with a description of the principal risks and uncertainties that it faces; and
- there are reasonable grounds to believe that each of the Rio Tinto Group, Rio Tinto plc and Rio Tinto Limited will be able to pay its debts as and when they become due and payable.

The directors have been given the declarations by the Chief Executive and Chief Financial Officer required by section 295A of the Australian Corporations Act 2001 as amended by the Australian Securities and Investments Commission Order dated 16 July 2021.

Disclosure of information to auditors

The directors in office at the date of this report have each confirmed that:

- so far as they are aware, there is no relevant audit information of which the Group's auditors are unaware; and
- they have taken all the steps that they ought to have taken as a director to make themselves aware of any relevant audit information and to establish that the Group's auditors are aware of that information.

This declaration is made in accordance with a resolution of the Board.

Simon Thompson
Chairman

Jakob Stausholm
Chief Executive

Peter Cunningham
Chief Financial Officer

Independent auditors' reports

of KPMG LLP ('KPMG UK') to the members of Rio Tinto plc

and of KPMG ('KPMG Australia') to the members of Rio Tinto Limited

REPORT ON THE AUDITS OF THE FINANCIAL STATEMENTS

1. OPINIONS: OUR OPINIONS ARE UNMODIFIED

In KPMG UK's opinion:

- the financial statements give a true and fair view of the state of the Group's and of the UK parent company, Rio Tinto plc's, affairs as at 31 December 2021, and of the Group's profit for the year then ended;
- the Group financial statements have been properly prepared in accordance with UK-adopted international accounting standards and IFRSs as issued by the International Accounting Standards Board (IASB). As explained in note 1 to the financial statements, the Group, in addition to complying with its legal obligation to apply UK-adopted international accounting standards, has applied IFRSs as issued by the IASB;
- the Rio Tinto plc company financial statements have been properly prepared in accordance with UK accounting standards, including FRS 101 "Reduced Disclosure Framework"; and
- the financial statements have been prepared in accordance with the requirements of the Companies Act 2006.

In KPMG Australia's opinion:

- The accompanying Group financial statements are in accordance with the Australian Corporations Act 2001, as amended by the Australian Securities and Investments Commission Order dated 16 July 2021 (the "ASIC Order") including:
  - giving a true and fair view of the Group's financial position as at 31 December 2021 and of its financial performance for the year then ended; and
  - complying with UK-adopted international accounting standards and the Australian Corporations Regulations 2001.

For the purpose of these reports, the terms 'we' and 'our' denote KPMG UK in relation to UK responsibilities and reporting obligations to the members of Rio Tinto plc, and KPMG Australia in relation to Australian responsibilities and reporting obligations to the members of Rio Tinto Limited. Rio Tinto ('the Group' or 'Rio Tinto Group') consists of Rio Tinto plc, Rio Tinto Limited (individually 'the Company' or together 'the Companies') and their respective subsidiaries including the Group's share of joint arrangements and associates, during the financial year ended 31 December 2021. The 'Group financial statements' denotes the financial statements prepared for the Rio Tinto Group. 'Rio Tinto plc company financial statements' denotes the company only financial statements for the UK parent company, Rio Tinto plc. The 'Group financial statements' and 'Rio Tinto plc company financial statements' taken together are referred to as 'financial statements'.

What our opinions cover

We have audited the Group financial statements as at and for the year ended 31 December 2021 ('FY21') included in the Annual Report and Accounts, which comprise:

Rio Tinto Group
Group Income Statement
Group Statement of Comprehensive Income
Group Cash Flow Statement
Group Balance Sheet
Group Statement of Changes in Equity
notes[a] to the Group financial statements, including the summary of significant accounting policies, the outline of dual listed companies structure and basis of preparation of the Group financial statements.

KPMG UK has also audited the UK parent company, Rio Tinto plc's financial statements for the year ended 31 December 2021, which comprise the UK parent company balance sheet; the UK parent company statement of changes in equity; and related notes, which include a description of the significant accounting policies and other explanatory information.

KPMG Australia has considered the Directors' declaration, the Reconciliation with Australian Accounting Standards note and the Australian Corporations Act – Summary of ASIC relief note to be part of the Group financial statements when forming its opinion under the requirements of the Australian Corporations Act 2001, as amended by the ASIC Order. KPMG Australia has also audited the Remuneration Report included in the Directors' report for the year ended 31 December 2021.

Basis for opinions

We conducted our audits in accordance with International Standards on Auditing (UK) ("ISAs (UK)"), Australian Auditing Standards ("ASAs") and applicable laws. Our responsibilities under those standards are further described in the Auditors' responsibilities for the audit of the financial statements section of our report. We believe that the audit evidence we have obtained is a sufficient and appropriate basis for our opinions. Our audit opinions are consistent with our report to the audit committee.

[a] KPMG UK has considered notes 1 – 42 and notes 44 – 45 and KPMG Australia has considered notes 1 – 45 to be part of the Group financial statements in forming their respective opinions.

2. OVERVIEW OF OUR AUDITS

Key Audit Matters

		FY21 Audit risk significance vs FY20	Item
Recurring key audit matters	Evaluation of impairment assessments of property, plant and equipment in specific cash generating units	▲	3.1
	Evaluation of certain provisions for close-down, restoration and environmental obligations (‘closure provisions’)	◀▶	3.2
	Evaluation of provisions for uncertain tax positions	◀▶	3.3
	Evaluation of recoverability of Rio Tinto plc’s Investments in subsidiaries (KPMG UK only)	◀▶	3.4

Audit Committee interaction

During the year, the Audit Committee (AC) met seven times. We are invited to attend all Audit Committee meetings and are invited to meet with the AC in private sessions without Executive Directors being present. For each Key Audit Matter, we have set out communications with the Audit Committee in Section 3, including matters that required particular judgment.

The matters included in the Audit Committee Chair’s report on page 153 are consistent with our observations of those meetings. Our audit opinions and matters included in this report are consistent with those discussed and included in our reports to the Rio Tinto Audit Committee.

Our independence

We have fulfilled our ethical responsibilities under, and we remain independent of the Group in accordance with, UK ethical requirements including the FRC Ethical Standard as applied to listed public interest entities; the Australian Corporations Act 2001 as amended by the ASIC Order; and the relevant ethical requirements of the Australian Accounting Professional and Ethical Standards Board’s APES 110 Code of Ethics for Professional Accountants (including Independence Standards).

We have not provided any services which are prohibited by the standards noted above to the Group during the year ended 31 December 2021 (FY21) or subsequently.

The period of total uninterrupted engagement is for the two financial years ended 31 December 2021.

Total audit fee	US$21.2m
Total non-audit fees	US$3.9m
Non-audit fee as a % of audit fee %	18.4%
Next financial period which requires a tender	31 December 2030
Tenure of Group signing and component partners	1 – 2 years

Materiality

(Section 7 below)

The scope of our work is influenced by our view of materiality and our assessed risk of material misstatement.

We have determined overall materiality for the Group at US$700m (2020: US$ 550m).

A key judgment in determining materiality (and performance materiality) was the appropriate benchmark to select, based on our perception of the needs of the members of the Companies. We considered which benchmarks and Key Performance Indicators have the greatest bearing on decisions of the members of the Companies.

We determined that profit before tax, is the key measure for performance of the Group. As such, we based our materiality on profit before tax excluding certain identified items which could significantly distort results in any one particular year, of which US$700m represents 2.3% (2020: 3.3%).

Independent auditors' reports

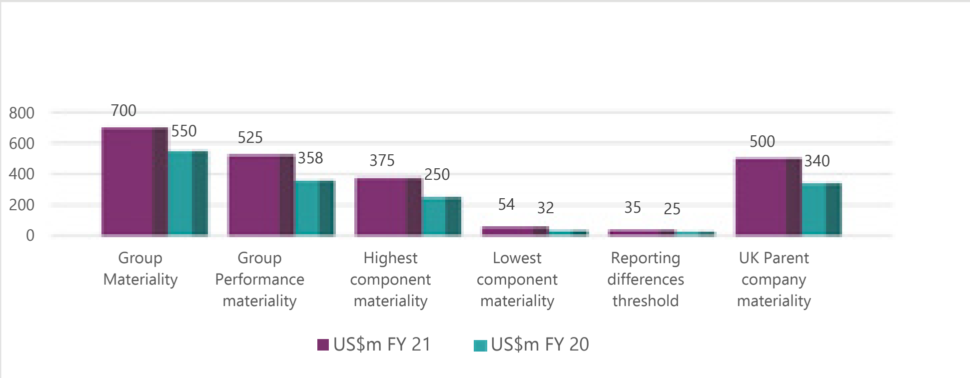
of KPMG LLP ('KPMG UK') to the members of Rio Tinto plc

and of KPMG ('KPMG Australia') to the members of Rio Tinto Limited

2. OVERVIEW OF OUR AUDITS (CONTINUED)

Materiality

(Section 7 below)



Group scope

(Section 8 below)

We performed our risk assessment and planning procedures to determine which of the Group's components are likely to include risks of material misstatement to the Group financial statements, including the type of procedures to be performed at these components and the extent of involvement required from our component auditors around the world. We scoped:

- Four components, Pilbara Iron Ore, Aluminium Atlantic operations, Oyu Tolgoi and Rio Tinto Treasury UK as individually financially significant components which were subject to full scope audits by component auditors;
- Four further components subject to full scope audits by component auditors;
- Three components subject to 'audit of specific account balance' which are associated with a significant risk in relation to provision for closedown, restoration, and environmental obligations;
- One component subject to 'audit of specific account balance' which is associated with a significant risk in relation to uncertain tax positions; and
- Nine further components subject to 'audits of specific account balance' to ensure sufficient audit coverage.

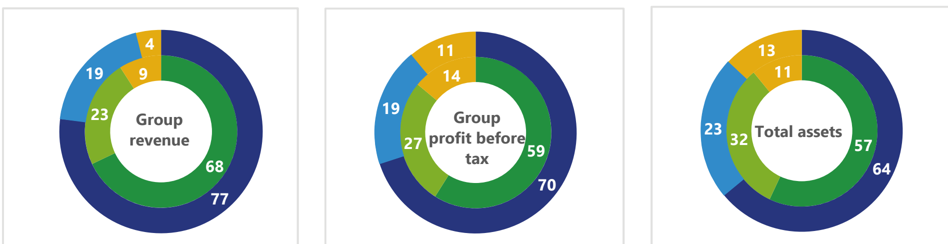
Certain Group sales and purchase transactions that originate in various countries are processed in Singapore and Delhi where we have also established audit teams to perform testing on behalf of our component teams. We tested the key controls that operate in Singapore and Delhi that relate to the transactions that we have tested at these locations. Other procedures that were performed centrally are set out in more detail in Section 8 below.

In addition, we performed Group level analysis on the remaining components to determine whether risks of material misstatement existed in those components and planned audit responses thereto.

We consider the scope of our audits, as agreed with the Audit Committee, to be an appropriate basis for our audit opinions. The total number of components within the scope of our work:

	Number of components (to reflect FY21 reporting structure)	
	FY21	FY20
Full scope audits for group audit purposes	8	8
Audit of 'specific account balance' for group audit purposes	13	12
Total	**21**	**20**

Coverage % on the Group financial statements



Full scope audits for group audit purposes – FY21
Audits of 'specific account balance' for group reporting – FY21
Full scope audits for group audit purposes – FY20
Audits of 'specific account balance' for group reporting – FY20
Out of scope

3. KEY AUDIT MATTERS

What we mean

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the current year financial statements and include the most significant assessed risks of material misstatement (whether or not due to fraud) identified by us, including those which had the greatest effect on:

- the overall audit strategy;
- the allocation of resources in the audit; and
- directing the efforts of the engagement team.

We include below the key audit matters (unchanged from 2020), in decreasing order of audit significance, in arriving at the audit opinions above, together with our principal audit procedures to address those matters and, as required for public interest entities, our results from those procedures. These matters were addressed in the context of, and our results are based on procedures undertaken for the purpose of our audit of the financial statements as a whole and in forming our opinions thereon, and consequently are incidental to those opinions, and we do not provide separate opinions on these matters.

3.1 Evaluation of impairment assessments of property, plant and equipment in specific cash generating units ('CGU')

Financial statement elements

Cash generating units ('CGU'):

- Oyu Tolgoi copper-gold mine ('Oyu Tolgoi') (Carrying value: US$11.8billion); and
- Kitimat aluminium smelter ('Kitimat') (Carrying value: US$3,323m)

Our results

FY21: Acceptable (FY20: In the prior year, the aforementioned cash generating units were evaluated for indicators of impairment or impairment reversal of property, plant and equipment with acceptable results).

Description of the key audit matter

The Group has determined that there were indicators of impairments of property, plant and equipment in the Oyu Tolgoi and Kitimat CGUs, which led to the Group estimating recoverable amounts of the CGUs (based on fair value less costs of disposal methodology) and comparing them to the respective carrying amounts. The Group concluded that the Kitimat CGU was impaired by US$269m and that the Oyu Tolgoi CGU did not require impairment or reversal of impairment.

The determination of recoverable amounts of the CGUs required the Group to exercise judgment and estimation in arriving at key assumptions. These key assumptions included forecast commodity prices and discount rates.

Specifically, in relation to the Oyu Tolgoi CGU, other key assumptions used by the Group included the timing and volume of the forecast production from the underground project and the adjustments applied to the future cash flows to reflect development and other project risks.

Other key assumptions for the Kitimat CGU used by the Group included the timing and volume of forecast production and shipment.

Our response to the risk

Our procedures to address the risk included:

Control operation

Evaluating the design and testing the operating effectiveness of certain internal controls of the Group related to the impairment process for determination of the recoverable amounts of property, plant and equipment for the Oyu Tolgoi and Kitimat CGUs.

Tests of detail

We performed the following procedures to challenge the Group while evaluating the key assumptions used to determine the recoverable amounts:

- involved our own valuation professionals with specialised skills and knowledge who assisted us in assessing:
  - the discount rates, by comparing assumptions used to calculate the discount rate to a range of internal and external sources; and
  - the forecast commodity prices, by comparing them to market consensus forecasts.

Specifically, for the Oyu Tolgoi CGU we,

- assessed the scope, competency and objectivity of the Group's internal experts who prepared the life of mine plans (which details the timing and production volumes) utilised in the Group's impairment assessment, and analysed against our knowledge of the operation and industry; and
- made inquiries with senior finance and operational personnel within the Group and used our audit knowledge to corroborate and challenge:
  - the Group's assumptions on timing and volume of production from the underground project; and
  - the adjustments applied to the cash flows to reflect development and other project risks.

Independent auditors' reports

of KPMG LLP ('KPMG UK') to the members of Rio Tinto plc

and of KPMG ('KPMG Australia') to the members of Rio Tinto Limited

3. KEY AUDIT MATTERS (CONTINUED)

3.1 Evaluation of impairment assessments of property, plant and equipment in specific cash generating units ('CGU') (continued)

Description of the key audit matter	Our response to the risk
We have identified the Group's impairment assessments of property, plant and equipment in the Oyu Tolgoi and Kitimat CGUs as a key audit matter. This was due to the complex auditor judgment relating to the facts and circumstances of each of the Group's impairment assessments, the level of specialised skills needed to evaluate certain key assumptions noted above and the increased risk of error due to the size of the CGUs. The effect of these matters is that, as part of our risk assessment, we determined that the key assumptions used by the Group have a high degree of estimation uncertainty with a wide potential range of reasonable outcomes. Refer to notes 1(i) and 6, and the Audit Committee's views set out on page 153.	Our procedures to address the risk included (continued): Tests of detail (continued) Specifically, for the Kitimat CGU we, • compared the Group's historical forecast production and shipment volumes to actual volumes to assess the Group's ability to accurately forecast; and • assessed the consistency of the Group's forecast production volumes and timing thereof with the planned ramp up schedule and corroborated this through inquiry of the operational personnel. Additionally, we performed the following procedure for both the CGUs: • evaluating the compliance of the impairment assessments to the relevant accounting standards, checking their mathematical accuracy and agreeing the carrying value of the CGUs to the Group's accounting records. Impact of climate change We involved our sustainability specialists to assist in understanding the Group's approach to incorporating the impacts of climate change into its pricing process and in comparing carbon pricing assumptions to publicly available information. Assessing disclosures We assessed the related disclosures in notes 1 and 6, including sensitivity disclosures, for compliance with the relevant accounting requirements and against the results of our work.

Communications with Rio Tinto's Audit Committee

We discussed with and reported to the Audit Committee:

- Indicators of impairment noted for Kitimat CGU which included production challenges due to the labour strike and subsequent restart to operations.
- Indicators of impairment noted for the Oyu Tolgoi CGU which included political and stakeholder challenges including risks around funding, complexities associated with the underground development and delay in the undercut and thereby the timing of the production from the underground project.
- Involvement of our valuation professionals assisting in assessing the discount rates and commodity pricing.
- How the Group considered the impacts of climate change within the impairment tests.

Based on the risk identified and our procedures performed, we found the Group's determination of the recoverable amount and the related impairment charge booked for the Kitimat CGU and the related disclosures in the financial statements comply with the accounting requirements and are acceptable.

3.2 Evaluation of certain provisions for close-down, restoration and environmental obligations ('closure provisions')

Financial statement elements	Our results
Carrying value of closure provisions: As at 31 December 2021 - US$14,542m (2020: US$13,335m)	FY21: Acceptable (FY20: Acceptable)

3. KEY AUDIT MATTERS (CONTINUED)

3.2 Evaluation of certain provisions for close-down, restoration and environmental obligations ('closure provisions') (continued)

Description of the key audit matter

The Group incurs legal and constructive obligations for close-down and restoration activities which include the dismantling and demolition of infrastructure, the removal of residual materials and the remediation of disturbed areas for mines and certain refineries and smelters. Generally, there is relatively limited activity within the Group or broader industry of completing large scale restoration and rehabilitation projects, and elements of restoration and rehabilitation of each site are relatively unique to the site. As such, there are limited comparable historical precedents against which to benchmark estimates of future costs, which increases estimation uncertainty.

A significant proportion of the Group's assets have long remaining lives, which also increases the estimation uncertainty relating to the rehabilitation activities required and the timing and amount of the associated future cash flows. Because of this, the effect of the time value of money is material.

Close-down, restoration and environmental remediation activities are governed by a combination of legislative requirements, the Group's policies, and commitments made to stakeholders. These vary across location, product and operation.

The Group has disclosed that the determination of when an estimate associated with close-down, restoration and environmental obligations is sufficiently reliable to update is an area of judgment that may have a significant effect on the amounts recognised in the financial statements.

The evaluation of closure provisions for certain sites within Rio Tinto Iron ore ('Pilbara'), Gove refinery ('Gove') and Energy Resources of Australia ('ERA') is a key audit matter due to the amount of the provision and the judgment and specialised skills involved in our audit testing of certain key assumptions used by the Group to determine the provision including:

- the future close-down and restoration costs including costs associated to post-closure monitoring ('closure costs');
- the life of the operation and the nature and timing of closure and rehabilitation activities; and
- the discount rate.

Refer to notes 1(l) and 25, and the Audit Committee's views set out on page 153.

Our response to the risk

Our procedures to address the risk included:

Control operation

Evaluating the design and testing the operating effectiveness of certain internal controls over the Group's process to estimate provisions for close-down, restoration and environmental obligations over the Group's selection of key assumptions to be used.

Tests of detail

We performed the following procedures:

- evaluated the scope, competency and objectivity of the Group's experts, both internal and/or external to the Group, who produce the cost estimates by examining the work they were involved to perform, their professional qualifications and experience; and
- inspected the most recent closure studies and other technical material prepared by the Group relating to changes in the closure provision to assess the nature and scope of work planned to be undertaken. This included assumptions relating to the life of the operation and the nature and timing of closure and rehabilitation activities and expectation.

For certain closure provisions within Pilbara and Gove, we:

- compared historical forecast cost assumptions to actual costs to assess the Group's ability to accurately forecast; and
- compared the nature, timing and the estimated closure costs included in the studies with those used in the calculation of the provision.

Additionally, for the closure provisions within ERA and Gove, we assessed updates to the provision for changes to previous estimates or the correction of prior period errors, and against our knowledge.

For operations that the Group determined did not require a change in key assumptions during the year, we considered the consistency of the Group's conclusion with our understanding of the obligations associated with that operation and its closure remediation plan.

Our closure and valuation expertise

We involved our own valuations professionals with specialised skills and knowledge who assisted in evaluating the discount rate applied by the Group to calculate the net present value of these provisions. We compared it to external data including yields on long-term government bonds and external market research.

We involved our own environmental professionals for Pilbara, Gove and ERA with specialised skills and knowledge who assisted us in assessing certain assumptions regarding the forecast closure costs of closure activities based on their experience and familiarity with applicable legislative requirements and industry practice and the Group's closure commitments.

Assessing disclosures

- We assessed the appropriateness of the related disclosures in notes 1 and 25 of the financial statements including the Group's disclosure of the key source of estimation uncertainty surrounding the preliminary closure studies on ERA's Ranger Uranium mine against the results of our work and the accounting requirements.

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3. KEY AUDIT MATTERS (CONTINUED)

3.2 Evaluation of certain provisions for close-down, restoration and environmental obligations ('closure provisions') (continued)

Communications with Rio Tinto's Audit Committee

We discussed with and reported to the Audit Committee:

- Key procedures performed which included evaluating the scope, competency and objectivity of the Group's experts, who produce the cost estimates, comparing historical forecast cost assumptions to actual costs, inspecting most recent closure studies, and comparing the nature, timing and the estimated closure costs included in the studies with those used in the calculation of the provision.
- Involvement of our valuation professionals assisting in assessing the discount rates applied by the Group.
- Involvement of our environmental professionals for Pilbara, Gove and ERA who assisted us in assessing certain assumptions regarding the forecast closure costs of closure activities.

Based on the risk identified and our procedures performed, we consider that the level of provisions for close-down, restoration and environmental obligations and related disclosures to be acceptable.

3.3 Evaluation of provisions for uncertain tax positions

Financial statement elements	Our results
Provisions for uncertain tax positions	FY21: Acceptable (FY20: Acceptable)

Description of the key audit matter

The Group operates across multiple tax jurisdictions and is subject to periodic challenge by local tax authorities on a range of tax matters including transfer pricing, royalties, other resource and production-based taxes, and indirect taxes.

Where the amount of tax payable is uncertain, the Group establishes provisions based on judgment and estimates relating to tax law, settlement negotiations or changes in legislation. The Group maintains material provisions for uncertain tax positions.

We focused our work on the Group's uncertain tax positions associated to disputes with the Australian Taxation Office (ATO) related to transfer pricing and related issues and with the Mongolian Tax Authority regarding transaction related issues.

As part of our risk assessment, we determined that these uncertain tax positions have a high degree of estimation uncertainty with a wide range of potential outcomes. The evaluation of these provisions for uncertain tax positions is a key audit matter due to the judgment, estimation uncertainty and specialised skills involved in auditing these provisions for uncertain tax positions.

Refer to notes 1(n) and 9, and the Audit Committee's views set out on page 153.

Our response to the risk

Our procedures to address the risk included:

Control operation

Evaluating the design and testing the operating effectiveness of certain internal controls related to the tax process, including controls over the assessment of provisions for uncertain tax positions.

Our taxation expertise

We involved our own tax professionals with specialised skills and knowledge of the application of legislation by the relevant tax authorities, knowledge of tax audits and relevant compliance programmes. They assisted us in challenging the Group's assessment of uncertain tax positions including assumptions applied and estimates made associated to its disputes with the Australian Taxation Office and Mongolian Tax Authority, which included:

- assessing the implications of results of historical tax audits, and outcomes from comparable situations for the positions taken by the Group; and
- inspecting internally and externally prepared documentation, including correspondence with tax authorities, transfer pricing documentation and third - party tax advice received by the Group, to evaluate the Group's current disputes and uncertain tax positions.

Assessing disclosures

We assessed the appropriateness of the Group's tax disclosures in notes 1(n) and 9 of the financial statements against the accounting requirements and the results of our work.

3. KEY AUDIT MATTERS (CONTINUED)

3.3 Evaluation of provisions for uncertain tax positions (continued)

Communications with Rio Tinto’s Audit Committee

We discussed with and reported to the Audit Committee:

- How we considered specific external advice obtained by the Group in respect of these disputes regarding our view on the appropriateness of provisioning.
- How we considered the merits of the technical tax positions adopted by the Group, having regard to relevant tax legislation and case law, in determining the Group’s tax provisions.
- The Group’s history of resolving disputes with tax authorities.

Based on the risk identified and our procedures performed, we consider that the level of tax provisioning and related disclosures to be acceptable.

3.4 Evaluation of recoverability of Rio Tinto plc’s investments in subsidiaries (KPMG UK only)

Financial statement elements	Our results
Carrying value of Rio Tinto plc’s investments in Group companies, for FY21 is US$36,280m (2020: US$ 36,320m)	FY21: Acceptable (FY20: Acceptable)

Description of the key audit matter	Our response to the risk
In respect of KPMG UK’s audit of the UK parent company, Rio Tinto plc, the sole key audit matter relates to the recoverability of its investment in its subsidiaries of the Group. Their recoverability is not at a high risk of significant misstatement or subject to significant judgment. However, due to the value of these investments in the context of the UK parent company, Rio Tinto plc’s financial statements, this is the area that had the greatest effect overall on our UK parent company audit.	We performed the tests below rather than seeking to rely on any of the company’s controls because the nature of the balance is such that we would expect to obtain audit evidence primarily through the detailed procedures described. Our procedures to address the risk included: Tests of detail Comparing the carrying amount of its investments with the relevant subsidiaries’ draft balance sheet to identify whether their net assets, being an approximation of their minimum recoverable amount, were in excess of their carrying amount and assessing whether those subsidiaries have historically been profit-making.

Communications with Rio Tinto’s Audit Committee

We reported to the Audit Committee that based on the risk identified and our procedures performed, we found the company’s conclusion that there is no impairment of its investments in subsidiaries to be acceptable.

4. THE IMPACT OF CLIMATE CHANGE ON OUR AUDIT

In planning our audit, we considered the potential impacts of climate change on the Group’s business and its financial statements, based on our knowledge of the Group’s operations and their stated strategy with respect to climate change.

The context of climate change for the Group

Unlike some other major resources companies, the Group does not mine or extract hydrocarbons such as coal, natural gas, or oil but it does emit greenhouse gases directly from energy used in its mining operations, the processing of metals and minerals, and the transportation of its products. Some of the Group’s products are used in energy and carbon intensive industries including steel and aluminium production. Other of the Group’s products, such as copper, are expected to continue to be important in the transition to a low-carbon economy.

As explained in note 1 of the Group’s financial statements, in October 2021 the Group announced updated targets to reduce scope 1 and 2 carbon emissions relative to its 2018 baseline by 15% in 2025, by 50% in 2030 and to achieve net zero emissions across its operations by 2050. The Group has disclosed its expectation to make incremental capital expenditure of US$7.5 billion associated with key decarbonisation projects to achieve this target by 2030, particularly to enable a move to renewable power, to electrify processing and to run electric mobile fleets.

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4. THE IMPACT OF CLIMATE CHANGE ON OUR AUDIT (CONTINUED)

The Group's assessment of accounting consequences

IFRS requires the Group's financial reporting to be based, amongst other things, on the Group's best estimate of assumptions that are reasonable and supportable as at the date of reporting. Those assumptions may not align with the ways in which the global economy, society and government policies will need to change to meet the targets to limit global warming to 1.5^{o}c which is aligned with the stretch goal of the 2015 COP 21 Paris Agreement.

The Group has set carbon emission targets and estimated the incremental capital and operational expenditure required to deliver those targets. The Group has considered the potential for asset obsolescence or shorter economic lives of its existing property, plant and equipment, particularly with respect to carbon intensive assets such as coal fired power stations and aluminium smelters, but has not yet made any material changes to accounting estimates as a result.

The Group discloses judgments and estimates which are potentially impacted by climate change, including internal commodity pricing estimates and forecast carbon taxes, which are pervasively used in various financial processes of the Group. These processes include, but are not restricted to, impairment assessments for certain CGUs.

The Group has provided more detail on how they have considered climate change in their financial reporting in note 1 of the Group's financial statements. This year the Group has also provided additional disclosures to illustrate the impact of commodity and carbon prices on the net present value of certain CGUs that were subject to impairment tests in the year under a scenario which aligns to the Group's interpretation of "Paris Aligned". More detail on these disclosures can be found in note 6 of the Group's financial statements.

Our audit response

Risk assessment procedures

As part of our risk assessment procedures, we made enquiries, with the assistance of our sustainability specialists, of key members of management. Our enquiries focussed on understanding the Group's climate related strategy and identifying those areas where climate change could have a potential material impact on the financial statements.

We challenged management's assessment that its stated climate change strategy did not result in any impairment trigger or reassessment of useful economic lives on carbon intensive assets in these financial statements, taking into account the remaining life of relevant assets, and headroom on CGUs that could be most impacted by climate change.

We did not identify the impact of climate risk as a separate Key Audit Matter in our audit given the nature of the Group's operations and knowledge gained of its impact on critical accounting estimates and judgements during our risk assessment procedures and testing.

Audit procedures in relation to Key Audit Matters

We did not consider the impact of climate change to be significant to our audit response for the Key Audit Matters relating to closure provisions or uncertain tax matters, but have performed procedures to address the impact of climate change on our Key Audit Matter relating to the evaluation of impairment assessments of property, plant and equipment in certain CGUs, as set out in section 3 of this report. Within that section of our audit report, we explain how we involved our sustainability specialists to compare carbon pricing assumptions in the impairment assessments to publicly available information for certain CGUs in arriving at our audit conclusions.

Other audit procedures

During the course of our audit, we carried out the following additional audit procedures:

- we considered the Group's processes around climate change related disclosures in the Annual Report and read the disclosures in the Strategic Report and Directors' Report and considered its consistency with the financial statements and our audit knowledge;
- we assessed the appropriateness of climate-related financial disclosures, including TCFD recommended disclosures; and
- we assessed the consistency between the Group's estimate of the capital expenditure planned for decarbonisation of US$7.5 billion with the cash flows used in its going concern and viability assessments.

The audit procedures were performed principally by the group engagement team with the support of our sustainability specialists.

5. GOING CONCERN, VIABILITY AND PRINCIPAL RISKS AND UNCERTAINTIES (KPMG UK ONLY)

The Directors have prepared the financial statements on the going concern basis as they do not intend to liquidate the UK parent company or the Group or to cease their operations, and they have concluded that the UK parent company's and the Group's financial position means that this is realistic. They have also concluded that there are no material uncertainties that could have cast significant doubt over their ability to continue as a going concern for at least a year from the date of approval of the financial statements ("the going concern period").

Going concern

Our responsibility

We used our knowledge of the Group, its industry, and the general economic environment to identify the inherent risks to its business model and analysed how those risks might affect the Group's financial resources or ability to continue operations over the going concern period. The risks we consider as most relevant to the level of the Group's financial resources over this period relate to levels of demand and commodity pricing.

We critically assessed the assumptions in the Directors' downside scenarios relevant to liquidity and covenant metrics, in particular in relation to revenue growth by comparing to historical trends and assessing whether downside scenarios applied take into account reasonably possible downsides. The extent of our work was influenced by the level of liquidity.

We assessed the completeness of the going concern disclosure.

Our conclusions

We consider that the Directors' use of the going concern basis of accounting in the preparation of the Group's and UK parent company's financial statements is appropriate.

We have not identified, and concur with the Directors' assessment that there is not, a material uncertainty related to events or conditions that, individually or collectively, may cast significant doubt on the Group's or UK parent company's ability to continue as a going concern for the going concern period.

We have nothing material to add or draw attention to in relation to the Directors' statement in note 1 to the financial statements on the use of the going concern basis of accounting with no material uncertainties that may cast significant doubt over the Group and UK parent company's use of that basis for the going concern period, and we found the going concern disclosure in note 1 to be acceptable.

The related statement under the UK Listing Rules set out on page 199 is materially consistent with the financial statements and our audit knowledge.

However, as we cannot predict all future events or conditions and as subsequent events may result in outcomes that are inconsistent with judgments that were reasonable at the time they were made, the above conclusions are not a guarantee that the Group or the UK parent company will continue in operation.

Disclosures on emerging and principal risks and longer-term viability

Our responsibility

We are required to perform procedures to identify whether there is a material inconsistency between the Directors' disclosures in respect of emerging and principal risks and the viability statement, and the financial statements and our audit knowledge.

Our reporting

Based on the knowledge we acquired during our financial statement audit, we have nothing further to add or draw attention to in relation to:

- the Directors' confirmation within the viability statement that they have carried out a robust assessment of the emerging and principal risks facing the Group, including those that would threaten its business model, future performance, solvency and liquidity;
- the Principal Risks and Uncertainties disclosures describing these risks and explaining how they are being managed and mitigated; and
- the Directors' explanation in the viability statement of how they have assessed the prospects of the Group, over what period they have done so and why they considered that period to be appropriate, and their statement as to whether they have a reasonable expectation that the Group will be able to continue in operation and meet its liabilities as they fall due over the period of their assessment, including any related disclosures drawing attention to any necessary qualifications or assumptions.

Under the UK Listing Rules we are also required to review the Viability Statement set out on page 115. Based on the above procedures, we have concluded that the above disclosures are materially consistent with the financial statements and our audit knowledge.

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5. GOING CONCERN, VIABILITY AND PRINCIPAL RISKS AND UNCERTAINTIES (KPMG UK ONLY) (CONTINUED)

Disclosures on emerging and principal risks and longer-term viability (continued)

Our reporting

Our work is limited to assessing these matters in the context of only the knowledge acquired during our financial statement audit. As we cannot predict all future events or conditions and as subsequent events may result in outcomes that are inconsistent with judgments that were reasonable at the time they were made, the absence of anything to report on these statements is not a guarantee as to the Group's and UK parent company's longer-term viability.

6. KPMG UK'S REPORTING ON OUR ABILITY TO DETECT IRREGULARITIES, AND OUR RESPONSE

Fraud – Identifying and responding to risks of material misstatements due to fraud

Fraud risk assessment

To identify risks of material misstatement due to fraud ("fraud risks") we assessed events or conditions that could indicate an incentive or pressure by the Directors and other management to commit, or provide an opportunity to commit, fraud. Our risk assessment procedures included:

- Enquiries of the Directors, other management, internal audit and the Audit Committee, including obtaining and reviewing supporting documentation, concerning the Group's policies and procedures relating to:
  - detecting and responding to the risks of fraud; and
  - internal controls established to mitigate risks related to fraud;
- Enquiries of the Directors, other management, internal audit and the Audit Committee as to whether they had knowledge of any actual, suspected or alleged fraud;
- Reading Board and Audit Committee minutes;
- Considering remuneration incentive schemes and performance targets for Directors and other management, including the flexed and unflexed underlying earnings and STIP free cash flow target ranges for executive remuneration; and
- Discussions among the engagement team regarding how and where fraud might occur in the financial statements and any potential indicators of fraud. The engagement team includes audit partners and staff who have extensive experience of working with companies in the mining sector, and this experience was relevant to the discussion about where fraud risks may arise. The discussions also involved our own forensic specialists to assist us in identifying fraud risks based on discussions of the circumstances of the Group, who advised the engagement team of fraud schemes that had arisen in similar sectors and industries and participated in the initial fraud risk assessment discussions.

Risk communications

We communicated identified fraud risks throughout the audit team and remained alert to any indications of fraud throughout the audit. This included communication from the group audit team to component audit teams of relevant fraud risks identified at the group level and requests to component audit teams to report to the group audit team any instances of fraud that could give rise to a material misstatement of the Group financial statements.

Fraud risks

As required by UK auditing standards we addressed the risk of management override of controls and the risk of fraudulent revenue recognition. In particular we considered the risk that revenue is recorded in the wrong period, specifically overstated and the risk that Group and component management may be in a position to make inappropriate accounting entries, and the risk of bias in accounting estimates and judgments.

6. KPMG UK'S REPORTING ON OUR ABILITY TO DETECT IRREGULARITIES, AND OUR RESPONSE (CONTINUED)

Fraud – Identifying and responding to risks of material misstatements due to fraud (continued)

Procedures to address fraud risks	Our audit procedures included evaluating the design, implementation, and operating effectiveness of internal controls relevant to mitigate these risks. We also performed substantive audit procedures including: • Comparing journal entries to supporting documentation for a selection based on risk including, for example, those posted by senior finance management, those posted to unusual accounts or those containing unusual journal descriptions; • Assessing significant accounting estimates for bias; • Obtaining third party confirmations for all material cash balances; and • Assessing when revenue was recognised, particularly focusing on revenue recognised in the days before and after the year end date, and whether it was recognised in the appropriate year. Work on the fraud risks was performed by a combination of component auditors and the group audit team.

Laws and regulations – Identifying and responding to risks of material misstatement due to non-compliance with laws and regulations

Risk assessment	We identified areas of laws and regulations that could reasonably be expected to have a material effect on the financial statements. For this risk assessment, matters considered included the following: • our general commercial and mining sector experience; • through discussion with the Directors and other management (as required by auditing standards); • from inspection of the Group's regulatory and legal correspondence; and • discussions with the Directors and other management about the policies and procedures regarding compliance with laws and regulations. As the Group operates in a regulated environment, our assessment of risks of material misstatement also involved gaining an understanding of control environment including the Group's higher-level procedures for complying with regulatory requirements.

Risk communication	Our communication of identified laws and regulations risks was made throughout our team and we remained alert to any indications of non-compliance throughout the audit. This included communication from the group audit team to all component audit teams of relevant laws and regulations identified at group level, and a request for component auditors to report to the group audit team any instances of non-compliance with laws and regulations that could give rise to a material misstatement of the Group financial statements.

Direct laws context and link to audit	The potential effect of these laws and regulations on the financial statements varies considerably. Firstly, the Group is subject to laws and regulations that directly affect the financial statements including: • financial reporting legislation (including related companies' legislation); • distributable profits legislation; • taxation legislation (direct and indirect); and • pensions legislation. We assessed the extent of compliance with these laws and regulations as part of our procedures on the related financial statement items.

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6. KPMG UK'S REPORTING ON OUR ABILITY TO DETECT IRREGULARITIES, AND OUR RESPONSE (CONTINUED)

Laws and regulations – Identifying and responding to risks of material misstatement due to non-compliance with laws and regulations (continued)

Most significant indirect law/regulation areas	Secondly, the Group is subject to many other laws and regulations where the consequences of non-compliance could have a material effect on amounts or disclosures in the financial statements, for instance through the imposition of fines or litigation or harm to the Group's license to operate. We identified the following areas as those most likely to have such an effect: • anti-bribery, fraud and corruption; • health and safety legislation; • employment and social security legislation; • environmental protection legislation; and • competition legislation. Auditing standards limit the required audit procedures to identify non-compliance with these laws and regulations to enquiry of the Directors and other management and inspection of regulatory and legal correspondence, if any. Therefore, if a breach of law or regulations is not disclosed to us or evident from relevant correspondence, our audit will not detect that breach. For the contingent liabilities disclosed in note 30 we assessed disclosures against our understanding from legal confirmations received from external counsel. For the uncertain tax positions referred to in note 1 we performed procedures as detailed in our key audit matter (page 329).

Context of the ability of the audit to detect fraud or breaches of law or regulation

Owing to the inherent limitations of an audit, there is an unavoidable risk that we may not have detected some material misstatements in the financial statements, even though we have properly planned and performed our audit in accordance with auditing standards. For example, the further removed non-compliance with laws and regulations is from the events and transactions reflected in the financial statements, the less likely the inherently limited procedures required by UK auditing standards would identify it.

In addition, as with any audit, there remained a higher risk of non-detection of fraud, as these may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls. Our audit procedures are designed to detect material misstatement. We are not responsible for preventing non-compliance or fraud and cannot be expected to detect non-compliance with all laws and regulations.

7. OUR DETERMINATION OF MATERIALITY

The scope of our audit was influenced by our application of materiality. We set quantitative thresholds and overlay qualitative considerations to help us determine the scope of our audit and the nature, timing and extent of our procedures, and in evaluating the effect of misstatements, both individually and in the aggregate, on the financial statements as a whole.

US$700m **(2020: US$550m)** **Materiality for the financial statements as a whole**	**What we mean by materiality** This is the amount representing the total magnitude of misstatements that we expect to influence the economic decisions of the users of these financial statements.
	Basis for determining materiality and judgments applied Our assessment of overall group materiality was US$700m (2020: US$550m). This was derived from the level of profit before tax excluding certain identified items which could significantly distort results in any one particular year. We consider profit before tax, excluding certain identified items, is a key indicator of performance, the basis for earnings, and therefore the primary focus of a reasonable investor. We have checked analyst consensus data and other investor commentary for signals of alternate significant influencers of economic decisions. No revisions to our calculation methodology resulted therefrom. The certain identified item excluded in FY21 was: • net pre-tax impairments US$269m charge (2020: US$1,243m charge) Materiality of US$700m (2020: US$550m) was determined by applying a percentage to the profit before tax, excluding certain identified items US$31,102m (2020: US$16,634m). Materiality for the Rio Tinto plc company financial statements as a whole was set at US$500m (2020: US$340m), determined with reference to a benchmark of the UK parent company's total assets of which it represents 0.9% (2020: 0.8%).

7. OUR DETERMINATION OF MATERIALITY (CONTINUED)

US$525m **(2020: US$358m)** **Performance materiality**	**What we mean by performance materiality** Our procedures on individual account balances and disclosures were performed to performance materiality, to reduce to an acceptable level the risk that individually immaterial misstatements in individual account balances might add up to a material amount across the financial statements as a whole.
	Basis for determining performance materiality and judgments applied We have considered performance materiality at a level of 75% (2020: 65%) of materiality for the Rio Tinto Group financial statements as a whole, and for the Rio Tinto plc company financial statements to be appropriate, having taken account of: • The level of audit differences (adjusted and unadjusted) identified during our previous audit; and • Our view of the strength and robustness of the control environment, including the tone at the top and culture of Rio Tinto's organisation as well as control deficiencies identified in previous audits. The level of performance materiality we considered appropriate was lower in FY 20 primarily as it was our first year of audit. Performance materiality for the Rio Tinto plc company financial statements, was set at US$375m (2020: US$221m).

US$35m **(2020: US$25m)** **Audit misstatement posting threshold**	**What we mean by Audit misstatement posting threshold** This is the amount below which identified misstatements are clearly trivial from a quantitative point of view. We may become aware of misstatements below this threshold which could alter the nature, timing and extent of our audit procedures, for example if we identify smaller misstatements which are indicators of fraud. This is also the amount above which all misstatements identified are communicated to Rio Tinto's Audit Committee.
	Basis for determining the audit misstatement reporting threshold and judgments applied We set our audit misstatement posting at 5% of our materiality, rounded down to US$35m (2020: US$25m). We also report to the Audit Committee any items that warrant reporting on qualitative grounds.

Materiality for the Group financial statements was set at US$700m (2020: US$550m) which compared to the following main Financial Statement caption amounts as follows:

		Total Group revenue	Group profit before tax	Total Group assets
FY21	Financial statement caption	US$63,495m	US$30,833m	US$102,896m
FY21	Group materiality as % of caption	1.1%	2.3%	0.7%
FY20	Financial statement caption	US$44,611m	US$15,391m	US$97,390m
FY20	Group materiality as % of caption	1.2%	3.6%	0.6%

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8. THE SCOPE OF OUR AUDIT

Group scope

What we mean

How we determined the procedures to be performed across the Group:

We performed risk assessment and planning procedures and scoped in:

- Four components, Pilbara Iron Ore, Aluminium Atlantic operations, Oyu Tolgoi and Rio Tinto Treasury UK as individually financially significant components which were subject to full scope audits by component auditors;
- Four further components subject to full scope audits by component auditors;
- Three components subject to 'audit of specific account balance' which are associated with a significant risk in relation to provision for closedown, restoration, and environmental obligations;
- One component subject to 'audit of specific account balance' which is associated with a significant risk in relation to uncertain tax positions; and
- Nine further components subject to 'audits of specific account balance' to ensure sufficient audit coverage.

	Range of component materialities FY21	Number of components (reflecting FY21 reporting structure)	
		FY21	FY20
Full scope audits for group audit purposes	US$70m - US$375m	8	8
Audits of 'specific account balance' for group reporting	US$54m - US$150m	13	12
Total		**21**	**20**

We have also performed audit procedures centrally across the Group, beyond the component scope set out above, in the following areas:

- Testing of IT systems and configurations;
- Consolidation of the financial information;
- Climate considerations and impact on the financial statements;
- Evaluating the Group's uncertain tax position on DLC Dividend financing;
- Identifying journal entries with a defined high-risk criteria; and
- Pensions.

Coverage % on the Group financial statements

	Total Group revenue	Group profit before tax	Total Group assets
Full scope audits for group audit purposes	77% (2020: 68%)	70% (2020: 59%)	64% (2020: 57%)
Audits of 'specific account balance' for group reporting	19% (2020: 23%)	19% (2020: 27%)	23% (2020: 32%)
Out-of-scope	04% (2020: 09%)	11% (2020: 14%)	13% (2020: 11%)

None of the out-of-scope entities individually represented more than 2% (2020: 4%) of any of total Group revenue, total profits and losses making up Group profit before taxation or Group assets. The work on 20 of the 21 in-scope components (2020: 19 of the 20 components, reflecting FY 21 reporting structure) was performed by KPMG member firms. The audit of the UK parent company, Rio Tinto plc company financial statements was performed by the group audit team.

Approach on controls

For the audit of the Group financial statements, we were able to rely upon the Group's internal controls over financial reporting in several areas of our audit, where our controls testing supported this approach, which enabled us to reduce the scope of our substantive audit work; in the other areas the scope of the audit work performed was fully substantive. For the audit of the Rio Tinto plc company financial statements, the scope of the audit work performed was fully substantive as we did not place reliance upon Rio Tinto plc's internal controls over financial reporting.

8. THE SCOPE OF OUR AUDIT (CONTINUED)

<table>
<tr><td rowspan="2">Group audit team oversight</td><td>What we mean
The extent of the Group audit team's involvement in component audits.</td></tr>
<tr><td>As part of determining the scope and preparing our audit plan and strategy, the group audit team held various meetings with our component auditors in UK, Australia, Canada, South Africa, Singapore and Chile to discuss key audit risks and obtain input from component teams.

The group audit team additionally held workshops for all the components whereby the component auditors and the group audit team's discussions included the significant risks, close calls and fraud risk factors.

The group audit team instructed component auditors as to the significant areas to be covered, including the relevant risks detailed above and the information to be reported back. The group audit team approved the component materialities, which ranged from US$54m to US$375m, having regard to the mix of size and risk profile of the components.

It was not practicable in the current environment, due to the coronavirus pandemic and on-going restrictions on movement of people across borders, to travel and physically visit many sites. However, the group audit team was able to visit some sites:

<table>
<tr><th></th><th>2021</th><th>2020</th></tr>
<tr><td>Sites visited</td><td>• Pilbara
• Perth (Southern Hemisphere Hub)</td><td>• Pilbara
• Oyu Tolgoi (Virtual)
• Perth (Southern Hemisphere Hub)</td></tr>
</table>

Aside from the site visits mentioned above, frequent video conference calls were held throughout the audit with the component auditors. During these video conference calls we inspected the component team's key work papers related to significant risks and assessed the appropriateness of conclusions and consistencies between reported findings and work performed.</td></tr>
</table>

9. KPMG AUSTRALIA'S REPORT ON THE DIRECTORS REMUNERATION REPORT

Opinion	In our opinion, the Remuneration Report of Rio Tinto Limited for the year ended 31 December 2021 complies with Section 300A of the Australian Corporations Act 2001.
Our responsibilities	KPMG Australia is required to audit and express an opinion on the Remuneration Report, for the year ended 31 December 2021, included in pages 160 to 198 of the Annual Report, based on its audit conducted in accordance with Australian Auditing Standards.
Directors' responsibilities	The Directors of Rio Tinto Limited are responsible for the preparation and presentation of the Remuneration Report in accordance with Section 300A of the Corporations Act 2001.

Independent auditors' reports

of KPMG LLP ('KPMG UK') to the members of Rio Tinto plc

and of KPMG ('KPMG Australia') to the members of Rio Tinto Limited

10. OTHER INFORMATION IN THE ANNUAL REPORT

The Directors are responsible for the other information presented in the Annual Report together with the financial statements. Other Information is financial and non-financial information in Rio Tinto's annual reporting which is provided in addition to the financial statements and the Auditors' Report. Our opinion on the financial statements does not cover the other information and, accordingly, we do not express an audit opinion or, except as explicitly stated below, or any form of assurance conclusion thereon except for KPMG UK's opinion on disclosures of emerging and principal risks and longer-term viability and KPMG Australia's report on the directors' remuneration report and its related assurance opinion stated above.

All other information

Our responsibility	Our reporting
Our responsibility is to read the other information and, in doing so, consider whether, based on our financial statements audit work, the information is materially misstated or inconsistent with the financial statements or our audit knowledge and report such misstatements or inconsistencies.	Based solely on that work we have not identified material misstatements or inconsistencies in the other information.

Strategic report and directors' report (KPMG UK only)

Our responsibility	Our reporting
Based solely on our work on the other information described above we are required to report:	
• if we have identified material misstatements in the strategic report and the directors' report;	No material misstatements noted.
• if in our opinion the information given in those reports for FY21 is consistent with the financial statements; and	Information in those reports for FY21 is consistent with the financial statements.
• if in our opinion those reports have been prepared in accordance with the Companies Act 2006.	Those reports have been prepared in accordance with Companies Act 2006.

Directors' remuneration report (KPMG UK only)

Our responsibility	Our reporting
KPMG UK is required to form an opinion as to whether the part of the Directors' Remuneration Report to be audited has been properly prepared in accordance with the Companies Act 2006.	In our opinion the part of the Directors' Remuneration Report to be audited has been properly prepared in accordance with the Companies Act 2006.

Corporate governance disclosures (KPMG UK only)

Our responsibility	Our reporting
We are required to perform procedures to identify whether there is a material inconsistency between the financial statements and our audit knowledge, and: • the Directors' statement that they consider that the annual report and financial statements taken as a whole is fair, balanced and understandable, and provides the information necessary for the Rio Tinto plc's members to assess the Group's position and performance, business model and strategy; • the section of the annual report describing the work of the Audit Committee, including the significant issues that the Audit Committee considered in relation to the financial statements, and how these issues were addressed; and • the section of the annual report that describes the review of the effectiveness of the Group's risk management and internal control systems.	Based on those procedures, we have concluded that each of these disclosures is materially consistent with the financial statements and our audit knowledge.
We are also required to review the part of Corporate Governance Statement relating to the Group's compliance with the provisions of the UK Corporate Governance Code specified by the UK Listing Rules for our review, and to report if a corporate governance statement has not been prepared by the company.	We have nothing to report in this respect.

10. OTHER INFORMATION IN THE ANNUAL REPORT (CONTINUED)

Other matters on which we are required to report by exception (KPMG UK only)	
Our responsibility Under the Companies Act 2006, we are required to report to you if, in our opinion: ▪ adequate accounting records have not been kept by the UK parent company, or returns adequate for our audit have not been received from branches not visited by us; or ▪ the UK parent company financial statements and the part of the Directors' Remuneration Report to be audited are not in agreement with the accounting records and returns; or ▪ certain disclosures of Directors' remuneration specified by law are not made; or ▪ we have not received all the information and explanations we require for our audit.	**Our reporting** We have nothing to report in these respects.

11. RESPECTIVE RESPONSIBILITIES

Directors' responsibilities for the financial statements

As explained more fully in their statement set out on page 322 of the financial statements, the Directors are responsible for: the preparation of the financial statements, including being satisfied that they give a true and fair view in accordance with the relevant financial reporting frameworks; implementing such internal control as they determine is necessary to enable the preparation of financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error; assessing the Group, Rio Tinto plc's and Rio Tinto Limited's ability to continue as a going concern and whether the use of the going concern basis of accounting is appropriate, disclosing, as applicable, matters related to going concern; and using the going concern basis of accounting unless they either intend to liquidate the Group, Rio Tinto plc and Rio Tinto Limited or to cease operations, or have no realistic alternative but to do so.

Auditors' responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or other irregularities, or error, and to issue our opinions in an auditor's report. Reasonable assurance is a high level of assurance, but does not guarantee that an audit conducted in accordance with ISAs (UK) and ASAs will always detect a material misstatement when it exists. Misstatements can arise from fraud, other irregularities or error and are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

A fuller description of KPMG UK's responsibilities is provided on the FRC's website at www.frc.org.uk/auditorsresponsibilities. A further description of KPMG Australia's responsibilities for the audit of the Financial Statements is located at the Auditing and Assurance Standards Board website at: https://www.auasb.gov.au/admin/file/content102/c3/ar1_2020.pdf. This description forms part of our Australian auditor's report.

Independent auditors' reports

of KPMG LLP ('KPMG UK') to the members of Rio Tinto plc

and of KPMG ('KPMG Australia') to the members of Rio Tinto Limited

12. THE PURPOSE OF OUR AUDIT WORK AND TO WHOM WE OWE OUR RESPONSIBILITIES

KPMG UK's report is made solely to Rio Tinto plc's members, as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006 and the terms of our engagement by that company. Our audit work has been undertaken so that we might state to the members of Rio Tinto plc those matters we are required to state to them in an auditor's report, and the further matters we are required to state to them in accordance with the terms agreed with Rio Tinto plc, and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than Rio Tinto plc's members, as a body, for our audit work, for this report, or for the opinion we have formed.

KPMG Australia's report is made solely to Rio Tinto Limited's members, as a body, in accordance with the Australian Corporations Act 2001 as amended by the ASIC Order dated 16 July 2021. Our audit work has been undertaken so that we might state to the members of Rio Tinto Limited those matters we are required to state to them in an auditor's report, and the further matters we are required to state to them in accordance with the terms agreed with Rio Tinto Limited, and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than Rio Tinto Limited's members, as a body, for our audit work, for this report, or for the opinion we have formed.

Jonathan Downer (Senior Statutory Auditor)

for and on behalf of KPMG LLP, Statutory Auditor

Chartered Accountants

London, United Kingdom

23 February 2022

Trevor Hart

Partner

KPMG

Perth, Australia

23 February 2022

Lead Auditor's Independence Declaration under Section 307C of the Australian Corporations Act 2001

To the Directors of Rio Tinto Limited

I declare that, to the best of my knowledge and belief, in relation to the audit of Rio Tinto Limited for the year ended 31 December 2021 there have been:

(a) no contraventions of the auditor independence requirements as set out in the Australian Corporations Act 2001 in relation to the audit; and

(b) no contraventions of any applicable code of professional conduct in relation to the audit.

This declaration is in respect of Rio Tinto Limited and the entities it controlled during the period.

KPMG

KPMG

Trevor Hart

Partner

Perth
23 February 2022

Liability limited by a scheme approved under Professional Standards Legislation

Alternative Performance Measures

The Group presents certain alternative performance measures (APMs) which are reconciled to directly comparable IFRS financial measures below. These APMs are used by management to assess the performance of the business and provide additional information, which investors may find useful. APMs are presented in order to give further insight into the underlying business performance of the Group's operations.

APMs are not consistently defined and calculated by all companies, including those in the Group’s industry. Accordingly, these measures used by the Group may not be comparable with similarly titled measures and disclosures made by other companies. Consequently, these APMs should not be regarded as a substitute for the IFRS measures and should be considered supplementary to those measures.

The following tables present the Group's key financial measures not defined according to IFRS and a reconciliation between those APMs and their nearest respective IFRS measures.

APMs derived from the income statement

The following income statement measures are used by the Group to provide greater understanding of the underlying business performance of its operations and to enhance comparability of reporting periods. They indicate the underlying commercial and operating performance of our assets including revenue generation, productivity and cost management.

Gross product sales

Gross product sales include consolidated sales revenue plus the equivalent sales revenue of equity accounted units in proportion to our equity interest (after adjusting for sales to/from subsidiaries).

Gross product sales measures revenue on a basis that is comparable to our Underlying EBITDA metric.

	2021 US$m	2020 US$m	2019 US$m
Consolidated sales revenue	**63,495**	44,611	43,165
Share of equity accounted unit sales and inter-subsidiary/equity accounted unit sales	**3,073**	2,407	2,202
Gross product sales	**66,568**	47,018	45,367

Underlying EBITDA

Underlying EBITDA represents profit before tax, net finance items, depreciation and amortisation excluding the EBITDA impact of the same items that are excluded in arriving at underlying earnings (as defined on page 345).

	2021 US$m	2020 US$m	2019 US$m
Profit after tax	**22,575**	10,400	6,972
Depreciation and amortisation in subsidiaries excluding capitalised depreciation	**4,525**	4,074	4,272
Depreciation and amortisation in equity accounted units	**497**	576	653
Finance items in subsidiaries	**26**	1,751	648
Taxation in subsidiaries	**8,258**	4,991	4,147
Taxation and finance items in equity accounted units	**759**	443	296
Impairment charges net of reversals	**269**	1,272	3,487
Gain on recognition of a new wharf at Kitimat, Canada	**(336)**	—	—
Losses/(gains) on embedded commodity derivatives not qualifying for hedge accounting (including exchange)	**51**	(6)	260
Net losses on consolidation and disposal of interests in businesses	**—**	—	291
Other exclusions	**—**	—	171
Change in closure estimates (non-operating and fully impaired sites)	**1,096**	401	—
Underlying EBITDA	**37,720**	23,902	21,197

Alternative Performance Measures

Underlying EBITDA margin

Underlying EBITDA margin is defined as Group underlying EBITDA divided by gross product sales.

	2021 US$m	2020 US$m	2019 US$m
Underlying EBITDA	**37,720**	23,902	21,197
Gross product sales	**66,568**	47,018	45,367
Underlying EBITDA margin	**57 %**	51 %	47 %

Pilbara underlying FOB EBITDA margin

The Pilbara underlying free on board (FOB) EBITDA margin is defined as Pilbara underlying EBITDA divided by Pilbara gross product sales, excluding freight revenue.

	2021 US$m	2020 US$m	2019 US$m
Pilbara			
Underlying EBITDA	**27,837**	18,896	15,936
Pilbara gross product sales	**39,111**	27,027	23,681
Less: Freight revenue	**(2,707)**	(1,487)	(1,671)
Pilbara gross product sales, excluding freight revenue	**36,404**	25,540	22,010
Pilbara underlying FOB EBITDA margin	**76 %**	74 %	72 %

Underlying EBITDA margin from Aluminium integrated operations

Underlying EBITDA margin from integrated operations is defined as underlying EBITDA divided by gross product sales.

	2021 US$m	2020 US$m	2019 US$m
Aluminium			
Underlying EBITDA - integrated operations	**4,487**	2,227	2,375
Gross product sales - integrated operations	**11,881**	8,458	9,275
Underlying EBITDA margin from integrated operations	**38 %**	26 %	26 %

Underlying EBITDA margin (product group operations)

Underlying EBITDA margin (product group operations) is defined as underlying EBITDA divided by gross product sales.

		Adjusted[(a)]	Adjusted[(a)]
	2021 US$m	2020 US$m	2019 US$m
Copper			
Underlying EBITDA - product group operations	**4,368**	2,440	2,234
Gross product sales - product group operations	**7,434**	4,903	5,181
Underlying EBITDA margin - product group operations	**59 %**	50 %	43 %

		Adjusted[(a)]	Adjusted[(a)]
	2021 US$m	2020 US$m	2019 US$m
Minerals			
Underlying EBITDA - product group operations	**2,765**	1,815	1,966
Gross product sales - product group operations	**6,410**	5,118	5,339
Underlying EBITDA margin - product group operations	**43 %**	35 %	37 %

(a) The comparatives have been recast in accordance with the organisational restructure announced on 28 January 2021.The main impacts are as follows: Simandou has moved from the previous Energy & Minerals product group to the Copper product group; Uranium has moved from the previous Energy & Minerals product group to Other Operations; Diamonds has moved from the previous Copper & Diamonds product group to the Minerals product group; the Minerals product group retains the Argyle residual operations and from 1 January 2021, Argyle closure has moved to Other Operations. Argyle residual operations includes activity relating to the sale of remaining diamond inventory and property held. Argyle closure include activity relating to the management and execution of the Argyle mine closure obligations and management of entities with interests in state and traditional owner agreements and licences. As a result of these changes, the Copper & Diamonds segment is renamed Copper and the Energy & Minerals segment is renamed Minerals from 2021.

Underlying earnings

Underlying earnings represent net earnings attributable to the owners of Rio Tinto, adjusted to exclude items, which do not reflect the underlying performance of the Group's operations.

Exclusions from underlying earnings are those gains and losses, that individually, or in aggregate with similar items, are of a nature and size to require exclusion in order to provide additional insight into underlying business performance.

The following items are excluded from net earnings in arriving at underlying earnings in each period irrespective of materiality:

- Net gains/(losses) on disposal of interests in businesses.
- Impairment charges and reversals.
- Profit/(loss) after tax from discontinued operations.
- Exchange and derivative gains and losses. This exclusion includes exchange gains/(losses) on external net debt and intragroup balances, unrealised gains/(losses) on currency and interest rate derivatives not qualifying for hedge accounting, unrealised gains/(losses) on certain commodity derivatives not qualifying for hedge accounting, and unrealised gains/(losses) on embedded derivatives not qualifying for hedge accounting.
- Adjustments to closure provisions where the adjustment is associated to an impairment charge, for legacy sites where the disturbance or environmental contamination relates to the pre-acquisition period.

The reconciliation of underlying earnings to net earnings can be found in note 2.

Basic underlying earnings per share

Basic underlying earnings per share is calculated as underlying earnings divided by the weighted average number of shares outstanding during the year.

On a per share basis, this allows the comparability of underlying financial performance adjusted to exclude items, which do not reflect the underlying performance of the Group's operations.

	2021 (cents)	2020 (cents)
Basic earnings per ordinary share	**1,303.4**	604.0
Items excluded from underlying earnings per share	**17.7**	165.6
Basic underlying earnings per ordinary share	**1,321.1**	769.6

Interest cover

Interest cover is a financial metric used when managing our risk. It represents the number of times finance income and finance costs (including amounts capitalised) is covered by profit before taxation before finance income, finance costs, share of profit after tax of equity accounted units and items excluded from underlying earnings, plus dividends from equity accounted units.

	2021 US$m	2020 US$m
Profit before taxation	**30,833**	15,391
Add back		
Finance income	**(64)**	(141)
Finance costs	**243**	268
Share of profit after tax of equity accounted units	**(1,042)**	(652)
Items excluded from underlying earnings	**508**	2,891
Add: Dividends from equity accounted units	**1,431**	594
Calculated earnings	**31,909**	18,351
Finance income	**64**	141
Finance costs	**(243)**	(268)
Add: Amounts capitalised	**(358)**	(340)
Total Finance income/costs before capitalisation	**(537)**	(467)
Interest cover	**59**	39

Alternative Performance Measures

Payout ratio

The payout ratio is used by us to guide the dividend policy we implemented in 2016, with which we have sought to return 40-60% of underlying earnings, on average through the cycle to shareholders as dividends. It is calculated as total equity dividends per share to owners of Rio Tinto declared in respect of the financial year divided by underlying earnings per share (as defined above). Dividends declared usually include an interim dividend paid in the year, and a final dividend paid after the end of the year. Any special dividends declared in respect of the financial year are also included.

	2021 (cents)	2020 (cents)
Interim dividend declared per share	**376.0**	155.0
Interim special dividend declared per share	**185.0**	—
Final dividend declared per share	**417.0**	309.0
Final special dividend declared per share	**62.0**	93.0
Total dividend declared per share for the year	**1,040.0**	557.0
Underlying earnings per share	**1,321.1**	769.6
Payout ratio	**79 %**	72 %

APMs derived from cash flow statement

Capital expenditure

Capital expenditure comprises the net sustaining and development expenditure on property, plant and equipment, and on intangible assets. This is equivalent to “Purchases of property, plant and equipment and intangible assets” in the cash flow statement less “Sales of property, plant and equipment and intangible assets”.

This measure is used to support management's objective of effective and efficient capital allocation as we need to invest in existing assets in order to maintain and improve productive capacity, and in new assets to grow the business.

Free cash flow

Free cash flow is defined as net cash generated from operating activities minus purchases of property, plant and equipment and intangibles and payments of lease principal, plus proceeds from the sale of property, plant and equipment and intangible assets.

This measures the net cash returned by the business after the expenditure of sustaining and development capital. This cash can be used for shareholder returns, reducing debt and other investing/financing activities.

	2021 US$m	2020 US$m	2019 US$m
Net cash generated from operating activities	**25,345**	15,875	14,912
Less: Purchase of property, plant and equipment and intangible assets	**(7,384)**	(6,189)	(5,488)
Less: Lease principal payments	**(358)**	(324)	(315)
Add: Sales of property, plant and equipment and intangible assets	**61**	45	49
Free cash flow	**17,664**	9,407	9,158

APMs derived from the balance sheet

Net cash/(debt)

Net cash/(debt) is total borrowings plus lease liabilities less cash and cash equivalents and other liquid investments, adjusted for derivatives related to net debt.

Net cash/(debt) measures how we are managing our balance sheet and capital structure. Refer to Consolidated net cash/(debt) note for the reconciliation on page 257.

Net gearing ratio

Net gearing ratio is defined as net (cash)/debt divided by the sum of net debt and total equity at the end of each period. It demonstrates the degree to which the Group's operations are funded by debt versus equity.

	2021 US$m	2020 US$m
Net (cash)/debt	**(1,576)**	664
Net (cash)/debt	**(1,576)**	664
Total equity	**56,590**	51,903
Net (cash)/debt plus total equity	**55,014**	52,567
Net gearing ratio	**(3%)**	1%

Underlying return on capital employed

Underlying return on capital employed ("ROCE") is defined as underlying earnings excluding net interest divided by average capital employed (operating assets).

Underlying ROCE measures how efficiently we generate profits from investment in our portfolio of assets.

	2021 US$m	2020 US$m
Profit after tax attributable to owners of Rio Tinto (net earnings)	**21,094**	9,769
Items added back to derive underlying earnings (refer to page 345)	**286**	2,679
Underlying earnings	**21,380**	12,448
Add/(deduct):		
Finance income per the income statement	**(64)**	(141)
Finance costs per the income statement	**243**	268
Tax on finance cost	**(52)**	(38)
Non-controlling interest share of net finance costs	**(64)**	(107)
Net interest cost in equity accounted units (Rio Tinto share)	**32**	32
Net interest	**95**	14
Adjusted underlying earnings	**21,475**	12,462
Equity attributable to owners of Rio Tinto - beginning of the period	**47,054**	40,532
Net debt - beginning of the period	**664**	3,651
Capital employed - beginning of the period	**47,718**	44,183
Equity attributable to owners of Rio Tinto - end of the period	**51,432**	47,054
Net (cash)/debt - end of the period	**(1,576)**	664
Capital employed - end of the period	**49,856**	47,718
Average capital employed	**48,787**	45,951
Underlying return on capital employed	**44 %**	27 %

Financial Summary 2012-2021

US$m	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Gross product sales[a]	55,597	54,575	50,041	36,784	35,336	41,867	42,835	45,367	47,018	**66,568**
Share of equity accounted units' sales revenue and items excluded from underlying earnings	(4,655)	(3,404)	(2,377)	(1,955)	(1,555)	(1,837)	(2,313)	(2,202)	(2,407)	**(3,073)**
Consolidated sales revenue	50,942	51,171	47,664	34,829	33,781	40,030	40,522	43,165	44,611	**63,495**
Underlying profit before interest and tax (PBIT)	13,467	16,039	13,851	7,310	8,053	13,363	13,208	15,979	18,786	**31,938**
Finance costs[b]	(616)	(794)	(967)	(1,076)	(1,360)	(1,090)	(680)	(638)	(504)	**(597)**
Exchange differences and derivatives[c]	695	(3,362)	(2,021)	(3,458)	622	(1,078)	923	(273)	(1,247)	**521**
Other exclusions from underlying earnings	(15,977)	(8,378)	(1,311)	(3,502)	(972)	1,621	4,716	(3,949)	(1,644)	**(1,029)**
Profit/(loss) before tax (PBT)	(2,431)	3,505	9,552	(726)	6,343	12,816	18,167	11,119	15,391	**30,833**
Tax on exclusions	2,896	2,642	423	567	(155)	(596)	(801)	391	204	**224**
Tax on underlying PBT	(3,485)	(5,068)	(3,476)	(1,560)	(1,412)	(3,369)	(3,441)	(4,538)	(5,195)	**(8,482)**
Loss after tax from discontinued operations	(7)	—	—	—	—	—	—	—	—	**—**
Attributable to non-controlling interests	(1)	2,586	28	853	(159)	(89)	(287)	1,038	(631)	**(1,481)**
Net earnings/(loss)	(3,028)	3,665	6,527	(866)	4,617	8,762	13,638	8,010	9,769	**21,094**
Underlying EBITDA	19,245	21,509	19,665	12,621	13,510	18,580	18,136	21,197	23,902	**37,720**
Underlying earnings[d]	9,269	10,217	9,305	4,540	5,100	8,627	8,808	10,373	12,448	**21,380**
Earnings/(loss) per share (basic) – continuing operations	(163.4)c	198.4c	353.1c	(47.5)c	256.9c	490.4c	793.2c	491.4c	604.0c	**1303.4c**
Underlying earnings per share (basic) – continuing operations	501.3c	553.1c	503.4c	248.8c	283.8c	482.8c	512.3c	636.3c	769.6c	**1321.1c**
Dividends per share: declared for year[e]										
Rio Tinto shareholders (US cents)	167.00c	192.00c	215.00c	215.00c	170.00c	290.00c	307.00c	443.00c	557.00c	**1040.00c**
Rio Tinto plc (pence)	106.77p	120.10p	134.88p	143.13p	134.36p	212.56p	232.78p	350.61p	408.37p	**756.42p**
Rio Tinto Limited (Aus. cents)	160.18c	213.14c	256.07c	296.80c	222.75c	366.25c	421.73c	657.32c	733.88c	**1422.90c**
Net assets										
Fixed assets[f]	90,580	81,554	80,669	70,226	68,104	70,735	64,351	64,902	70,347	**72,142**
Other assets less liabilities	8,478	8,224	4,596	4,037	4,128	2,495	2,498	2,314	3,124	**4,411**
Provisions (including deferred tax liabilities)	(22,126)	(18,221)	(18,176)	(16,352)	(16,915)	(18,270)	(17,281)	(18,323)	(20,904)	**(21,539)**
Net cash/(debt)	(19,192)	(18,055)	(12,495)	(13,783)	(9,587)	(3,845)	255	(3,651)	(664)	**1,576**
Non-controlling interests	(11,187)	(7,616)	(8,309)	(6,779)	(6,440)	(6,404)	(6,137)	(4,710)	(4,849)	**(5,158)**
Equity attributable to owners of Rio Tinto	46,553	45,886	46,285	37,349	39,290	44,711	43,686	40,532	47,054	**51,432**
Capital expenditure[g]	(17,615)	(13,001)	(8,162)	(4,685)	(3,012)	(4,482)	(5,430)	(5,488)	(6,189)	**(7,384)**
Acquisitions	(1,335)	4	—	(3)	—	—	(5)	—	—	**—**
Disposals	251	1,896	887	(38)	761	2,675	7,733	(80)	10	**4**
Net cash generated from operating activities[h]	9,430	15,078	14,286	9,383	8,465	13,884	11,821	14,912	15,875	**25,345**
Cash flows before financing activities[i]	(8,813)	4,132	7,783	4,783	6,361	11,511	13,142	9,411	9,319	**18,186**
Ratios										
Net cash/(debt) to total capital[j]	-25%	-25%	-19%	-24%	-17%	-7%	1%	7%	1%	**-3%**
Underlying earnings: owners' equity[k]	19%	22%	20%	11%	13%	21%	20%	25%	28%	**43%**
Interest cover[l]	13	13	13	7	7	14	22	28	39	**59**

(a) Gross product sales include consolidated sales revenue plus the equivalent sales revenue of equity accounted units in proportion to our equity interest (after adjusting for sales to/from subsidiaries).
(b) Finance costs include net interest and amortisation of discount. From 1 January 2019, it also included the impact of adopting IFRS 16 "Leases".
(c) Under IFRS, as defined in note 1, certain gains and losses on currency exchange and on revaluation of derivatives are included in the Group's net earnings/(loss). These items are excluded from underlying earnings.
(d) Underlying earnings is an additional measure of earnings, which is reported by Rio Tinto with its IFRS (as defined in note 1) results to provide greater understanding of the underlying business performance of its operations. It is defined in note 2 to the financial statements. Underlying profit before interest and tax (PBIT) is similar to underlying earnings except that it is stated before interest and tax.
(e) Dividends per share are the amounts declared in respect of each financial year excluding share buy-backs and special dividends relating to the return of divestment proceeds. These usually include an interim dividend paid in the year, a final dividend paid after the end of the year and special dividends where applicable.
(f) Fixed assets include: property, plant and equipment, intangible assets, goodwill, and investments in, and long-term loans to, equity accounted units. From 1 January 2019, it also includes the impact of adopting IFRS 16.
(g) Capital expenditure is presented gross, before taking into account any disposals of property, plant and equipment or intangible assets.
(h) Net cash generated from operating activities represents the cash generated by the Group's consolidated operations, after payment of interest, taxes, and dividends to non-controlling interests in subsidiaries.
(i) Cash flow before financing activities is stated before deducting dividends payable to owners of Rio Tinto.
(j) Total capital comprises equity attributable to owners of Rio Tinto plus net debt and non-controlling interests.
(k) Underlying earnings: owners' equity represents underlying earnings expressed as a percentage of the mean of opening and closing equity attributable to owners of Rio Tinto.
(l) Interest cover is a financial metric used when managing our risk. It represents the number of times finance income and finance costs (including amounts capitalised) is covered by profit before taxation before finance income, finance costs, share of profit after tax of equity accounted units and items excluded from underlying earnings, plus dividends from equity accounted units.

Summary Financial Data in Australian Dollars, Sterling and US Dollars

2021 A$m	2020 A$m	2021 £m	2020 £m		2021 US$m	2020 US$m
84,488	64,577	**46,151**	34,749	Consolidated sales revenue	**63,495**	44,611
88,577	68,061	**48,385**	36,624	Gross product sales	**66,568**	47,018
41,027	22,279	**22,411**	11,989	Profit before tax from continuing operations	**30,833**	15,391
30,039	15,055	**16,409**	8,101	Profit for the year from continuing operations	**22,575**	10,400
28,068	14,141	**15,332**	7,609	Net earnings attributable to Rio Tinto shareholders	**21,094**	9,769
50,191	34,599	**27,417**	18,618	Underlying EBITDA	**37,720**	23,902
28,449	18,019	**15,540**	9,696	Underlying earnings[(a)]	**21,380**	12,448
1734.3c	874.3c	**947.4p**	470.5p	Basic earnings per ordinary share[(b)]	**1303.4c**	604.0c
1757.8c	1114.1c	**960.2p**	599.5p	Basic underlying earnings per ordinary share[(a)(b)]	**1321.1c**	769.6c
				Dividends per share to Rio Tinto shareholders[(c)]		
906.90c	566.21c	**492.70p**	297.21p	- paid – ordinary dividend	**685.0c**	386.0c
370.27c	—	**200.03p**	—	- paid – special dividend	**278.0c**	—
577.04c	397.48c	**306.72p**	221.86p	- proposed – ordinary dividend	**417.0c**	309.0c
85.80c	119.63c	**45.60p**	66.77p	- proposed – special dividend	**62.0c**	93.0c
24,199	13,490	**13,218**	7,259	Cash flow before financing activities	**18,186**	9,319
2,173	(864)	**1,168**	(488)	Net cash/(debt)	**1,576**	(664)
70,906	61,252	**38,108**	34,592	Equity attributable to Rio Tinto shareholders	**51,432**	47,054

(a) Underlying earnings exclude impairments and other charges of US$286 million (2020: US$2,679 million), which are analysed on page 240.
(b) Basic earnings per ordinary share and basic underlying earnings per ordinary share do not recognise the dilution resulting from share options on issue.
(c) The Australian dollar and sterling amounts are based on the US dollar amounts, retranslated at average or closing rates as appropriate, except for the dividends which are the actual amounts.

The financial data above has been extracted from the financial information set out on pages 212-311.

Production, Ore Reserves, Mineral Resources and Operations

Metals and minerals production

		2021 Production		2020 Production		2019 Production	
	Rio Tinto % share[a]	Total	Rio Tinto share	Total	Rio Tinto share	Total	Rio Tinto share
ALUMINA ('000 tonnes)							
Jonquière (Vaudreuil) (Canada)[b]	100.0%	**1,364**	**1,364**	1,424	1,424	1,413	1,413
Jonquière (Vaudreuil) specialty plant (Canada)	100.0%	**107**	**107**	94	94	109	109
Queensland Alumina (Australia)	80.0%	**3,705**	**2,964**	3,701	2,961	3,454	2,763
São Luis (Alumar) (Brazil)	10.0%	**3,662**	**366**	3,848	385	3,679	368
Yarwun (Australia)	100.0%	**3,093**	**3,093**	3,175	3,175	3,091	3,091
Rio Tinto total			**7,894**		8,039		7,744
ALUMINIUM ('000 tonnes)							
Alma (Canada)	100.0%	**471**	**471**	473	473	472	472
Alouette (Sept-Îles) (Canada)	40.0%	**629**	**251**	623	249	602	241
Arvida (Canada)	100.0%	**168**	**168**	169	169	175	175
Arvida AP60 (Canada)	100.0%	**60**	**60**	60	60	60	60
Bécancour (Canada)	25.1%	**463**	**116**	393	98	77	19
Bell Bay (Australia)	100.0%	**189**	**189**	192	192	189	189
Boyne Island (Australia)	59.4%	**502**	**298**	510	303	499	296
Grande-Baie (Canada)	100.0%	**230**	**230**	225	225	233	233
ISAL (Reykjavik) (Iceland)	100.0%	**203**	**203**	183	183	184	184
Kitimat (Canada)	100.0%	**263**	**263**	329	329	385	385
Laterrière (Canada)	100.0%	**252**	**252**	250	250	257	257
Sohar (Oman)	20.0%	**395**	**79**	397	79	391	78
Tiwai Point (New Zealand)	79.4%	**333**	**264**	333	265	351	279
Tomago (Australia)	51.6%	**592**	**305**	592	305	588	303
Rio Tinto total			**3,151**		3,180		3,171
BAUXITE ('000 tonnes)							
Gove (Australia)	100.0%	**11,763**	**11,763**	12,299	12,299	12,201	12,201
Porto Trombetas (MRN) (Brazil)	12.0%	**11,383**	**1,366**	11,629	1,395	11,060	1,327
Sangaredi (Guinea)	23.0%[c]	**15,797**	**7,109**	16,506	7,428	13,701	6,165
Weipa (Australia)	100.0%	**34,088**	**34,088**	35,009	35,009	35,411	35,411
Rio Tinto total			**54,326**		56,131		55,105
BORATES ('000 tonnes)[d]							
Rio Tinto Borates – Boron (US)	100.0%	**488**	**488**	480	480	520	520
COPPER (mined) ('000 tonnes)							
Bingham Canyon (US)	100.0%	**159.4**	**159.4**	140.0	140.0	186.8	186.8
Escondida (Chile)	30.0%	**931.8**	**279.5**	1,125.9	337.8	1,138.6	341.6
Oyu Tolgoi (Mongolia)[e]	33.5%	**163.0**	**54.6**	149.6	50.2	146.3	49.1
Rio Tinto total			**493.5**		527.9		577.4
COPPER (refined) ('000 tonnes)							
Escondida (Chile)	30.0%	**195.3**	**58.6**	233.9	70.2	250.2	75.0
Kennecott (US)	100.0%	**143.3**	**143.3**	84.8	84.8	184.6	184.6
Rio Tinto total			**201.9**		155.0		259.6
DIAMONDS ('000 carats)							
Argyle (Australia)[f]	100.0%	**–**	**–**	10,945	10,945	12,999	12,999
Diavik (Canada)[g]	100.0%	**5,843**	**3,847**	6,218	3,731	6,719	4,031
Rio Tinto total			**3,847**		14,676		17,030
GOLD (mined) ('000 ounces)							
Bingham Canyon (US)	100.0%	**139.5**	**139.5**	171.2	171.2	234.7	234.7
Escondida (Chile)	30.0%	**161.7**	**48.5**	169.5	50.9	246.7	74.0
Oyu Tolgoi (Mongolia)[e]	33.5%	**468.1**	**156.9**	181.9	61.0	241.8	81.1
Rio Tinto total			**344.9**		283.0		389.7
GOLD (refined) ('000 ounces)							
Kennecott (US)	100.0%	**176.4**	**176.4**	117.5	117.5	218.7	218.7
IRON ORE ('000 tonnes)							
Hamersley mines (Australia)	[h]	**199,699**	**199,699**	210,682	210,682	209,392	209,392
Hamersley – Channar (Australia)[i]	100.0%	**10,630**	**10,630**	9,175	6,139	7,970	4,782
Hope Downs (Australia)	50.0%	**49,284**	**24,642**	49,045	24,522	48,264	24,132
Iron Ore Company of Canada (Canada)	58.7%	**16,564**	**9,727**	17,715	10,402	17,943	10,536
Robe River - Robe Valley (Australia)	53.0%	**25,497**	**13,514**	30,295	16,056	26,951	14,284
Robe River - West Angelas (Australia)	53.0%	**34,613**	**18,345**	34,209	18,131	34,086	18,066
Rio Tinto total			**276,557**		285,932		281,192

	Rio Tinto % share[(a)]	2021 Production Total	2021 Production Rio Tinto share	2020 Production Total	2020 Production Rio Tinto share	2019 Production Total	2019 Production Rio Tinto share
MOLYBDENUM (‘000 tonnes)							
Bingham Canyon (US)	100%	**7.6**	**7.6**	20.4	20.4	11.2	11.2
SALT (‘000 tonnes)							
Dampier Salt (Australia)	68.4%	**8,555**	**5,848**	7,111	4,861	7,931	5,422
SILVER (mined) (‘000 ounces)							
Bingham Canyon (US)	100.0%	**2,228**	**2,228**	2,205	2,205	2,815	2,815
Escondida (Chile)	30.0%	**5,305**	**1,591**	6,196	1,859	7,687	2,306
Oyu Tolgoi (Mongolia)[(e)]	33.5%	**977**	**328**	876	293	867	290
Rio Tinto total			**4,148**		4,357		5,412
SILVER (refined) (‘000 ounces)							
Kennecott (US)	100.0%	**2,671**	**2,671**	1,363	1,363	2,853	2,853
TITANIUM DIOXIDE SLAG (‘000 tonnes)							
Rio Tinto Iron & Titanium (Canada/South Africa)[(j)]	100.0%	**1,014**	**1,014**	1,120	1,120	1,206	1,206
URANIUM (‘000 lbs U_3O_8)							
Energy Resources of Australia (Australia)[(k)]	86.3%	**75**	**65**	3,471	2,870	3,860	2,640
Rössing (Namibia)[(l)]	–	**–**	**–**	–	–	3,080	2,114
Rio Tinto total			**65**		2,870		4,754

Production data notes:

Mine production figures for metals refer to the total quantity of metal produced in concentrates, leach liquor or doré bullion irrespective of whether these products are then refined onsite, except for the data for bauxite and iron ore which can represent production of marketable quantities of ore plus concentrates and pellets. Production figures are sometimes more precise than the rounded numbers shown, hence small differences may result from calculation of Rio Tinto share of production.

(a) Rio Tinto percentage share, shown above, is as at the end of 2021. The footnotes below include all ownership changes over the three years.

(b) Jonquière’s (Vaudreuil’s) production shows smelter grade alumina only and excludes hydrate produced and used for specialty alumina.

(c) Rio Tinto has a 22.95% shareholding in the Sangaredi mine but benefits from 45.0% of production.

(d) Borate quantities are expressed as B_2O_3.

(e) Rio Tinto owns a 33.52% indirect interest in Oyu Tolgoi through its 50.79% interest in Turquoise Hill Resources Ltd.

(f) The Argyle diamonds mine closed on 3 November 2020. Production is reported up to that date.

(g) On 17 November 2021, Rio Tinto’s ownership interest in Diavik increased from 60% to 100%. Production is reported including this change from 1 November 2021.

(h) Includes 100% of production from Paraburdoo, Mt Tom Price, Marandoo, Yandicoogina, Brockman, Nammuldi, Silvergrass and the Eastern Range mines. Whilst Rio Tinto owns 54% of the Eastern Range mine, under the terms of the joint venture agreement, Hamersley Iron manages the operation and is obliged to purchase all mine production from the joint venture and therefore all of the production is included in Rio Tinto's share of production.

(i) Rio Tinto’s ownership interest in Channar mine increased from 60% to 100%, following conclusion of its joint venture with Sinosteel Corporation upon reaching planned 290 million tonnes production on 22 October 2020. Production is reported at 100% from this date onward. Historic data is unchanged.

(j) Quantities comprise 100% of Rio Tinto Fer et Titane and Rio Tinto’s 74% share of Richards Bay Minerals’ production. Ilmenite mined in Madagascar is being processed in Canada.

(k) ERA report drummed U_3O_8. ERA ceased processing operations on 8 January 2021, as required by the Ranger Authority. In February 2020, our interest in Energy Resources of Australia (ERA) increased from 68.4% to 86.3% as a result of new ERA shares issued to Rio Tinto under the Entitlement Offer and Underwriting Agreement to raise funds for the rehabilitation of the Ranger Project Area. Production is reported including this change from 1 March 2020.

(l) Rössing report drummed U_3O_8. On 16 July 2019, Rio Tinto completed the sale of its entire interest in the Rössing uranium mine in Namibia to China National Uranium Corporation Limited.

Mineral Resources and Ore Reserves

Mineral Resources and Ore Reserves for Rio Tinto managed operations are reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, December 2012 (the JORC Code) as required by the Australian Securities Exchange (ASX). Rio Tinto also files an annual report on Form 20-F (Form 20-F) with the US Securities and Exchange Commission (SEC) and prepares for the Form 20-F the Mineral Resources and Ore Reserves in accordance with subpart 1300 of Regulation S-K (Regulation S-K). Some variations may occur between the reporting in accordance with the JORC Code and Regulation S-K.

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. Estimates of such material are based largely on geological information with only preliminary consideration of mining, economic and other factors. While in the judgment of the Competent Person there are realistic expectations that all or part of the Mineral Resources will eventually become Proved or Probable Ore Reserves, there is no guarantee that this will occur as the result depends on further technical and economic studies and prevailing economic conditions in the future.

An Ore Reserve is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted. It is defined by studies at Pre-Feasibility or Feasibility level as appropriate, with the application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction can reasonably be justified.

Rio Tinto's Mineral Resources are reported as additional (exclusive) to the reported Ore Reserves.

For Mineral Resource and Ore Reserve reporting, the JORC Code envisages the use of reasonable investment assumptions to test the economic viability of the Ore Reserves and the reasonable prospects of eventual economic extraction for the Mineral Resources. To achieve this, Rio Tinto uses internally generated projected long-term commodity prices.

Regulation S-K requires the use of a justifiable commodity price to test the economic viability of the Mineral Reserves and the reasonable prospects of economic extraction for the Mineral Resources, and prices used in calculating the estimates must be disclosed. As a result of the commercial sensitivity of Rio Tinto's long-term commodity prices, Rio Tinto uses commercially available consensus pricing or historical pricing for SEC reporting. For this reason and others, some Mineral Reserves reported to the SEC in the Form 20-F may differ from those Ore Reserves reported below.

Mineral Resource and Ore Reserve information in the tables below is based on information compiled by Competent Persons (as defined by the JORC Code), most of whom are full time employees of Rio Tinto or related companies. Each has had a minimum of five years' relevant experience and is a member of a recognised professional body whose members are bound by a professional code of ethics; being members of The Australasian Institute of Mining and Metallurgy (the AusIMM), Australian Institute of Geoscientists (AIG) or recognised professional organisations (RPOs). Each Competent Person consents to the inclusion in this Annual Report of information they have provided in the form and context in which it appears. Competent Persons responsible for the estimates are listed on pages 378-379, by operation, along with their professional affiliation, employer, and accountability for Mineral Resources and/or Ore Reserves.

Mineral Resources and Ore Reserves from externally managed operations, in which Rio Tinto holds a minority share, are reported as received from the managing entity and in accordance with the JORC code.

Figures from our managed operations are the responsibility of the managing directors of the business units and estimates are carried out by the Competent Persons.

The Mineral Resource and Ore Reserve figures in the following tables are as of 31 December 2021. Summary data for year end 2020 are shown for comparison. Metric units are used throughout. The figures used to calculate Rio Tinto's Mineral Resources and Ore Reserves are more precise than the rounded numbers shown in the tables, hence small differences might result if the calculations are repeated using the tabulated figures.

During 2021, Rio Tinto carried out a periodic review of its Mineral Resource and Ore Reserve reporting including a review of the materiality of various deleterious elements and the level of breakdown provided for each operation or project. As a result of this review, the following changes have been implemented for 2021 annual reporting:

- Iron Ore – Pilbara operations: Silica, alumina, phosphorous and loss on ignition (LOI) are now reported for the Pilbara operations. Previously, deleterious elements were not considered material for Pilbara operations due to the integrated nature and blending practices. As such, providing these details at the deposit level had the potential to mislead as ore from individual deposits is blended to create a saleable product. With the changing market conditions, Rio Tinto considers that these deleterious elements are becoming more relevant to pricing outcomes and is implementing this revised reporting to provide additional transparency. As the information may still be misleading at a deposit level due to the integration and blending practices, Rio Tinto has moved to reporting the Pilbara as a single integrated property, with breakdown by type of mineralisation, inclusive of deleterious elements. The tonnages attributable to each joint venture are included in the narrative to ensure visibility of this breakdown.
- Iron Ore – Simandou: Reporting of silica, alumina, phosphorous and LOI has been implemented to align with the Pilbara operations reporting.
- Iron Ore – Iron Ore Company of Canada (IOC): Reporting of silica, alumina and phosphorous has been implemented where possible to align with the Pilbara operations reporting. However, Ore Reserves are reported as saleable product (pellets and concentrate) and no meaningful relationship has been established between the product and feed grades of alumina and phosphorus, so these grades cannot be reported for Ore Reserves. Saleable product is produced to meet silica grade specifications, so the Ore Reserve silica grade is the targeted silica grade for the currently anticipated long-term product mix. LOI is not determined for resource drilling samples, so no estimate of LOI is available for Ore Reserves or Mineral Resources.
- Bauxite: Total silica is now reported for all Rio Tinto Aluminium operations. In the past, this was not considered material as the majority of the bauxite sales were part of an integrated business. Over time, more bauxite has been sold externally and hence silica reporting is now considered to be more material. This is also better aligned with current industry practice.

With the change in reporting practices outlined above, Rio Tinto has also redesigned the Mineral Resource and Ore Reserve tables to report all variables by operation and project rather than the previous practice of reporting each economic variable separately. The 2020 Mineral Resource and Ore Reserve numbers are also shown in the revised format for ease of reconciliation.

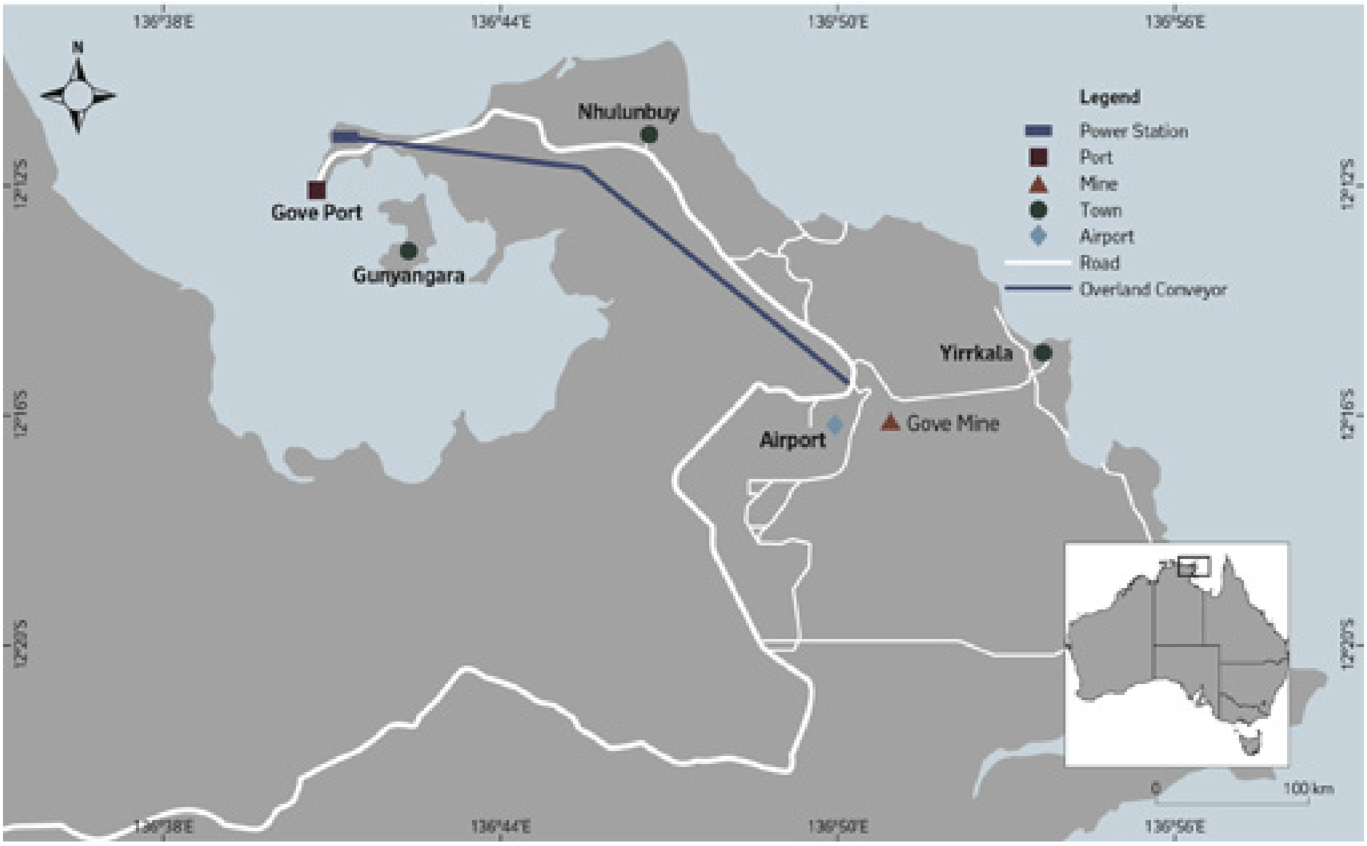
JORC Table 1 reports for new or materially upgraded significant deposits are released to the market; they are also available at riotinto.com. JORC Table 1, SEC Technical Report Summaries and NI 43-101 technical reports generated by non-managed units or joint venture partners are referenced within the reporting footnotes with the location and initial reporting date identified.

Ore Reserves

	Type of mine(a)	Proved ore reserves as at 31 December 2021			Probable ore reserves as at 31 December 2021		
		Tonnage	Grade		Tonnage	Grade	
Bauxite(b)		Mt	% Al_2O_3	% SiO_2	Mt	% Al_2O_3	% SiO_2
Rio Tinto Aluminium (Australia)(c)							
– Amrun(d)	O/P	258	54.2	9.2	568	54.9	9.1
– East Weipa and Andoom(d)	O/P	77	51.7	7.4	1	52.5	9.2
– Gove(e)	O/P	64	50.6	5.8	0.4	50.0	5.9
Total (Australia)		**398**	**53.1**	**8.3**	**570**	**54.9**	**9.0**
Porto Trombetas (MRN) (Brazil)(f)	O/P	43	48.7	4.7	12	48.9	4.7
Sangaredi (Guinea)(g)	O/P	361	47.0	1.9	18	49.5	2.5
Total Bauxite		**801**	**50.2**	**5.2**	**600**	**54.6**	**8.8**

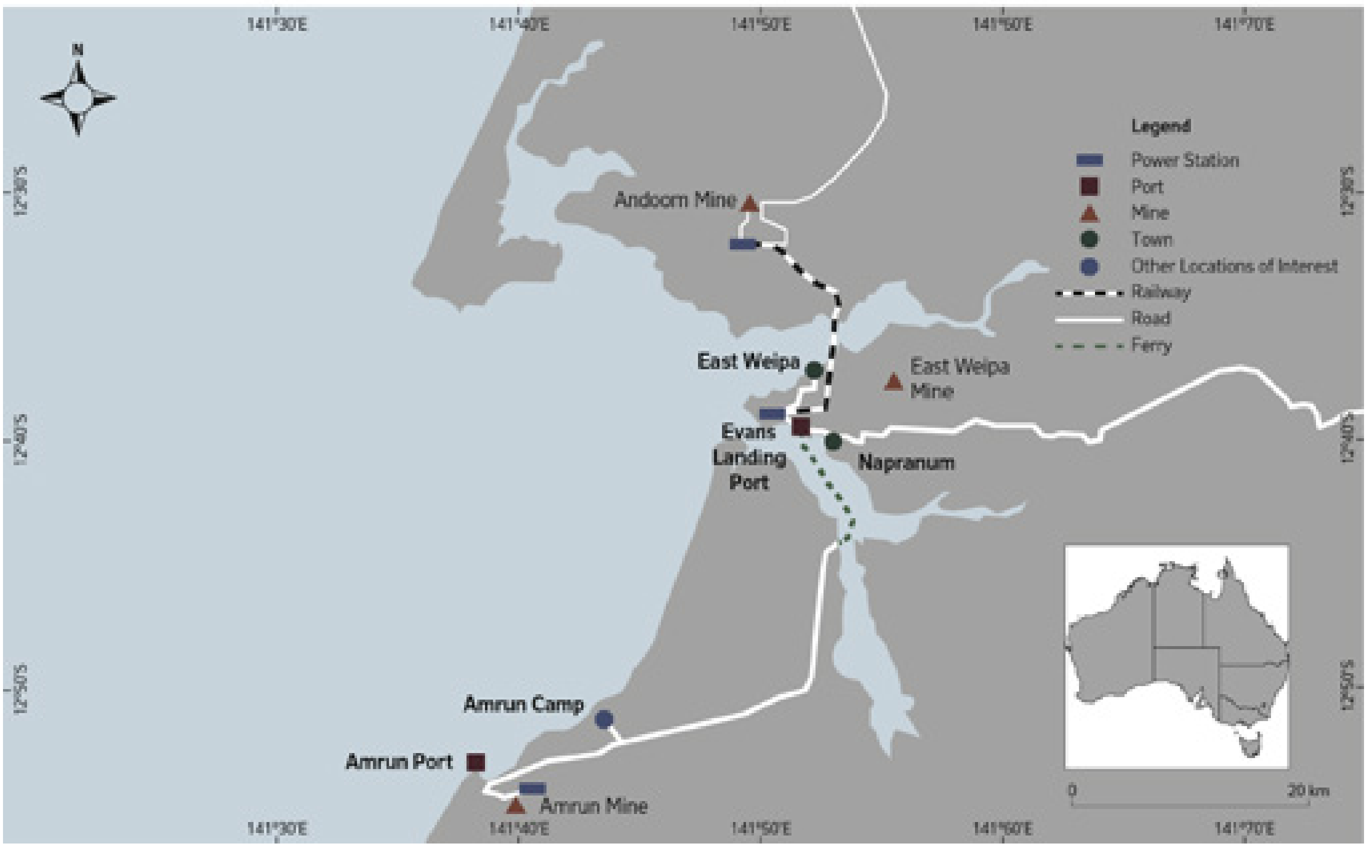
(a) Type of mine: O/P = open pit/surface, U/G = underground.
(b) Bauxite Reserves are stated as recoverable Reserves of marketable product after accounting for all mining and processing losses. Mill recoveries are therefore not shown.
(c) Australian bauxite Reserves are stated as dry tonnes and total alumina and silica grade.
(d) Amrun and East Weipa and Andoom Reserve tonnes decreased following updated economic assumptions, updated orebody knowledge and mining depletion. A JORC Table 1 in support of this change will be released to the market contemporaneously with the release of this Annual Report and can be viewed at riotinto.com/invest/financial-news-performance/resources-and-reserves.
(e) Gove Reserve tonnes decreased following updated economic assumptions and mining depletion.
(f) Porto Trombetas (MRN) Reserves are stated as dry tonnes, available alumina grade and reactive silica grade. Reserve tonnes increased following conversion of Cipó and Teófilo Plateaus Resources to Reserves.
(g) Sangaredi Reserve tonnes are reported on a 3% moisture basis and total alumina and silica grade.

Gove operations – Australia



Total ore reserves as at 31 December 2021			Rio Tinto Interest	Rio Tinto share Recoverable mineral	Total ore reserves as at 31 December 2020		
Tonnage	Grade				Tonnage	Grade	
Mt	% Al_2O_3	% SiO_2	%	Mt	Mt	% Al_2O_3	% SiO_2
826	**54.7**	**9.1**	100.0	**826**	1,044	54.0	9.1
78	**51.7**	**7.4**	100.0	**78**	100	51.4	7.5
64	**50.6**	**5.8**	100.0	**64**	80	50.4	5.6
968	**54.2**	**8.7**		**968**	1,225	53.5	8.8
55	**48.8**	**4.7**	12.0	**7**	21	48.2	5.6
379	**47.2**	**1.9**	23.0	**87**	396	47.2	2.1
1,401	**52.1**	**6.7**		**1,061**	1,642	51.9	8.3

Weipa operations – Australia



	Type of mine[(a)]	Proved ore reserves as at 31 December 2021						Probable ore reserves as at 31 December 2021					
		Tonnage	Grade					Tonnage	Grade				
Iron Ore[(b)]		Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI	Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI
Australia[(c)(d)]													
– Brockman Ore[(e)(f)]	O/P	719	62.3	3.2	1.9	0.13	5.1	627	61.6	3.7	2.0	0.13	5.4
– Marra Mamba Ore[(g)]	O/P	411	62.7	2.6	1.5	0.06	5.5	238	61.1	3.6	2.2	0.06	6.1
– Pisolite (Channel Iron) Ore[(h)]	O/P	580	57.8	4.6	1.9	0.05	10.4	100	56.3	5.2	2.5	0.04	11.2
Total (Australia)		**1,710**	**60.9**	**3.6**	**1.8**	**0.09**	**7.0**	**965**	**61.0**	**3.8**	**2.1**	**0.10**	**6.2**
Iron Ore Company of Canada (Canada)[(i)]	O/P	294	65.0	3.2	–	–	–	189	65.0	3.2	–	–	–
Total Iron Ore		**2,004**	**61.5**	**3.5**	**1.5**	**0.07**	**6.0**	**1,154**	**61.6**	**3.7**	**1.8**	**0.08**	**5.2**

(a) Type of mine: O/P = open pit/surface, U/G = underground.

(b) Reserves of iron ore are shown as recoverable Reserves of marketable product after accounting for all mining and processing losses. Mill recoveries are therefore not shown.

(c) Australian iron ore Reserve tonnes are reported on a dry weight basis.

(d) The updated assessment of Reserves reflects measures Rio Tinto has put in place following the events in the Juukan Gorge on 24 May 2020. These measures are intended to protect a number of sites, and to mitigate impacts to sites where there are existing heritage approvals authorising mining impacts, or a decision has been made not to seek regulatory approval to conduct mining activities, given the heritage considerations identified by Traditional Owners. As a result, in 2021, Rio Tinto has removed 46 Mt from Reserves, primarily from Gudai-Darri. Rio Tinto's approach to cultural heritage management generally will continue to evolve in response to changes in agreements with Traditional Owners, further engagement with Traditional Owners and changing heritage legislation. Any material changes to Reserves resulting from further refinement of Rio Tinto's approach will be disclosed at the appropriate time.

(e) Brockman Ore Reserve tonnes decreased following mining depletion and updated pit designs. Reserves of Brockman ore are 96.4% Rio Tinto owned, 0.7% Eastern Ranges Joint Venture and 3% Hope Downs Joint Venture (based on allocated tonnages).

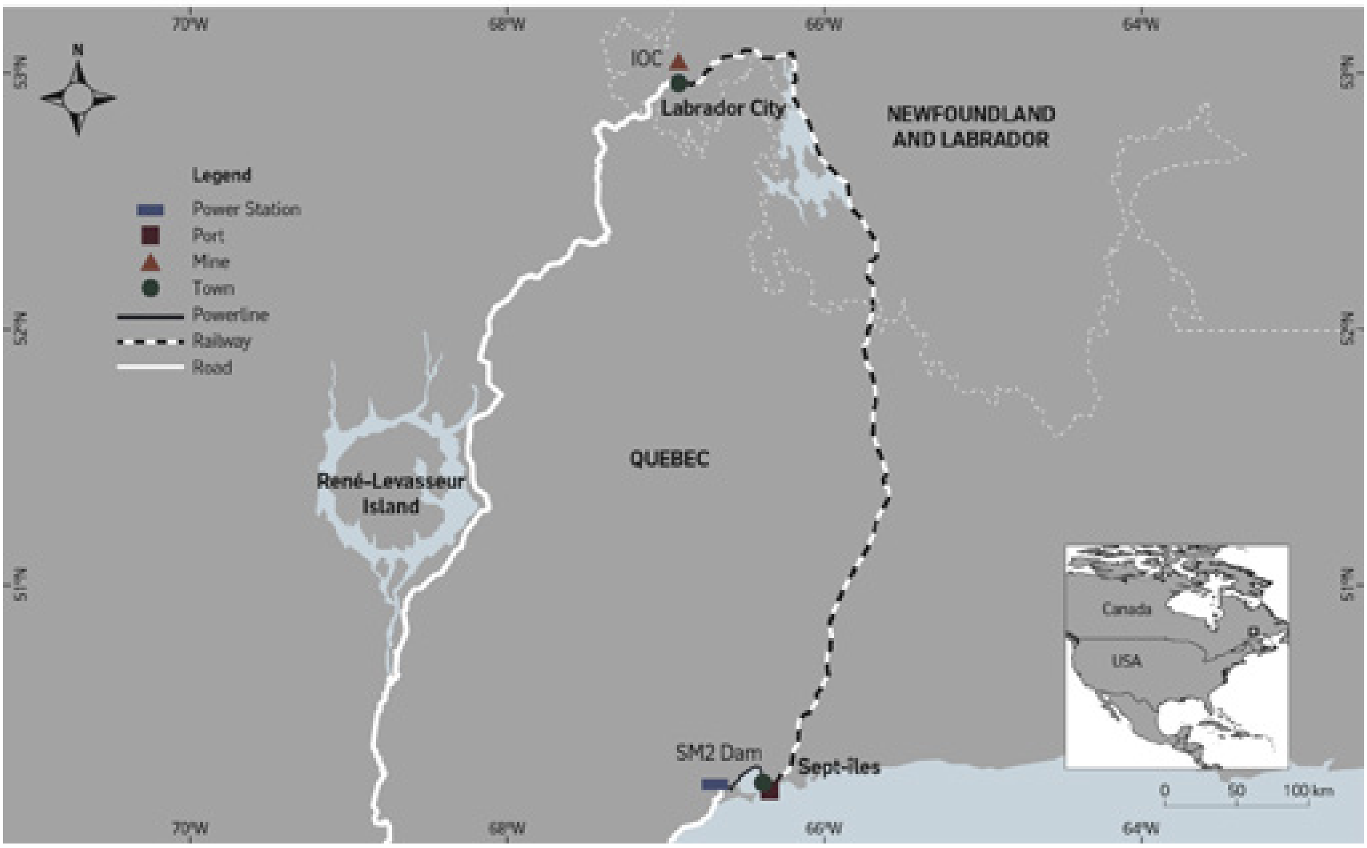
(f) Joint venture discussions with China Baowu Group covering the Western Range Project (Brockman Ore) are continuing.

(g) Marra Mamba Ore Reserve tonnes decreased following mining depletion, updated geological models and pit designs. Reserves of Marra Mamba Ore are 82.3% Rio Tinto owned, with 6.6% being Hope Downs Joint Venture and 11.1% being Robe Joint Venture (based on allocated tonnages).

(h) Pisolite Ore Reserve tonnes decreased following mining depletion and an updated geological model. Reserves of Pisolite Ore are 81.3% Rio Tinto owned, with the remaining 18.7% being Robe River Joint Venture (based on allocated tonnages).

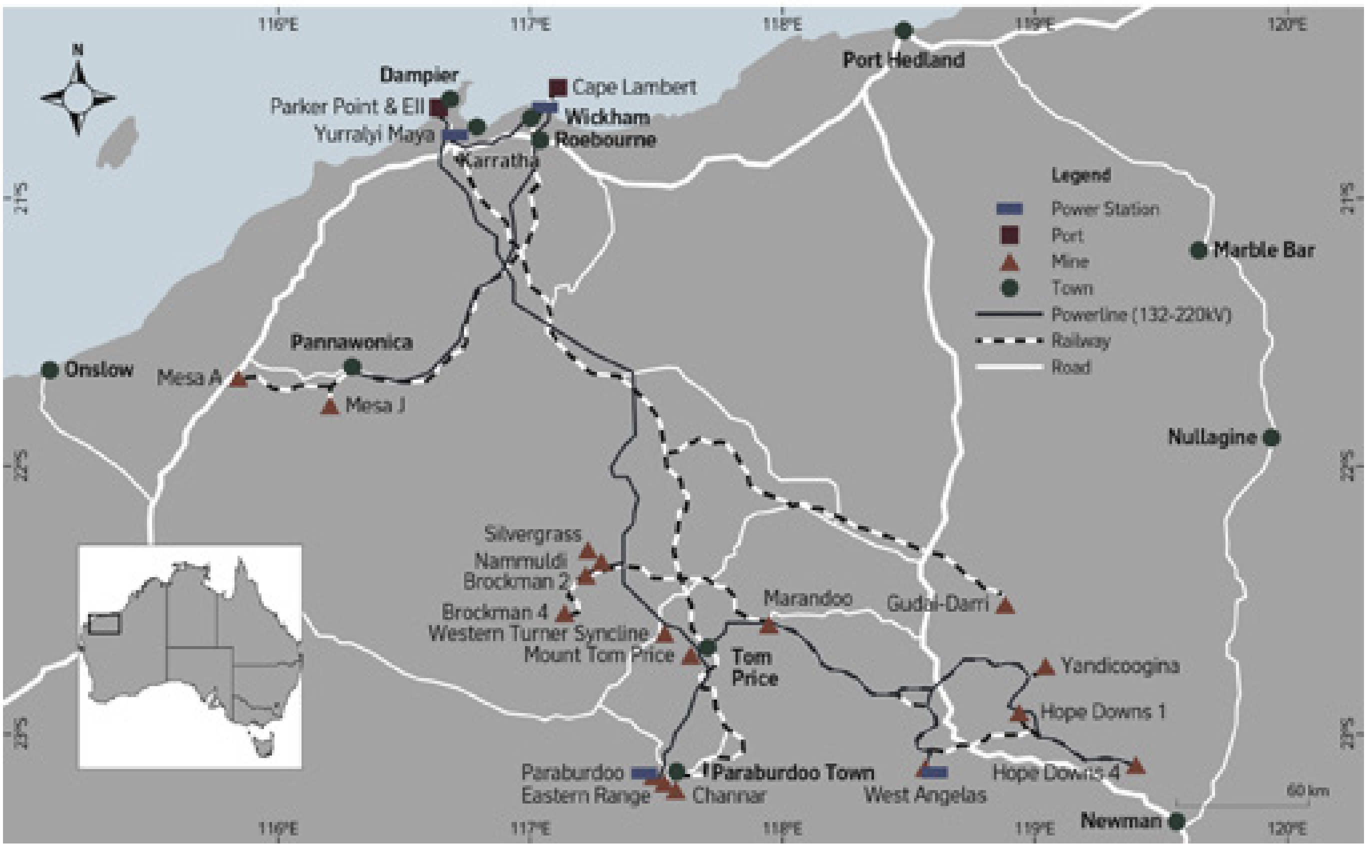
(i) Reserves at Iron Ore Company of Canada are reported as marketable product (57% pellets and 43% concentrate for sale) at a natural moisture content of 2%. The marketable product is derived from mined material comprising 696 million dry tonnes at 38.6% iron, 36.6% silica, 0.18% alumina, 0.023% phosphorus (Proved) and 448 million dry tonnes at 37.9% iron, 36.8% silica, 0.22% alumina, 0.024% phosphorus (Probable) using process recovery factors derived from current IOC concentrating and pellet operations.

Iron Ore Company of Canada operations – Canada



Total ore reserves as at 31 December 2021						Rio Tinto Interest	Rio Tinto share Marketable product	Total ore reserves as at 31 December 2020					
Tonnage	Grade												
Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI	%	Mt	Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI
1,345	**62.0**	**3.5**	**1.9**	**0.13**	**5.3**	96.4	**1,296**	1,483	62.0	3.5	1.9	0.13	5.2
649	**62.1**	**3.0**	**1.8**	**0.06**	**5.7**	82.3	**534**	781	61.9	3.2	1.8	0.06	5.7
680	**57.6**	**4.7**	**2.0**	**0.05**	**10.5**	81.3	**553**	786	57.5	4.8	2.0	0.05	10.5
2,675	**60.9**	**3.7**	**1.9**	**0.09**	**6.7**		**2,384**	3,050	60.8	3.8	1.9	0.09	6.7
483	**65.0**	**3.2**	**–**	**–**	**–**	58.7	**284**	510	65.0	3.2	–	–	–
3,158	**61.5**	**3.6**	**1.6**	**0.08**	**5.7**		**2,667**	3,560	61.0	3.7	1.6	0.08	5.7

Iron Ore operations – Australia



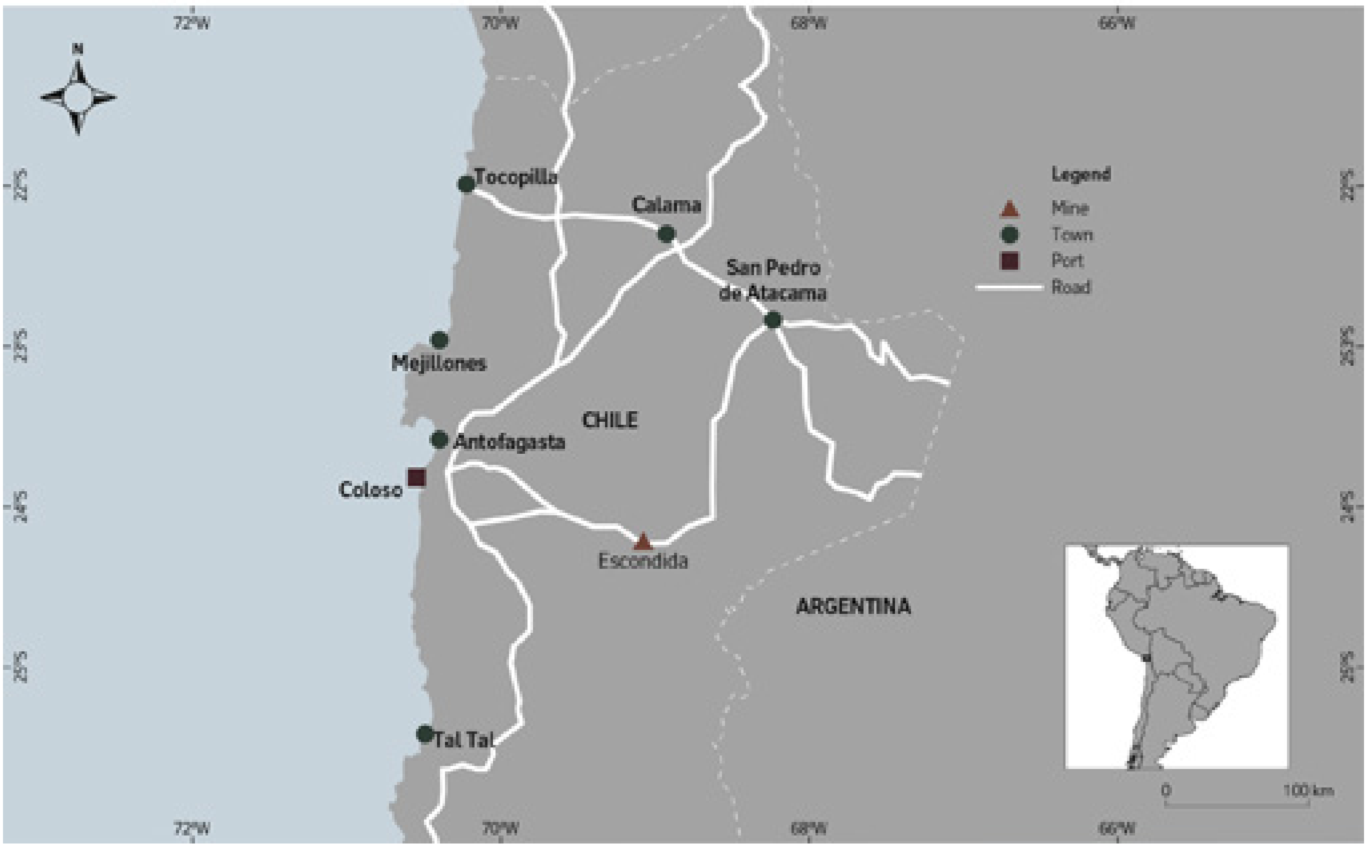
	Type of mine[a]	Proved ore reserves as at 31 December 2021					Probable ore reserves as at 31 December 2021				
		Tonnage	Grade				Tonnage	Grade			
Copper[b]		Mt	% Cu	g/t Au	g/t Ag	% Mo	Mt	% Cu	g/t Au	g/t Ag	% Mo
Bingham Canyon (US)[c]	O/P	341	0.44	0.17	2.06	0.034	199	0.44	0.19	2.50	0.019
Escondida (Chile)											
– oxide	O/P	77	0.62	–	–	–	121	0.53	–	–	–
– sulphide	O/P	3,416	0.68	–	–	–	1,695	0.57	–	–	–
– sulphide leach	O/P	1,325	0.42	–	–	–	284	0.39	–	–	–
Total (Chile)		**4,818**	**0.61**	**–**	**–**	**–**	**2,101**	**0.54**	**–**	**–**	**–**
Oyu Tolgoi (Mongolia)											
– Hugo Dummett North[d]	U/G	–	–	–	–	–	411	1.55	0.30	3.19	–
– Hugo Dummett North Extension	U/G	–	–	–	–	–	39	1.55	0.54	3.68	–
– Oyut open pit	O/P	261	0.52	0.37	1.30	–	450	0.40	0.24	1.13	–
– Oyut stockpiles	S/P	–	–	–	–	–	52	0.31	0.13	0.96	–
Total (Mongolia)		**261**	**0.52**	**0.37**	**1.30**	**–**	**952**	**0.94**	**0.27**	**2.12**	**–**
Total Copper		**5,421**	**0.59**	**0.03**	**0.19**	**0.002**	**3,252**	**0.65**	**0.09**	**0.77**	**0.001**

(a) Type of mine: O/P = open pit/surface, U/G = underground, S/P = stockpile.
(b) Copper Reserves are reported as dry mill feed tonnes.
(c) Bingham Canyon Reserves molybdenum grades interpolated from exploration drilling assays have been factored based on a long reconciliation history to blast hole and mill samples.
(d) The Hugo Dummett North Reserves include approximately 1.7 million tonnes of stockpiled material at a grade of 0.57% copper, 0.18 g/t gold and 1.4 g/t silver. The Hugo Dummett North underground mine is currently under construction.

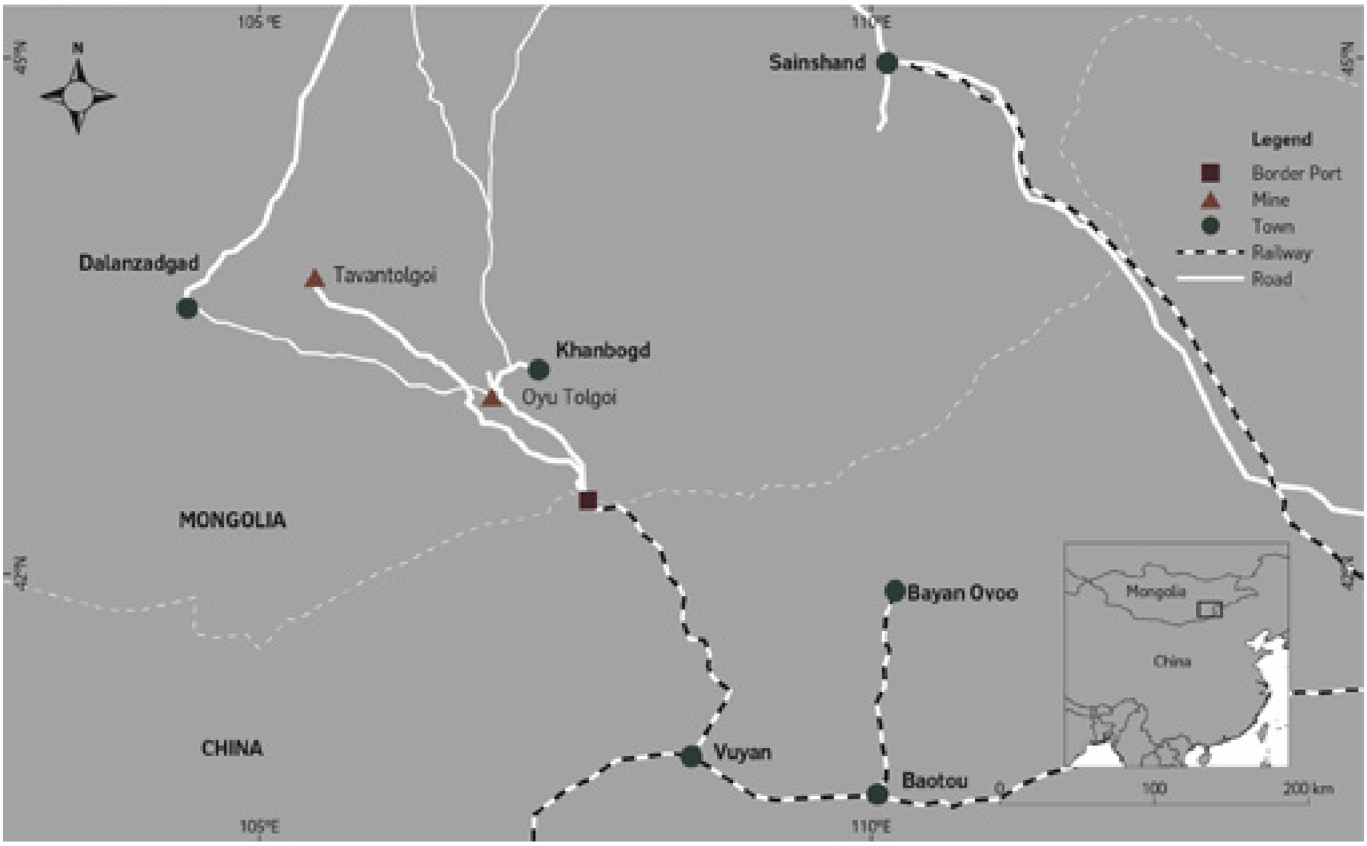
Bingham Canyon operations – United States of America

Total ore reserves as at 31 December 2021					Average mill recovery %				Rio Tinto Interest	Rio Tinto share Recoverable Metal				Total ore reserves as at 31 December 2020				
Tonnage	**Grade**													Tonnage	Grade			
Mt	**% Cu**	**g/t Au**	**g/t Ag**	**% Mo**	Cu	Au	Ag	Mo	%	**Mt Cu**	**Moz Au**	**Moz Ag**	**Mt Mo**	Mt	% Cu	g/t Au	g/t Ag	% Mo
541	**0.44**	**0.17**	**2.22**	**0.029**	89	69	74	57	100	**2.117**	**2.095**	**28.525**	**0.089**	552	0.44	0.16	2.11	0.031
198	**0.57**	**–**	**–**	**–**	56	–	–	–	30.0	**0.187**	**–**	**–**	**–**	183	0.56	–	–	–
5,111	**0.64**	**–**	**–**	**–**	83	–	–	–	30.0	**8.233**	**–**	**–**	**–**	5,151	0.65	–	–	–
1,610	**0.41**	**–**	**–**	**–**	41	–	–	–	30.0	**0.821**	**–**	**–**	**–**	1,648	0.42	–	–	–
6,919	**0.59**	**–**	**–**	**–**						**9.241**	**–**	**–**	**–**	6,982	0.59	–	–	–
411	**1.55**	**0.30**	**3.19**	**–**	92	79	81	–	33.5	**1.971**	**1.060**	**11.411**	**–**	409	1.51	0.29	3.12	–
39	**1.55**	**0.54**	**3.68**	**–**	92	81	83	–	29.4	**0.166**	**0.162**	**1.134**	**–**	39	1.56	0.54	3.69	–
711	**0.44**	**0.29**	**1.19**	**–**	78	66	53	–	33.5	**0.815**	**1.462**	**4.816**	**–**	743	0.44	0.30	1.20	–
52	**0.31**	**0.13**	**0.96**	**–**	70	53	51	–	33.5	**0.038**	**0.039**	**0.273**	**–**	57	0.32	0.13	0.93	–
1,213	**0.85**	**0.29**	**1.94**	**–**						**2.990**	**2.722**	**17.634**	**–**	1,247	0.82	0.30	1.90	–
8,673	**0.61**	**0.05**	**0.41**	**0.002**						**14.349**	**4.817**	**46.159**	**0.089**	8,781	0.62	0.05	0.40	0.002

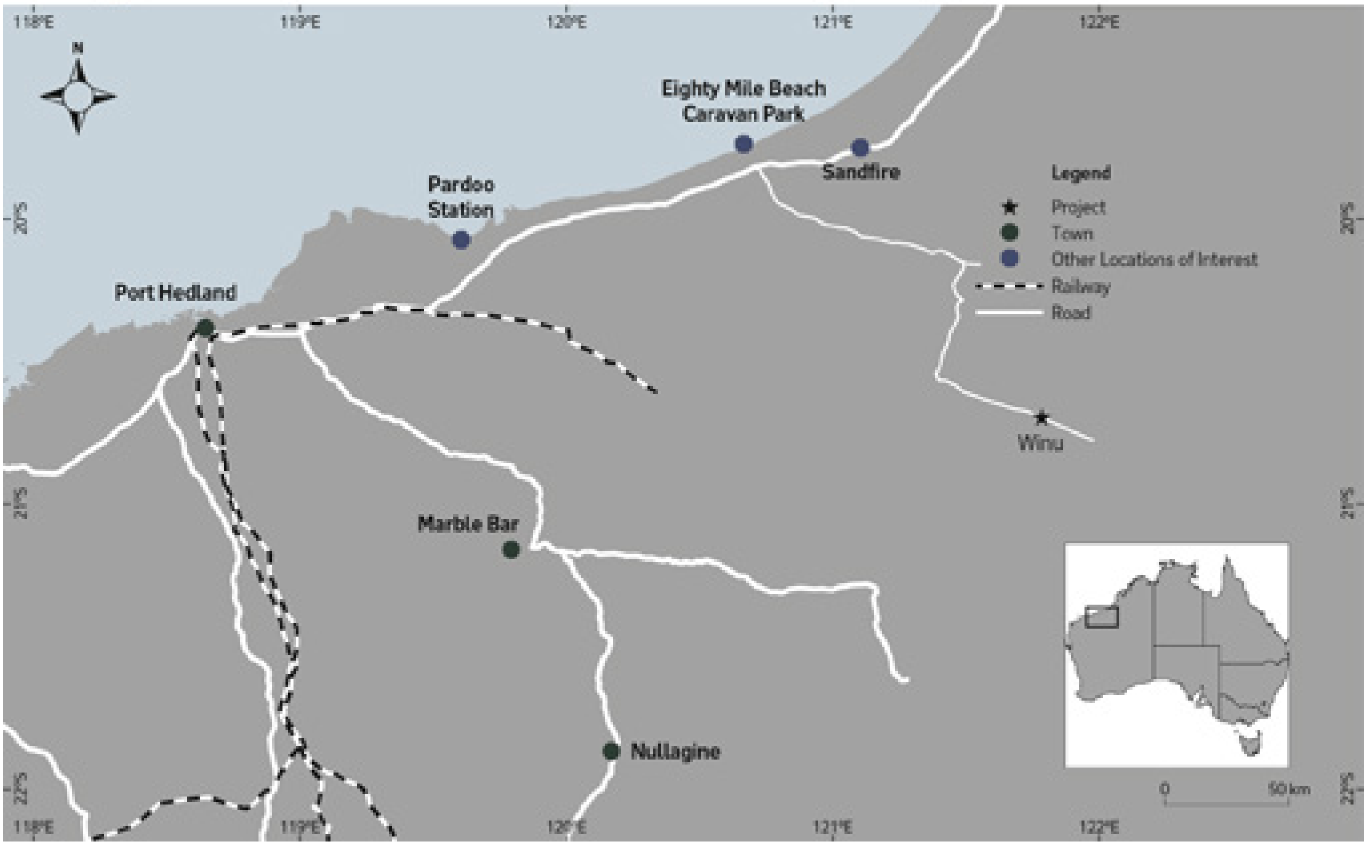
Escondida operations – Chile



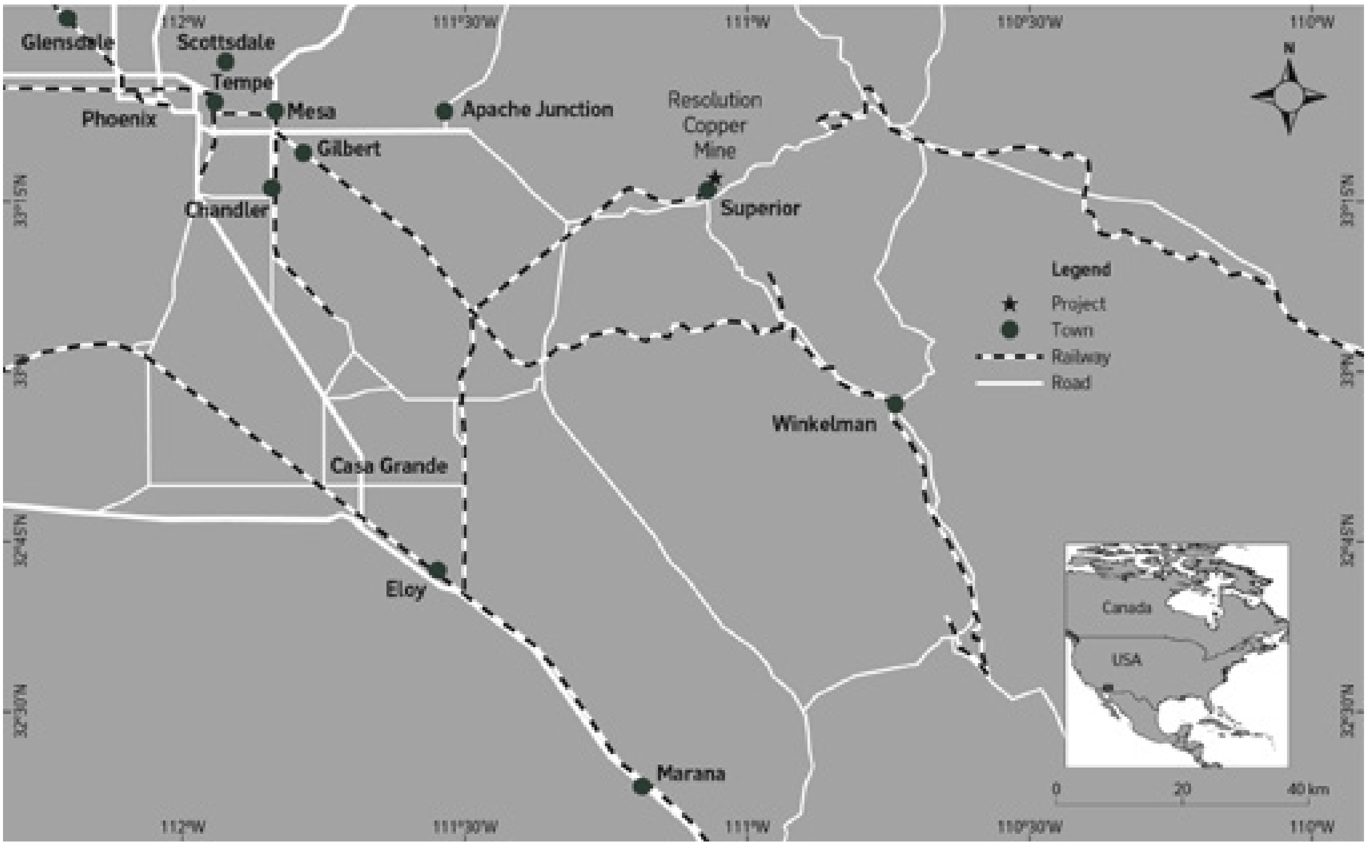
Oyu Tolgoi operations – Mongolia



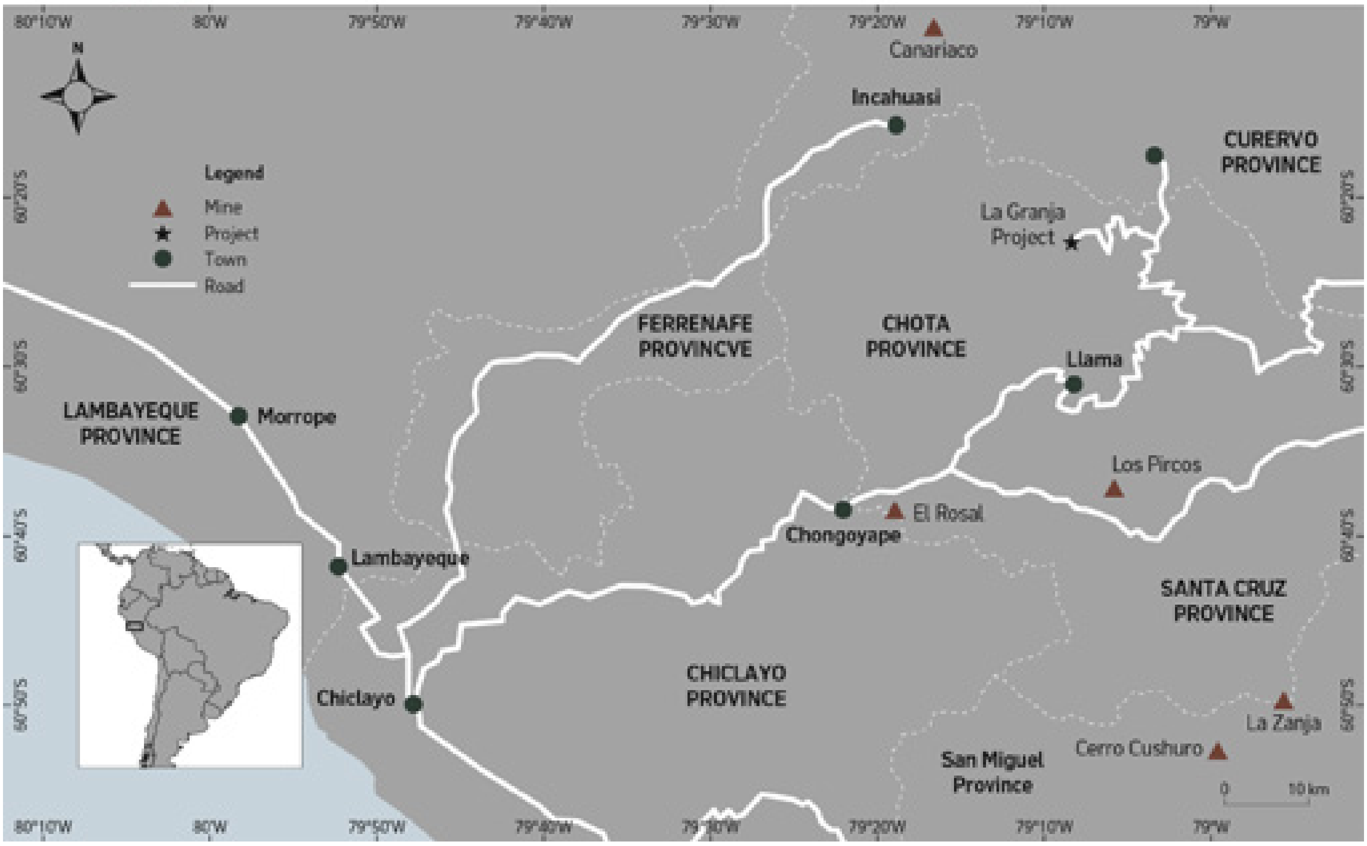
Winu project – Australia



Resolution project – United States of America



La Granja project – Peru



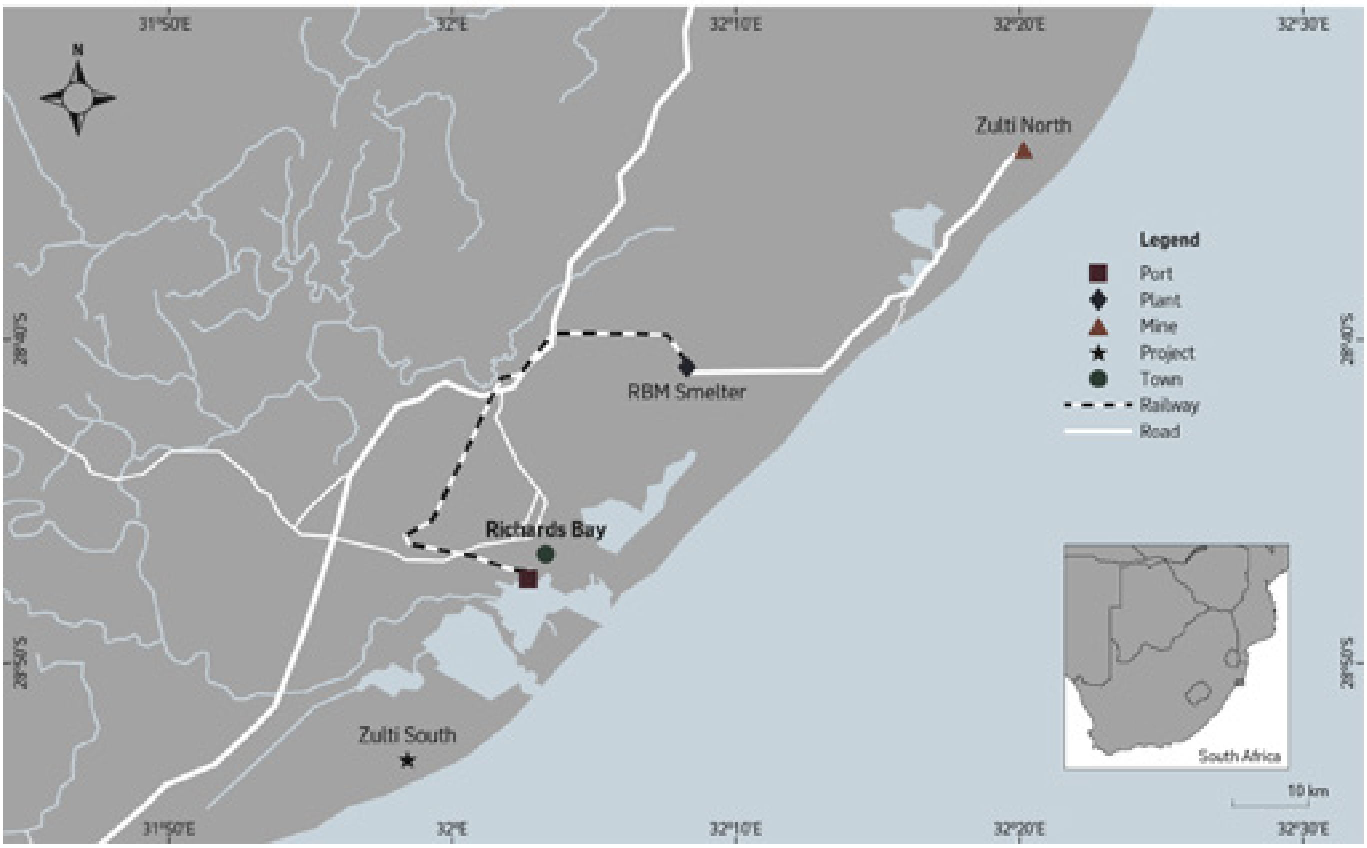
	Type of mine(a)	Proved ore reserves as at 31 December 2021 Tonnage	Grade		Probable ore reserves as at 31 December 2021 Tonnage	Grade	
Titanium Dioxide Feedstock(b)		Mt	% Ti Minerals	% Zircon	Mt	% Ti Minerals	% Zircon
QMM (Madagascar)(c)	O/P	245	3.7	0.2	64	3.4	0.2
RBM (South Africa)	O/P	922	2.2	0.3	471	2.5	0.3
RTFT (Canada)	O/P	–	–	–	153	80.0	–
Total Titanium Dioxide Feedstock		**1,167**	**2.6**	**0.3**	**689**	**19.8**	**0.2**

(a) Type of mine: O/P = open pit/surface, U/G = underground.
(b) The marketable product (zircon at RBM and zirsil at QMM) is shown after all mining and processing losses. Titanium Dioxide Feedstock Reserves are expressed as dry in situ tonnes.
(c) QMM Reserve tonnes decreased as a result of an updated geological model and mining depletion.

QIT Madagascar Minerals operations – Madagascar

	Total ore reserves as at 31 December 2021			Rio Tinto Interest	Rio Tinto share Marketable product		Total ore reserves as at 31 December 2020		
	Tonnage	Grade					Tonnage	Grade	
	Mt	% Ti Minerals	% Zircon	%	Mt Titanium Dioxide Feedstock	Mt Zircon	Mt	% Ti Minerals	% Zircon
	309	**3.7**	**0.2**	80.0	**4.4**	**0.3**	358	3.5	0.2
	1,393	**2.3**	**0.3**	74.0	**10.8**	**2.6**	1,426	2.4	0.3
	153	**80.0**	**–**	100.0	**48.5**	**–**	152	80.1	–
	1,856	**9.0**	**0.3**		**63.7**	**2.9**	1,936	8.7	0.3

Richards Bay Minerals operations – South Africa



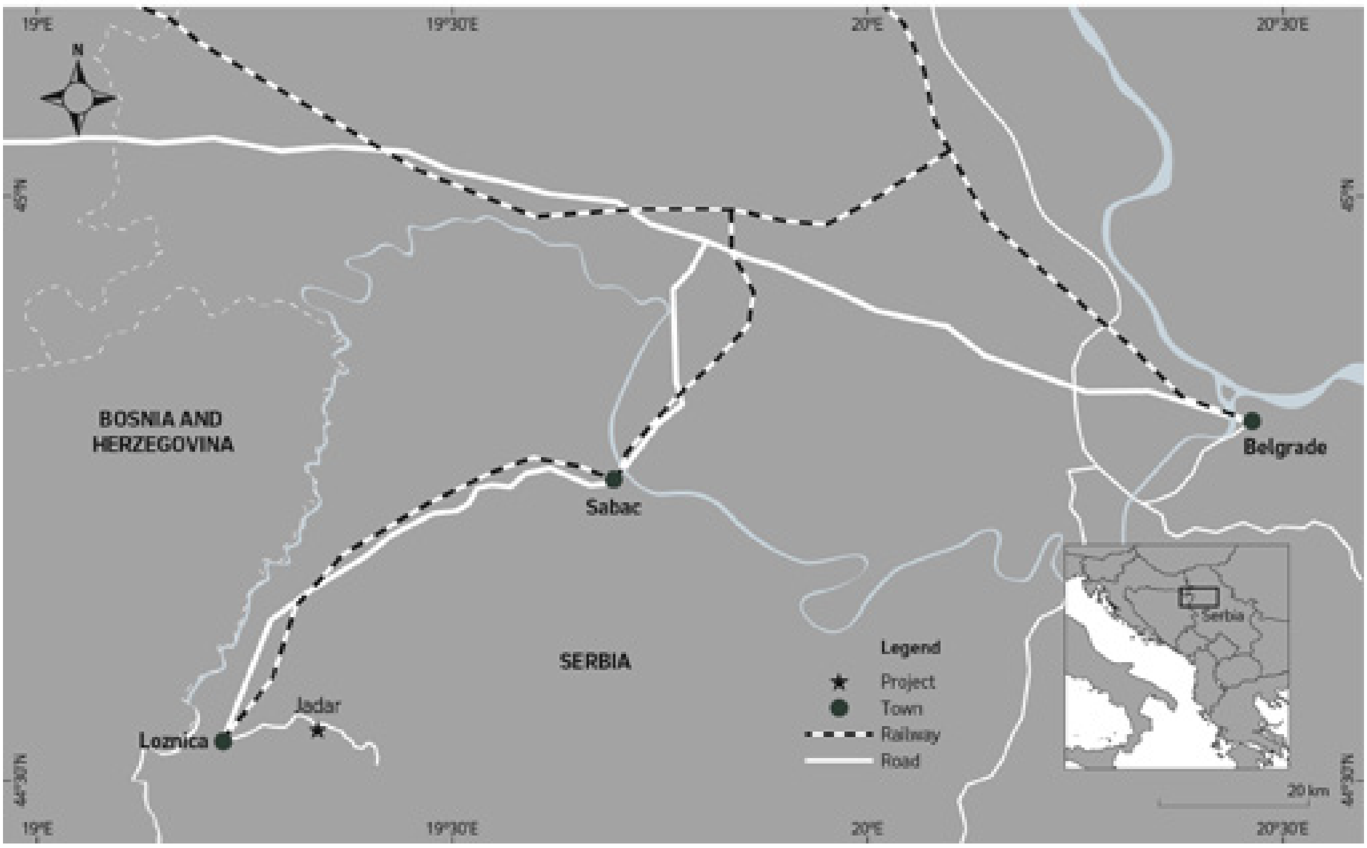
	Type of mine[a]	Proved ore reserves as at 31 December 2021	Probable ore reserves as at 31 December 2021	**Total ore reserves as at 31 December 2021**
		Tonnage	Tonnage	**Tonnage**
Borates[b]		Mt	Mt	**Mt**
Boron (US)	O/P	9	5	**14**
Jadar (Serbia)[c]	U/G	–	–	**–**
Total Borates		**9**	**5**	**14**

	Type of mine[a]	Proved ore reserves as at 31 December 2021		Probable ore reserves as at 31 December 2021		**Total ore reserves as at 31 December 2021**	
		Tonnage	Grade	Tonnage	Grade	**Tonnage**	**Grade**
Diamonds[d]		Mt	Carats per tonne	Mt	Carats per tonne	**Mt**	**Carats per tonne**
Diavik (Canada)[e][f]	U/G	3.8	2.1	1.6	2.2	**5.4**	**2.2**

	Type of mine[a]	Proved ore reserves as at 31 December 2021		Probable ore reserves as at 31 December 2021		**Total ore reserves as at 31 December 2021**	
		Tonnage	Grade	Tonnage	Grade	**Tonnage**	**Grade**
Lithium		Mt	% Li_2O	Mt	% Li_2O	**Mt**	**% Li_2O**
Jadar (Serbia)[c]	U/G	–	–	–	–	**–**	**–**

(a) Type of mine: O/P = open pit/surface, U/G = underground.
(b) Reserves of borates are expressed in terms of marketable product (B_2O_3) tonnes after all mining and processing losses.
(c) As a result of the Government of Serbia in January 2022 cancelling the Spatial Plan and revoking all related permits, Rio Tinto has decided to no longer report an Ore Reserve for the 100% owned Jadar lithium-borates project in western Serbia. A JORC Table 1 in support of this change will be released to the market contemporaneously with the release of this Annual Report and can be viewed at riotinto.com/invest/financial-news-performance/resources-and-reserves.
(d) Reserves of diamonds are shown as recoverable Reserves of marketable product after accounting for all mining and processing losses. Mill recoveries are therefore not shown.
(e) Diavik Reserves are based on a nominal 1 millimetre lower cut-off size and a final re-crushing size of 6 millimetres.
(f) Diavik Reserve tonnes decreased following mining depletion. Reported to the market on 18 November 2021, Rio Tinto has obtained a 100% interest in Diavik.

Jadar project – Serbia



	Rio Tinto Interest	Rio Tinto share Marketable product	Total ore reserves as at 31 December 2020
			Tonnage
	%	Mt	Mt
	100.0	14	15
	100.0	–	2
		14	17

	Rio Tinto Interest	Rio Tinto share Recoverable diamonds	Total ore reserves as at 31 December 2020	
			Tonnage	Grade
	%	M carats	Mt	Carats per tonne
	100.0	11.7	9	2.1

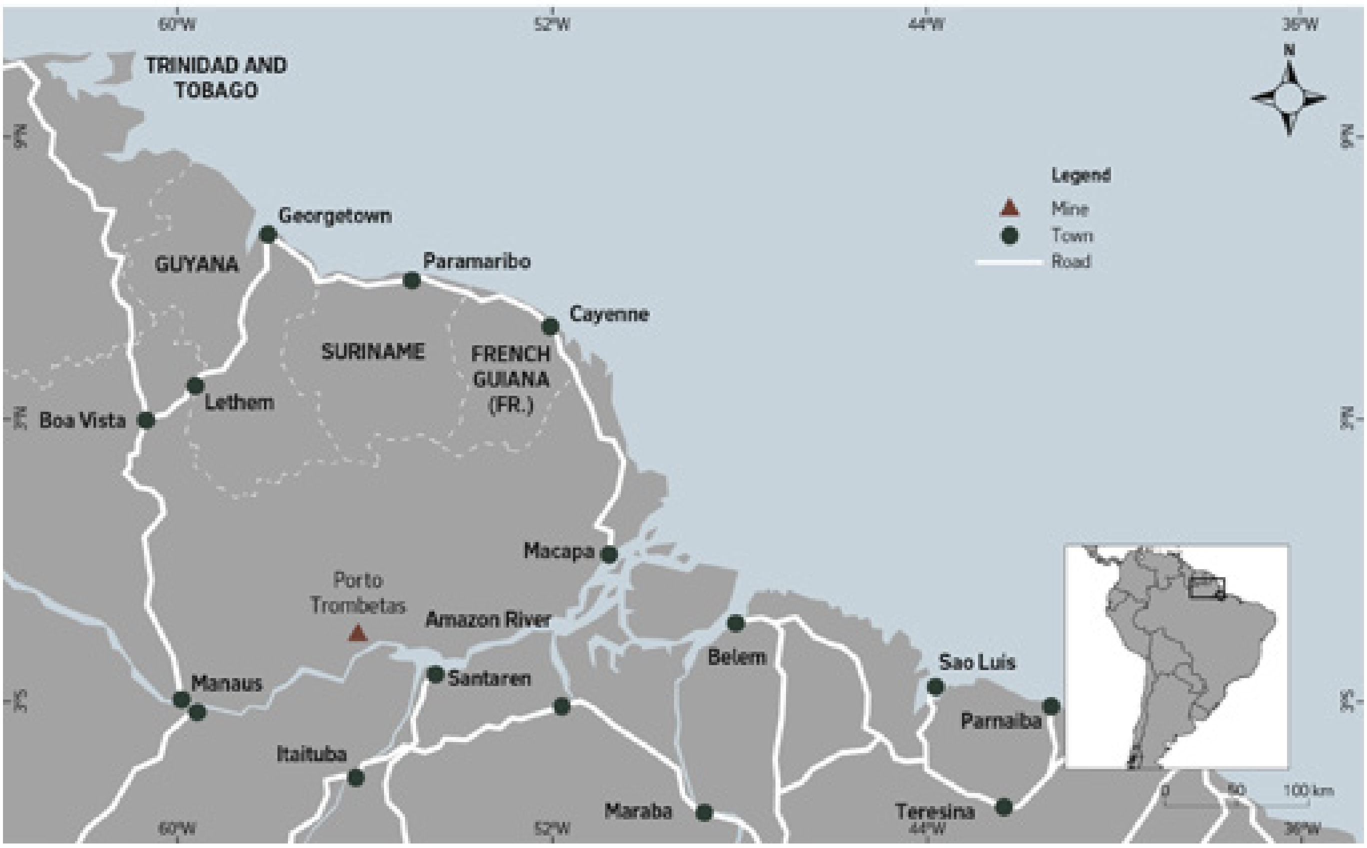
	Average mill recovery	Rio Tinto Interest	Rio Tinto share Marketable product	Total ore reserves as at 31 December 2020	
				Tonnage	Grade
	%	%	Mt	Mt	% Li_2O
	–	100.0	–	17	1.81

Mineral Resources

Bauxite	Likely mining method(a)	Measured resources as at 31 December 2021 Tonnage Mt	Grade % Al_2O_3	% SiO_2	Indicated resources as at 31 December 2021 Tonnage Mt	Grade % Al_2O_3	% SiO_2
Rio Tinto Aluminium (Australia)(b)							
– Amrun(c)	O/P	100	49.5	11.6	488	50.2	11.8
– East Weipa and Andoom(c)	O/P	63	49.5	8.4	–	–	–
– Gove	O/P	28	49.0	6.8	5.0	49.0	6.6
– North of Weipa	O/P	–	–	–	–	–	–
Total (Australia)		**191**	**49.4**	**9.9**	**494**	**50.2**	**11.7**
Porto Trombetas (MRN) (Brazil)(d)	O/P	251	49.6	4.4	31	48.5	5.2
Sangaredi (Guinea)(e)	O/P	329	43.8	2.1	5,962	46.6	2.3
Total Bauxite		**771**	**47.1**	**4.8**	**6,486**	**46.9**	**3.0**

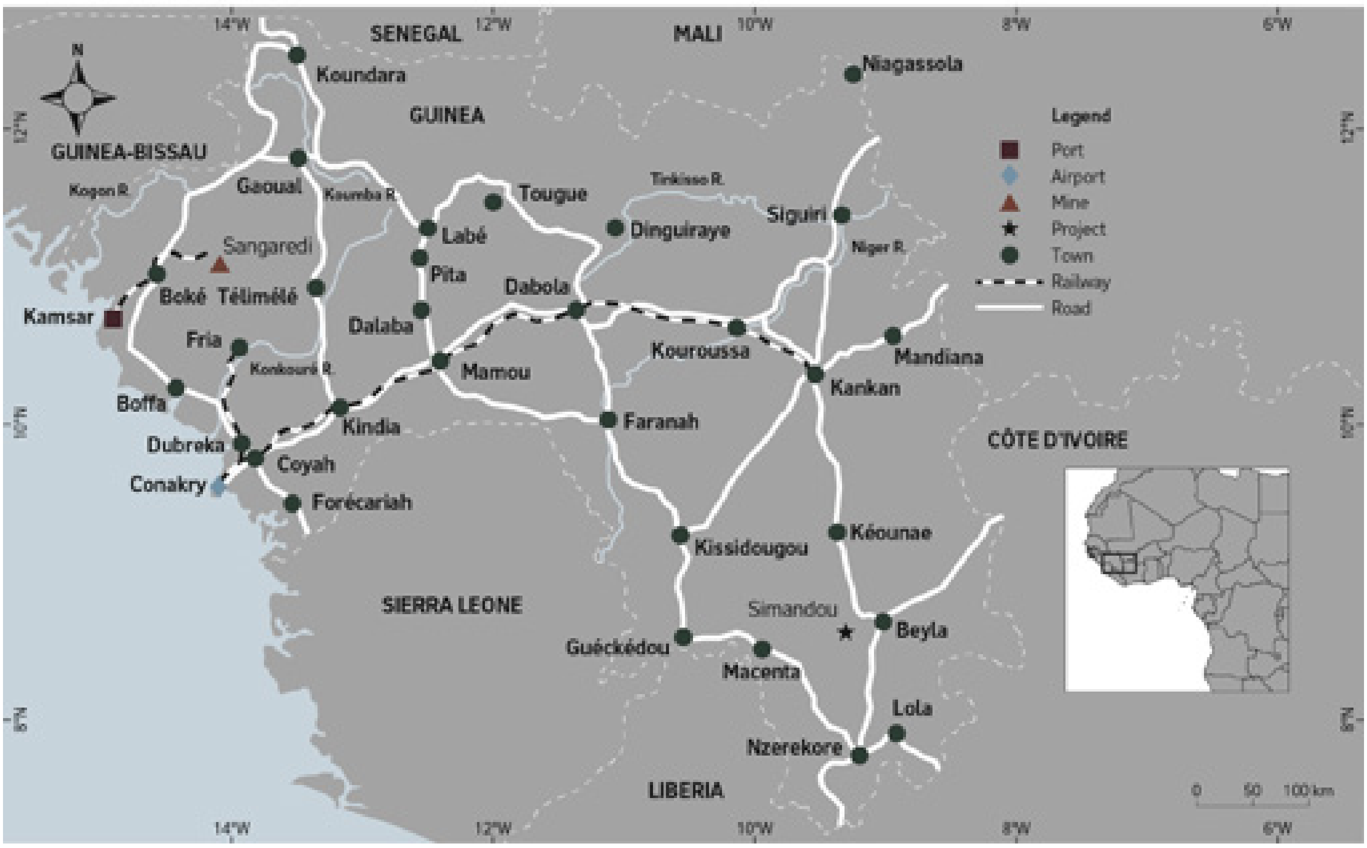
(a) Likely mining method: O/P = open pit/surface; U/G = underground.
(b) Rio Tinto Aluminium bauxite Resources are stated as dry product tonnes and total alumina and silica grades.
(c) Amrun and East Weipa and Andoom Resource tonnes increased following conversion of Reserves to Resources based on updated economic assumptions. A JORC Table 1 in support of this change will be released to the market contemporaneously with the release of this Annual Report and can be viewed at riotinto.com/invest/financial-news-performance/resources-and-reserves.
(d) Porto Trombetas (MRN) Resources are stated as dry in situ tonnes, available alumina grade and total silica grade.
(e) Sangredi Resource tonnes are reported on a 3% moisture basis and total alumina and silica grades.

Porto Trombetas operations – Brazil



Total Measured and Indicated resources as at 31 December 2021			Inferred resources as at 31 December 2021			**Total mineral resources as at 31 December 2021**			Rio Tinto Interest	Total mineral resources as at 31 December 2020		
Tonnage	**Grade**		Tonnage	Grade		**Tonnage**	**Grade**			Tonnage	Grade	
Mt	**% Al_2O_3**	**% SiO_2**	Mt	% Al_2O_3	% SiO_2	**Mt**	**% Al_2O_3**	**% SiO_2**	%	Mt	% Al_2O_3	% SiO_2
589	**50.1**	**11.7**	262	51.7	12.1	**850**	**50.6**	**11.8**	100.0	678	50.3	11.9
63	**49.5**	**8.4**	–	–	–	**63**	**49.5**	**8.4**	100.0	35	51.1	8.3
33	**49.0**	**6.8**	0.6	49.1	6.8	**34**	**49.0**	**6.8**	100.0	34	48.7	6.8
–	**–**	**–**	1,330	52.0	11.6	**1,330**	**52.0**	**11.6**	100.0	1,330	52.0	11.6
684	**50.0**	**11.2**	**1,592**	**51.9**	**11.6**	**2,276**	**51.3**	**11.5**		2,077	51.3	11.6
282	**49.5**	**4.5**	134	49.9	3.7	**416**	**49.6**	**4.2**	12.0	456	49.7	4.2
6,291	**46.5**	**2.3**	737	45.8	2.4	**7,028**	**46.4**	**2.3**	23.0	7,028	46.4	2.3
7,257	**46.9**	**3.2**	**2,463**	**50.0**	**8.5**	**9,720**	**47.7**	**4.5**		9,561	47.6	4.4

Simandou project and Sangaredi operations – Guinea



	Likely mining method[a]	Measured resources as at 31 December 2021						Indicated resources as at 31 December 2021						**Total Measured and Indicated resources as at 31 December 2021**					
		Tonnage	Grade					Tonnage	Grade					**Tonnage**	**Grade**				
Iron Ore[b]		Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI	Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI	**Mt**	**% Fe**	**% SiO_2**	**% Al_2O_3**	**% P**	**% LOI**
Australia																			
– Boolgeeda[c]	O/P	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**–**	**–**	**–**	**–**
– Brockman[d]	O/P	556	62.5	3.2	1.8	0.13	5.1	1,521	63.0	3.1	1.8	0.12	4.4	**2,077**	**62.8**	**3.1**	**1.8**	**0.12**	**4.6**
– Brockman Process Ore[e]	O/P	276	57.2	6.3	4.0	0.16	7.0	655	57.0	6.1	4.1	0.16	7.3	**931**	**57.0**	**6.1**	**4.1**	**0.16**	**7.2**
– Channel Iron Deposit[f]	O/P	723	56.5	5.9	2.5	0.06	10.2	1,800	58.4	4.5	2.6	0.08	8.8	**2,523**	**57.9**	**4.9**	**2.6**	**0.07**	**9.2**
– Detrital[g]	O/P	0.5	61.3	4.4	2.9	0.06	4.4	89	60.6	5.0	3.8	0.06	3.7	**90**	**60.6**	**5.0**	**3.8**	**0.06**	**3.7**
– Marra Mamba[h]	O/P	379	62.3	2.8	1.5	0.06	6.0	607	61.8	3.3	1.8	0.06	5.9	**986**	**62.0**	**3.1**	**1.7**	**0.06**	**6.0**
Total (Australia)		**1,935**	**59.4**	**4.6**	**2.3**	**0.09**	**7.4**	**4,672**	**60.2**	**4.1**	**2.5**	**0.10**	**6.7**	**6,607**	**60.0**	**4.2**	**2.4**	**0.10**	**6.9**
Iron Ore Company of Canada (Canada)[i]	O/P	158	40.8	36.3	0.2	0.02	–	628	38.6	37.2	0.2	0.03	–	**786**	**39.0**	**37.1**	**0.2**	**0.03**	**–**
Simandou (Guinea)[j]	O/P	416	66.8	1.2	1.1	0.06	1.9	1,645	65.2	2.2	1.3	0.08	2.9	**2,061**	**65.5**	**2.0**	**1.3**	**0.07**	**2.7**
Total Iron Ore		**2,509**	**59.5**	**6.0**	**2.0**	**0.08**	**6.0**	**6,945**	**59.4**	**6.7**	**2.0**	**0.09**	**5.2**	**9,454**	**59.4**	**6.5**	**2.00**	**0.09**	**5.4**

(a) Likely mining method: O/P = open pit/surface; U/G = underground.
(b) Iron ore Resources are stated on a dry in situ weight basis.
(c) Boolgeeda Resources are 100% Rio Tinto owned.
(d) Brockman Resources are 74.3% Rio Tinto owned, 0.1% Bao-HI Joint Venture, 5.0% Hope Downs Joint Venture, 4.4% Robe River Iron Associates Joint Venture and 16.3% Rhodes Ridge Joint Venture (based on allocated tonnages).
(e) Brockman Process Ore Resources are 70.5% Rio Tinto owned, 0.1% Bao-HI Joint Venture, 6.9% Hope Downs Joint Venture, 8.0% Robe River Iron Associates Joint Venture and 14.4% Rhodes Ridge Joint Venture (based on allocated tonnages).
(f) Channel Iron Deposit Resources are 70.1% Rio Tinto owned and 29.9% Robe River Iron Associates Joint Venture (based on allocated tonnages).
(g) Detrital Resources are 74.2% Rio Tinto owned, 3.9% Hope Downs Joint Venture, 4.4% Robe River Iron Associates Joint Venture and 17.4% Rhodes Ridge Joint Venture (based on allocated tonnages).
(h) Marra Mamba Resources are 64.5% Rio Tinto owned, 4.0% Hope Downs Joint Venture, 4.2% Robe River Iron Associates Joint Venture and 27.4% Rhodes Ridge Joint Venture (based on allocated tonnages).
(i) Iron Ore Company of Canada (IOC) Resources are stated as in situ material on a dry basis. This in situ material has the potential to produce marketable product (57% pellets and 43% concentrate for sale at a natural moisture content of 2%) comprising 67 million tonnes at 65% iron 3.2% silica (Measured), 264 million tonnes at 65% iron 3.2% silica (Indicated) and 370 million tonnes at 65% iron 3.2% silica (Inferred) using process recovery factors derived from current IOC concentrating and pellet operations.
(j) Rio Tinto and Chinalco, who respectively own 45.05% and 39.95% of Simandou Blocks 3 and 4, are working with the government of Guinea to realise value from the world-class iron ore deposit. The government of Guinea owns a 15% stake in the project.

Inferred resources as at 31 December 2021						**Total mineral resources as at 31 December 2021**						Rio Tinto Interest	Total mineral resources as at 31 December 2020					
Tonnage	Grade					**Tonnage**	**Grade**						Grade	Tonnage				
Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI	**Mt**	**% Fe**	**% SiO_2**	**% Al_2O_3**	**% P**	**% LOI**	%	Mt	% Fe	% SiO_2	% Al_2O_3	% P	% LOI
532	57.9	4.8	3.9	0.17	7.6	**532**	**57.9**	**4.8**	**3.9**	**0.17**	**7.6**	100.0	532	57.9	4.8	3.9	0.17	7.6
5,246	62.2	3.2	1.9	0.14	5.4	**7,323**	**62.4**	**3.2**	**1.8**	**0.13**	**5.2**	74.3	7,266	62.4	3.2	1.8	0.13	5.2
2,111	56.9	5.8	4.1	0.17	7.8	**3,042**	**57.0**	**5.9**	**4.1**	**0.17**	**7.6**	70.5	3,025	57.0	6.0	4.1	0.17	7.6
4,662	56.1	6.2	3.1	0.08	9.8	**7,184**	**56.7**	**5.7**	**2.9**	**0.08**	**9.6**	70.1	7,026	56.7	5.8	3.0	0.08	9.6
1,413	60.8	4.0	3.7	0.06	4.3	**1,503**	**60.8**	**4.1**	**3.7**	**0.06**	**4.3**	74.2	1,486	60.8	4.1	3.8	0.06	4.2
4,300	61.7	3.0	1.7	0.06	6.4	**5,287**	**61.8**	**3.0**	**1.7**	**0.06**	**6.3**	64.5	5,449	61.8	3.1	1.7	0.06	6.3
18,264	**59.7**	**4.3**	**2.6**	**0.10**	**7.0**	**24,870**	**59.8**	**4.3**	**2.6**	**0.10**	**7.0**		24,784	59.8	4.3	2.6	0.10	7.0
895	38.3	37.8	0.2	0.03	–	**1,681**	**38.6**	**37.5**	**0.2**	**0.03**	**–**	58.7	1,781	38.4	37.5	0.2	0.03	–
811	65.3	2.8	1.1	0.06	2.5	**2,872**	**65.5**	**2.3**	**1.2**	**0.07**	**2.6**	45.1	2,757	65.5	2.2	1.2	0.07	2.7
19,969	**59.0**	**5.8**	**2.4**	**0.10**	**6.5**	**29,423**	**59.1**	**6.0**	**2.3**	**0.09**	**6.2**		29,322	59.0	6.1	2.3	0.09	6.2

	Likely mining method[a]	Measured resources as at 31 December 2021					Indicated resources as at 31 December 2021					**Total Measured and Indicated resources as at 31 December 2021**				
		Tonnage	Grade				Tonnage	Grade				**Tonnage**	**Grade**			
Copper[b]		Mt	% Cu	g/t Au	g/t Ag	% Mo	Mt	% Cu	g/t Au	g/t Ag	% Mo	**Mt**	**% Cu**	**g/t Au**	**g/t Ag**	**% Mo**
Winu (Australia)[c]	O/P	–	–	–	–	–	249	0.45	0.33	2.72	–	**249**	**0.45**	**0.33**	**2.72**	**–**
Bingham Canyon (US)																
– Bingham Open Pit[d]	O/P	121	0.46	0.24	2.14	0.019	129	0.32	0.16	1.40	0.016	**250**	**0.39**	**0.20**	**1.76**	**0.017**
– North Rim Skarn	U/G	1	3.50	2.10	20.00	–	9	3.60	1.70	21.00	–	**10**	**3.59**	**1.74**	**20.90**	**–**
Resolution (US)	U/G	–	–	–	–	–	530	1.92	–	–	0.039	**530**	**1.92**	**–**	**–**	**0.039**
Total (US)		**122**	**0.49**	**0.26**	**2.29**	**0.018**	**668**	**1.63**	**0.05**	**0.55**	**0.034**	**790**	**1.46**	**0.09**	**0.82**	**0.032**
Escondida (Chile)																
– Chimborazo - sulphide	O/P	–	–	–	–	–	139	0.50	–	–	–	**139**	**0.50**	**–**	**–**	**–**
– Escondida - mixed	O/P	16	0.56	–	–	–	15	0.45	–	–	–	**31**	**0.51**	**–**	**–**	**–**
– Escondida - oxide	O/P	14	0.58	–	–	–	7	0.57	–	–	–	**21**	**0.58**	**–**	**–**	**–**
– Escondida - sulphide	O/P	486	0.60	–	–	–	1,553	0.47	–	–	–	**2,039**	**0.50**	**–**	**–**	**–**
– Pampa Escondida - sulphide	O/P	294	0.53	0.07	–	–	1,150	0.55	0.10	–	–	**1,444**	**0.55**	**0.09**	**–**	**–**
– Pinta Verde - oxide	O/P	109	0.60	–	–	–	64	0.53	–	–	–	**173**	**0.57**	**–**	**–**	**–**
– Pinta Verde - sulphide	O/P	–	–	–	–	–	23	0.50	–	–	–	**23**	**0.50**	**–**	**–**	**–**
Total (Chile)		**919**	**0.58**	**0.02**	**–**	**–**	**2,951**	**0.50**	**0.04**	**–**	**–**	**3,870**	**0.52**	**0.04**	**–**	**–**
La Granja (Peru)	O/P	–	–	–	–	–	130	0.85	–	–	–	**130**	**0.85**	**–**	**–**	**–**
Oyu Tolgoi (Mongolia)																
– Heruga ETG	U/G	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**–**	**–**	**–**
– Heruga OT	U/G	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**–**	**–**	**–**
– Hugo Dummett North[e]	U/G	56	1.89	0.49	4.24	–	383	1.37	0.35	3.20	–	**439**	**1.44**	**0.37**	**3.34**	**–**
– Hugo Dummett North Extension	U/G	–	–	–	–	–	84	1.62	0.55	4.20	–	**84**	**1.62**	**0.55**	**4.20**	**–**
– Hugo Dummett South	U/G	–	–	–	–	–	–	–	–	–	–	**–**	**–**	**–**	**–**	**–**
– Oyut Open Pit	O/P	16	0.41	0.38	1.10	–	92	0.33	0.30	1.13	–	**109**	**0.34**	**0.31**	**1.12**	**–**
– Oyut Underground	U/G	10	0.48	0.91	1.31	–	50	0.38	0.61	1.18	–	**60**	**0.40**	**0.66**	**1.20**	**–**
Total (Mongolia)		**82**	**1.42**	**0.52**	**3.27**	**–**	**610**	**1.17**	**0.39**	**2.86**	**–**	**692**	**1.20**	**0.41**	**2.91**	**–**
Total Copper		**1,123**	**0.63**	**0.08**	**0.49**	**0.002**	**4,608**	**0.76**	**0.10**	**0.61**	**0.005**	**5,731**	**0.74**	**0.1**	**0.58**	**0.004**

(a) Likely mining method: O/P = open pit/surface; U/G = underground.

(b) Copper Resources are stated on a dry in situ weight basis.

(c) Winu Resource tonnes increased on the basis of additional drilling, an updated geological model and study progression. This includes an upgrade of 248 million tonnes of Inferred Resource to Indicated Resource. A JORC Table 1 in support of this change will be released to the market contemporaneously with the release of this Annual Report and can be viewed at riotinto.com/invest/financial-news-performance/resources-and-reserves.

(d) Bingham Canyon Open Pit Resource molybdenum grades interpolated from exploration drilling assays have been factored based on a long reconciliation history to blast hole and mill samples.

(e) The Hugo Dummett North Resource include approximately 1.3 million tonnes of stockpiled material at a grade of 0.35% copper, 0.11 g/t gold and 0.85 g/t silver. The Hugo Dummett North underground mine is currently under construction.

Inferred resources as at 31 December 2021					**Total mineral resources as at 31 December 2021**					Rio Tinto Interest	Total mineral resources as at 31 December 2020				
Tonnage	Grade				**Tonnage**	**Grade**					Tonnage	Grade			
Mt	% Cu	g/t Au	g/t Ag	% Mo	**Mt**	**% Cu**	**g/t Au**	**g/t Ag**	**% Mo**	%	Mt	% Cu	g/t Au	g/t Ag	% Mo
358	0.37	0.28	1.95	–	**608**	**0.40**	**0.30**	**2.26**	**–**	100.0	503	0.35	0.27	2.15	–
6	0.29	0.14	1.19	0.003	**256**	**0.39**	**0.20**	**1.75**	**0.017**	100.0	285	0.38	0.20	1.79	0.017
10	3.70	1.50	21.00	–	**20**	**3.64**	**1.61**	**20.95**	**–**	100.0	20	3.65	1.62	20.95	–
1,257	1.36	–	–	0.035	**1,787**	**1.53**	**–**	**–**	**0.036**	55.0	1,787	1.53	–	–	0.036
1,273	**1.37**	**0.01**	**0.17**	**0.035**	**2,063**	**1.41**	**0.04**	**0.42**	**0.033**		2,092	1.39	0.04	0.44	0.033
84	0.60	–	–	–	**223**	**0.54**	**–**	**–**	**–**	30.0	223	0.54	–	–	–
23	0.45	–	–	–	**54**	**0.48**	**–**	**–**	**–**	30.0	74	0.55	–	–	–
3	0.78	–	–	–	**24**	**0.60**	**–**	**–**	**–**	30.0	36	0.77	–	–	–
10,371	0.53	–	–	–	**12,410**	**0.53**	**–**	**–**	**–**	30.0	12,245	0.53	–	–	–
6,000	0.43	0.04	–	–	**7,444**	**0.45**	**0.05**	**–**	**–**	30.0	7,444	0.45	0.05	–	–
15	0.54	–	–	–	**188**	**0.57**	**–**	**–**	**–**	30.0	188	0.57	–	–	–
37	0.45	–	–	–	**60**	**0.47**	**–**	**–**	**–**	30.0	60	0.47	–	–	–
16,533	**0.49**	**0.01**	**–**	**–**	**20,403**	**0.50**	**0.02**	**–**	**–**		20,270	0.50	0.02	–	–
4,190	0.50	–	–	–	**4,320**	**0.51**	**–**	**–**	**–**	100	4,320	0.51	–	–	–
1,502	0.41	0.40	1.44	0.012	**1,502**	**0.41**	**0.40**	**1.44**	**0.012**	29.4	1,448	0.41	0.40	1.46	0.012
107	0.42	0.30	1.58	0.011	**107**	**0.42**	**0.30**	**1.58**	**0.011**	33.5	105	0.42	0.30	1.58	0.011
720	0.83	0.29	2.47	–	**1,159**	**1.06**	**0.32**	**2.80**	**–**	33.5	1,218	1.02	0.31	2.72	–
160	1.05	0.37	2.85	–	**244**	**1.24**	**0.43**	**3.31**	**–**	29.4	253	1.21	0.42	3.24	–
731	0.83	0.07	1.87	–	**731**	**0.83**	**0.07**	**1.87**	**–**	33.5	724	0.84	0.07	1.88	–
336	0.29	0.19	1.03	–	**445**	**0.30**	**0.22**	**1.05**	**–**	33.5	460	0.30	0.21	1.04	–
144	0.41	0.42	1.25	–	**204**	**0.40**	**0.49**	**1.23**	**–**	33.5	233	0.39	0.45	1.21	–
3,700	**0.59**	**0.29**	**1.74**	**0.005**	**4,392**	**0.69**	**0.31**	**1.93**	**0.004**		4,441	0.68	0.30	1.92	0.003
26,054	**0.55**	**0.05**	**0.28**	**0.002**	**31,785**	**0.58**	**0.06**	**0.34**	**0.003**		31,626	0.58	0.06	0.33	0.003

	Likely mining method[(a)]	Measured resources as at 31 December 2021			Indicated resources as at 31 December 2021			**Total Measured and Indicated resources as at 31 December 2021**		
		Tonnage	Grade		Tonnage	Grade		**Tonnage**	**Grade**	
Titanium Dioxide Feedstock[(b)]		Mt	% Ti Minerals	% Zircon	Mt	% Ti Minerals	% Zircon	**Mt**	**% Ti Minerals**	**% Zircon**
QMM (Madagascar)	O/P	456	4.2	0.2	860	4.3	0.2	**1,316**	**4.3**	**0.2**
RBM (South Africa)[(c)]	O/P	–	–	–	9	9.5	7.8	**9**	**9.5**	**7.8**
RTFT (Canada)	O/P	–	–	–	11	84.9	–	**11**	**84.9**	–
Total Titanium Dioxide Feedstock		**456**	**4.2**	**0.2**	**880**	**5.4**	**8.0**	**1,336**	**5.0**	**5.4**

(a) Likely mining method: O/P = open pit/surface; U/G = underground.
(b) Titanium dioxide feedstock Resources are stated as dry in situ tonnes.
(c) RBM Resource tonnes decreased due to mining depletion.

Rio Tinto Fer et Titane operations – Canada

Inferred resources as at 31 December 2021			**Total mineral resources as at 31 December 2021**			Rio Tinto Interest	Total mineral resources as at 31 December 2020		
Tonnage	Grade		**Tonnage**	**Grade**			Tonnage	Grade	
Mt	% Ti Minerals	% Zircon	**Mt**	**% Ti Minerals**	**% Zircon**	%	Mt	% Ti Minerals	% Zircon
154	3.1	0.2	**1,470**	**4.1**	**0.2**	80.0	1,427	4.1	0.2
–	–	–	**9**	**9.5**	**7.8**	74.0	11	12.3	8.1
16	79.2	–	**27**	**81.6**	–	100.0	27	81.6	–
170	**10.1**	**0.2**	**1,506**	**5.5**	**4.8**		1,464	5.6	4.8

	Likely mining method[(a)]	Measured resources as at 31 December 2021	Indicated resources as at 31 December 2021	Total Measured and Indicated resources as at 31 December 2021
		Tonnage	Tonnage	**Tonnage**
Borates[(b)]		Mt	Mt	**Mt**
Jadar (Serbia)[(c)]	U/G	–	14	**14**

	Likely mining method[(a)]	Measured resources as at 31 December 2021		Indicated resources as at 31 December 2021		Total Measured and Indicated resources as at 31 December 2021	
		Tonnage	Grade	Tonnage	Grade	**Tonnage**	**Grade**
Diamonds[(d)]		Mt	Carats per tonne	Mt	Carats per tonne	**Mt**	**Carats per tonne**
Diavik (Canada)[(e)]	U/G	1.2	2.2	0.9	2.9	**2.1**	**2.5**

	Likely mining method[(a)]	Measured resources as at 31 December 2021		Indicated resources as at 31 December 2021		Total Measured and Indicated resources as at 31 December 2021	
		Tonnage	Grade	Tonnage	Grade	**Tonnage**	**Grade**
Lithium[(f)]		Mt	% Li_2O	Mt	% Li_2O	**Mt**	**% Li_2O**
Jadar (Serbia)	U/G	–	–	85	1.76	**85**	**1.76**

	Likely mining method[(a)]	Measured resources as at 31 December 2021		Indicated resources as at31 December 2021		Total Measured and Indicated resources as at 31 December 2021	
		Tonnage	Grade	Tonnage	Grade	**Tonnage**	**Grade**
Uranium[(g)]		Mt	% U_3O_8	Mt	% U_3O_8	**Mt**	**% U_3O_8**
Jabiluka (Energy Resources of Australia) (Australia)	U/G	1	0.887	14	0.520	**15**	**0.549**

(a) Likely mining method: O/P = open pit/surface; U/G = underground.
(b) Borates Resources are reported as dry in situ B_2O_3 tonnes, rather than marketable product as in Reserves.
(c) Jadar equivalent dry in situ Resource is 85 million tonnes at 16.1% B_2O_3 (Indicated) and 58 million tonnes at 12.0% B_2O_3 (Inferred).
(d) Diamond Resources are stated as dry in situ tonnes.
(e) Reported to the market on 18 November 2021, Rio Tinto has obtained a 100% interest in Diavik. The 2020 Resource figure is reported based on the previous 60% ownership.
(f) Lithium Resources are stated as dry in situ tonnes.
(g) Uranium Resources are stated as dry in situ tonnes. Rio Tinto acknowledge that they will not develop the Jabiluka mine without the approval of the Traditional Owners.

Inferred resources as at 31 December 2021	**Total mineral resources as at 31 December 2021**	Rio Tinto Interest	Total mineral resources as at 31 December 2020
Tonnage	**Tonnage**		Tonnage
Mt	**Mt**	%	Mt
7	**21**	100.0	20

Inferred resources as at 31 December 2021		**Total mineral resources as at 31 December 2021**		Rio Tinto Interest	Total mineral resources as at 31 December 2020	
Tonnage	Grade	**Tonnage**	**Grade**		Tonnage	Grade
Mt	Carats per tonne	**Mt**	**Carats per tonne**	%	Mt	Carats per tonne
0.6	1.9	**2.7**	**2.4**	100.0	1.5	2.5

Inferred resources as at 31 December 2021		**Total resources as at 31 December 2021**		Rio Tinto Interest	Total resources as at 31 December 2020	
Tonnage	Grade	**Tonnage**	**Grade**		Tonnage	Grade
Mt	% Li_2O	**Mt**	**% Li_2O**	%	Mt	% Li_2O
58	1.87	**144**	**1.80**	100	139	1.78

Inferred resources as at 31 December 2021		**Total mineral resources as at 31 December 2021**		Rio Tinto Interest	Total mineral resources as at 31 December 2020	
Tonnage	Grade	**Tonnage**	**Grade**		Tonnage	Grade
Mt	% U_3O_8	**Mt**	**% U_3O_8**	%	Mt	% U_3O_8
10	0.545	**25**	**0.547**	86.3	25	0.547

Diavik operations – Canada

Mineral Resources and Ore Reserves governance and internal controls

Rio Tinto has well-established governance processes and internal controls to support the generation and publication of Mineral Resources and Ore Reserves, including a series of business unit and product group structures and processes independent of operational reporting.

Audit Committee

The Audit Committee's remit includes the governance of Mineral Resources and Ore Reserves. This includes an annual review of Mineral Resources and Ore Reserves at a Group level, as well as a review of findings and progress from the Group Internal Audit programme.

Ore Reserves Steering Committee

The Ore Reserves Steering Committee (ORSC), chaired by the Chief Technical Officer, Development & Technology, meets at least quarterly. The ORSC comprises senior representatives across our technical, financial, governance and business groups and oversees the appointment of Competent Persons nominated by the business units, reviews Exploration Results, Mineral Resource or Ore Reserve data prior to public reporting and oversees the development of the Group Mineral Resource and Ore Reserve standards and guidance.

Orebody Knowledge Centre of Excellence

The Orebody Knowledge Centre of Excellence contains a dedicated Orebody Knowledge Technical Assurance team. Orebody Knowledge Technical Assurance, in conjunction with the ORSC, is the guardian and author of Group Mineral Resource and Ore Reserve standards and guidance and is responsible for the governance and compilation of Group Mineral Resource, Ore Reserve and reconciliation reporting. The Technical Assurance team also monitors the external reporting environment, facilitates internal audits, and monitors actions with Group Internal Audit.

Group Internal Audit

Mineral Resource and Ore Reserve internal audits are conducted by independent external consulting personnel in a programme managed by Group Internal Audit with the assistance of the Orebody Knowledge Centre of Excellence and the ORSC. Material findings are reported outside of the product group reporting line to the Audit Committee, and all reports and action plans are reviewed by the ORSC for alignment to internal and external reporting standards. During 2021, due to COVID restrictions, two internal Mineral Resource and Ore Reserve audits were completed remotely.

Geoscientific information management and assurance

Rio Tinto employs industry standard drilling, sampling, assaying and quality assurance/quality control (QA/QC) practices supported by formally documented procedures.

Diamond core and reverse circulation are the primary drilling methods employed, with other methods such as sonic and air core utilised if appropriate for the style of deposit. Drill hole locations are typically confirmed by high-precision differential Global Positioning System (GPS) and down-hole trace positioning is primarily achieved by gyroscopic survey.

Drill sample recovery is typically recorded, and all geological data is collected by qualified geoscientific professionals. Geological logging consistency is secured via formal logging procedures and training, reference materials, application of geological code libraries and digital logging directly to the geological database.

On-site or commercial laboratories provide appropriate analytical (assaying) techniques according to the commodity and style of deposit. Reliability of assay data is maintained via QA/QC procedures which monitor assay accuracy and precision through the analysis of blanks, sample duplicates and matrix matched certified reference materials.

The Rio Tinto standard for geoscientific information management is the industry-leading acQuire system and strict QA/QC criteria is employed to ensure only high-quality assay data is uploaded to a project's database.

Mineral Resource and Ore Reserve risk management

Risks to t's Mineral Resource and Ore Reserve estimates are managed through comprehensive risk assessments undertaken in support of the annual reporting cycle. Risks are identified and managed by verifying controls, determining and undertaking suitable actions to remove or reduce the risk, conducting reviews and maintaining compliance with standards and procedures. Risks are managed through a commercial risk management solution.

At the end of each reporting cycle, analysis of the Mineral Resource and Ore Reserve risks across all business units is undertaken to ensure both consistency of reporting and to determine if any Group-wide risks to the various processes exist.

Competent Persons

	Association(a)	Employer	Accountability	Deposits
Bauxite				
A McIntyre	AusIMM	Rio Tinto	Resources	Gove, East Weipa and Andoom, North of Weipa, Amrun
W Saba	AusIMM		Reserves	Gove, East Weipa and Andoom, Amrun
M A Diallo	EFG	Compagnie des Bauxites de Guinée	Resources	Sangaredi
M Keersemaker	AusIMM		Reserves	
J P M Franco	AusIMM	Mineração Rio do Norte	Reserves	Trombetas
M A H Monteiro	AusIMM		Resources and Reserves	
Borates				
B Griffiths	SME	Rio Tinto	Resources and Reserves	Boron
Copper				
H Martin	AusIMM	Rio Tinto	Resources	Resolution[c]
A Schwarz	AusIMM		Resources	
M Bixley	AusIMM	Rio Tinto	Reserves	Oyu Tolgoi[b] [c] [d]
O Dendev	AusIMM		Resources	
F Prince	AusIMM		Reserves	
R Hayes	AusIMM	Rio Tinto	Resources	Bingham Canyon[b] [c] [d]
E Mader	AusIMM		Reserves	
P Rodriguez	AusIMM		Resources	
K Schroeder	AusIMM		Resources	
J Vickery	AusIMM		Resources and Reserves	
F Barrera	AusIMM		Reserves	Escondida
R Maureira	AusIMM	Minera Escondida Ltda.	Resources	Escondida, Escondida – Chimborazo – sulphide, Pampa Escondida – sulphide[b], Pinta Verde
J Marshall	AusIMM	Rio Tinto	Resources	La Granja
J Pocoe	AusIMM	Rio Tinto	Resources	Winu[b] [d]

	Association[a]	Employer	Accountability	Deposits
Diamonds				
C Auld	NAPEG		Reserves	
M Kontzamanis	NAPEG	Rio Tinto	Reserves	Diavik
K Pollock	NAPEG		Resources and Reserves	
Iron ore				
K Tindale	AusIMM	Rio Tinto	Resources	Simandou
M McDonald	PEGNL		Resources	
B Power	PEGNL		Resources	
S Roche	AusIMM	Rio Tinto	Reserves	Iron Ore Company of Canada
R Way	PEGNL		Resources	
R Williams	PEGNL		Reserves	
P Ziemendorf	AusIMM		Reserves	
N Brajkovich	AusIMM		Resources	Rio Tinto Iron Ore – Boolgeeda, Brockman, Brockman Process Ore, Channel Iron Deposit, Detrital, Marra Mamba
P Savory	AusIMM		Resources	
C Kyngdon	AusIMM		Resources	
L Vilela Couto	AusIMM	Rio Tinto	Reserves	Rio Tinto Iron Ore – Brockman Ore, Marra Mamba Ore, Pisolite (Channel Iron) Ore
C Gagne	AusIMM		Reserves	
A Menaria	AusIMM		Reserves	
R Sarin	AusIMM		Reserves	
Lithium				
G Davis	AusIMM	Rio Tinto	Reserves	
A Earl	AusIMM	Consultant – Snowden Group	Reserves	Jadar[e]
J Garcia	EFG	Rio Tinto	Resources	
M Sweeney	AusIMM		Resources	
Titanium dioxide feedstock				
J Dumouchel	OGQ		Resources	
C Ferland	OIQ	Rio Tinto	Resources	Rio Tinto Fer et Titane (RTFT)
D Gallant	OIQ		Reserves	
T Daling	SAIMM		Reserves	
A Louw	SACNASP	Rio Tinto	Resources	Richards Bay Minerals (RBM)[f]
S Mnunu	SACNASP		Resources	
P Kluge	SAIMM	Rio Tinto	Reserves	QMM Madagascar Minerals[f]
F Hees	AusIMM		Resources	
Uranium				
S Pevely	AusIMM	Rio Tinto	Resources and Reserves	Energy Resources of Australia - Jabiluka

(a) AusIMM: Australasian Institute of Mining and Metallurgy
EFG: European Federation of Geologists
NAPEG: Association of Professional Engineers; Geologists and Geophysicists of the Northwest Territories
OGQ: L'Ordre des Géologues du Québec
OIQ: L'Ordre des Ingénieurs du Québec
PEGNL: Professional Engineers and Geoscientists Newfoundland and Labrador
SACNASP: South African Council for Natural Scientific Professions
SAIMM: Southern African Institute of Mining and Metallurgy
SME: Society of Mining, Metallurgy and Exploration

(b) Includes gold

(c) Includes molybdenum

(d) Includes silver

(e) Includes borates

(f) Includes zircon

Mines and production facilities

Group mines as at 31 December 2021

Iron Ore

Production properties

Property	Mine	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Australian Pilbara Operations	Hamersley Iron: Brockman 2 Brockman 4 Channar Gudai-Darri Marandoo Mount Tom Price Nammuldi Paraburdoo Silvergrass Western Turner Syncline Yandicoogina	100% Rio Tinto Channar was previously 60% owned by Rio Tinto (through Channar Mining Pty Ltd) and 40% by Sinosteel Corporation (Sinosteel Channar Pty Ltd). Ownership transferred to 100% Rio Tinto following completion of the Channar Mining Joint Venture arrangement during 2020.	Rio Tinto	Pilbara region, Western Australia	Access and infrastructure within the property includes: – a network of sealed and unsealed roads connecting to public roads and highways; – public and Rio Tinto-operated airports; – a Hamersley and Robe owned integrated heavy haulage rail network, operated by Pilbara Iron comprising in excess of 1,890km of rail, multiple rail cars and locomotives; – four shipping terminals, located at Dampier and Cape Lambert and managed as a single port system; – water piping networks for both abstracted water and supply of fresh water to sites; – managed accommodation villages for FIFO sites; – a housing portfolio managing properties in the towns of Dampier, Wickham, Karratha, Pannawonica, Paraburdoo and Tom Price; – tailings storage facilities at several mine sites. All assets are subject to routine inspections and ongoing investment and maintenance programmes to ensure these remain fit-for-purpose.	Agreements for life of mine with Government of Western Australia, save for the Yandicoogina mining lease, which expires in 2039 with an option to extend for 21 years. Mount Tom Price, Marandoo, Brockman 2, Brockman 4, Nammuldi and Western Turner Syncline Mineral and Mining Leases held under Iron Ore (Hamersley Range) Agreement Act 1963. Area of ML4SA subject to current mining operations approx 13,862 ha. Area of M272SA subject to current mining operations approx 2,154 ha. Gudai-Darri Mineral Lease held under Iron Ore (Mount Bruce) Agreement Act 1972. Area of ML252SA subject to current mining operations approx 1,954 ha. Paraburdoo and Eastern Range Mineral Lease held under Iron Ore (Hamersley Range) Agreement Act 1968. Area of ML246SA subject to current mining operations approx 1,990 ha Channar Mining Lease held under Iron Ore (Channar Joint Venture) Agreement Act 1987. Mining lease expires in 2028 with an option to extend by up to five years. Area of M265SA subject to current mining operations approx 1,955 ha. Yandicoogina Mining Lease held under Iron Ore (Yandicoogina) Agreement Act 1996. Area of M274SA subject to current mining operations approx 4,723 ha.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/ investment requirements; and payment of taxes and government royalties. The current business also operates under an Indigenous Land Use Agreement (ILUA) which includes commitments for payments made to trust accounts; indigenous employment and business opportunities; and heritage and cultural protections.	Mount Tom Price began operations in 1966, followed by Paraburdoo in 1974. During the 1990s, Channar (1990), Brockman 2 (1992), Marandoo (1994) and Yandicoogina (1998) achieved first ore. Nammuldi achieved first ore in 2006 followed by Brockman 4 (2010), Western Turner Syncline (2011) and Silvergrass (2017).The latest addition to the network of Hamersley Iron mines will be Gudai-Darri, where first ore is now expected in the second quarter of 2022, subject to the continuing impacts of COVID-19.	All mines operated by Rio Tinto within the property are open pit mines. The mining method employed uses conventional surface mining, whereby shovels and loaders are used to load drilled and blasted material into trucks for removal to waste dumps or feed to process plants. In addition to mining activities, Rio Tinto conducts both exploration and development drilling across the property.	Brockman 2, Brockman 4, Channar, Gudai-Darri, Tom Price, Paraburdoo and Western Turner Syncline: mineralisation is haematite/ goethite mineralisation hosted within the banded iron formations of the Brockman Formation. Detrital deposits also occur at these sites. At Tom Price and Western Turner Syncline, some goethite/ haematite mineralisation hosted within the Marra Mamba Formation also occurs. Marandoo and Silvergrass: mineralisation occurs as goethite/ haematite within the banded iron formations of the Marra Mamba Formation. Some detrital mineralisation also occurs. Yandicoogina: goethite mineralisation occurs as pisolite ores within the paleo-channel of a channel iron formation.	At Brockman 2, Brockman 4, the Nammuldi dry plant and Gudai-Darri, dry crushing and screening is used to produce lump and fines iron ore products. Ore from the Silvergrass and Nammuldi mines is blended and processed through a wet scrubbing and screening plant, ahead of desliming of the fines product using hydrocyclones. At Marandoo, wet scrubbing and screening is used to produce lump and fines iron ore products, prior to desliming of fines products using hydrocyclones. Ore from the Channar and Paraburdoo mines is crushed and then processed through a central tertiary crushing and dry screening plant to produce a dry lump product, with further wet processing of the fines using hydrocyclones to remove slimes. Ore from the Tom Price and Western Turner Syncline mines is directed to either the high grade plant for dry crushing and screening to dry lump and fines products, or to the low grade plant for beneficiation. Heavy media separation is used to beneficiate low grade lump, and a combination of heavy media hydrocyclones and spirals is used to beneficiate the low grade fines. At Yandi, ore is crushed to fines product only through a combination of dry crushing and screening, or crushing and wet processing of ore using classification to remove finer particles. The processing plants within the Hamersley Iron network vary considerably in age, and many plants have been subject to brownfields development since original construction. All plants are subject to an ongoing regime of sustaining capital investment and maintenance, underpinned by asset integrity audits, engineering inspections, engineering life cycles for key equipment and safety inspections and audits.	Supplied through the integrated Hamersley and Robe power network operated by Pilbara Iron.

Group mines as at 31 December 2021

Iron Ore continued

Property	Mine	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
	Eastern Range	54% Rio Tinto. Rio Tinto owns 54% of the Bao-Hi joint venture with the remaining 46% held by China Baowu	Rio Tinto	Pilbara region, Western Australia	Access and infrastructure within the property includes: – a network of sealed and unsealed roads connecting to public roads and highways; – public and Rio Tinto-operated airports; – a Hamersley and Robe owned integrated heavy haulage rail network, operated by Pilbara Iron comprising in excess of 1,890km of rail, multiple rail cars and locomotives; – four shipping terminals, located at Dampier and Cape Lambert and managed as a single port system; – water piping networks for both abstracted water and supply of fresh water to sites; – managed accommodation villages for FIFO sites; – a housing portfolio managing properties in the towns of Dampier, Wickham, Karratha, Pannawonica, Paraburdoo and Tom Price; – tailings storage facilities at several mine sites. All assets are subject to routine inspections and ongoing investment and maintenance programmes to ensure these remain fit-for-purpose.	Mineral lease expires in 2028 with successive options to extend by 21 years. Mineral lease held under Iron Ore (Hamersley Range) Agreement Act 1968. Area of ML4SA subject to current mining operations approx 1,048 ha.
	Hope Downs 1	50% Rio Tinto. 50% Hancock Prospecting Pty Ltd	Rio Tinto	Pilbara region, Western Australia	Access and infrastructure within the property includes: – a network of sealed and unsealed roads connecting to public roads and highways; – public and Rio Tinto-operated airports; – a Hamersley and Robe owned integrated heavy haulage rail network, operated by Pilbara Iron comprising in excess of 1,890km of rail, multiple rail cars and locomotives; – four shipping terminals, located at Dampier and Cape Lambert and managed as a single port system; – water piping networks for both abstracted water and supply of fresh water to sites; – managed accommodation villages for FIFO sites; – a housing portfolio managing properties in the towns of Dampier, Wickham, Karratha, Pannawonica, Paraburdoo and Tom Price; – tailings storage facilities at several mine sites. All assets are subject to routine inspections and ongoing investment and maintenance programmes to ensure these remain fit-for-purpose.	Mining lease expires in 2027 with two options to extend of 21 years each. Mining lease held under Iron Ore (Hope Downs) Agreement Act 1992. Area of M282SA subject to current mining operations approx 4,079 ha.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/investment requirements; and payment of taxes and government royalties. The current business also operates under an Indigenous Land Use Agreement (ILUA) which includes commitments for payments made to trust accounts; indigenous employment and business opportunities; and heritage and cultural protections.	The Bao-Hi joint venture was established in 2002 and has delivered sales of more than 200 million tonnes of iron ore to China. First ore from Eastern Range was delivered in 2004.	All mines operated by Rio Tinto within the property are open pit mines. The mining method employed uses conventional surface mining, whereby shovels and loaders are used to load drilled and blasted material into trucks for removal to waste dumps or feed to process plants. In addition to mining activities, Rio Tinto conducts both exploration and development drilling across the property.	Mineralisation at Eastern Range occurs as haematite/goethite mineralisation hosted within the banded iron formations of the Brockman Formation.	Ore from the Eastern Range mine is crushed and then processed through the central Paraburdoo tertiary crushing and dry screening plant to produce a dry lump product, with further wet processing of the fines product using hydrocyclones to remove slimes. The processing plants within the Hamersley Iron network vary considerably in age, and many plants have been subject to brownfields development since original construction. All plants are subject to an ongoing regime of sustaining capital investment and maintenance, underpinned by asset integrity audits, engineering inspections, engineering life cycles for key equipment and safety inspections and audits.	Supplied through the integrated Hamersley and Robe power network operated by Pilbara Iron.
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/investment requirements; and payment of taxes and government royalties. The current business also operates under an Indigenous Land Use Agreement (ILUA) which includes commitments for payments made to trust accounts; indigenous employment and business opportunities; and heritage and cultural protections.	Joint venture between Rio Tinto and Hancock Prospecting. Construction of Stage 1 to 22 million tonnes per annum commenced 2006 and first production occurred 2007. Stage 2 to 30 million tonnes per annum completed 2009.	All mines operated by Rio Tinto within the property are open pit mines. The mining method employed uses conventional surface mining, whereby shovels and loaders are used to load drilled and blasted material into trucks for removal to waste dumps or feed to process plants. In addition to mining activities, Rio Tinto conducts both exploration and development drilling across the property.	Mineralisation at Hope Downs 1 occurs as goethite/haematite within the banded iron formations of the Marra Mamba Formation. Some detrital mineralisation also occurs.	Ore from Hope Downs 1 is processed through the Hope Downs 1 processing plant, which utilises dry crushing and screening to produce lump and fines iron ore products. The processing plants within the Hamersley Iron network vary considerably in age, and many plants have been subject to brownfields development since original construction. All plants are subject to an ongoing regime of sustaining capital investment and maintenance, underpinned by asset integrity audits, engineering inspections, engineering life cycles for key equipment and safety inspections and audits.	Supplied through the integrated Hamersley and Robe power network operated by Pilbara Iron

Group mines as at 31 December 2021

Iron Ore continued

Property	Mine	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
	Hope Downs 4	50% Rio Tinto. 50% Hancock Prospecting Pty Ltd	Rio Tinto	Pilbara region, Western Australia	Access and infrastructure within the property includes: – a network of sealed and unsealed roads connecting to public roads and highways; – public and Rio Tinto-operated airports; – a Hamersley and Robe owned integrated heavy haulage rail network, operated by Pilbara Iron comprising in excess of 1,890km of rail, multiple rail cars and locomotives; – four shipping terminals, located at Dampier and Cape Lambert and managed as a single port system; – water piping networks for both abstracted water and supply of fresh water to sites; – managed accommodation villages for FIFO sites; – a housing portfolio managing properties in the towns of Dampier, Wickham, Karratha, Pannawonica, Paraburdoo and Tom Price; – tailings storage facilities at several mine sites. All assets are subject to routine inspections and ongoing investment and maintenance programmes to ensure these remain fit-for-purpose.	Mining lease expires in 2027 with two options to extend of 21 years each. Mining lease held under Iron Ore (Hope Downs) Agreement Act 1992. Area of M282SA subject to current mining operations approx 3,254 ha.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/investment requirements; and payment of taxes and government royalties. The current business also operates under an Indigenous Land Use Agreement (ILUA) which includes commitments for payments made to trust accounts; indigenous employment and business opportunities; and heritage and cultural protections.	Joint venture between Rio Tinto and Hancock Prospecting. Construction of wet plant processing to 15 million tonnes per annum commenced 2011 and first production occurred 2013.	All mines operated by Rio Tinto within the property are open pit mines. The mining method employed uses conventional surface mining, whereby shovels and loaders are used to load drilled and blasted material into trucks for removal to waste dumps or feed to process plants. In addition to mining activities, Rio Tinto conducts both exploration and development activities across the property.	Mineralisation at Hope Downs 4 occurs as haematite/goethite mineralisation hosted within the banded iron formations of the Brockman Formation.	Ore from Hope Downs 4 is processed through the Hope Downs 4 processing plant. Wet scrubbing and screening are used to separate lump and fines products, prior to desliming of fines product using hydrocyclones. The processing plants within the Hamersley Iron network vary considerably in age, and many plants have been subject to brownfields development since original construction. All plants are subject to an ongoing regime of sustaining capital investment and maintenance, underpinned by asset integrity audits, engineering inspections, engineering life cycles for key equipment and safety inspections and audits.	Supplied through the integrated Hamersley and Robe power network operated by Pilbara Iron.

Group mines as at 31 December 2021

Iron Ore continued

Property	Mine	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
	Robe River Iron Associates: Robe Valley mines: – Mesa A – Mesa J West Angelas	53% Rio Tinto. Robe River is a joint venture between Rio Tinto (53%), Mitsui Iron Ore Development (33%), and Nippon Steel Corporation (14%)	Rio Tinto	Pilbara region, Western Australia	Access and infrastructure within the property includes: – a network of sealed and unsealed roads connecting to public roads and highways; – public and Rio Tinto-operated airports; – a Hamersley and Robe owned integrated heavy haulage rail network, operated by Pilbara Iron comprising in excess of 1,890km of rail, multiple rail cars and locomotives; – four shipping terminals, located at Dampier and Cape Lambert and managed as a single port system; – water piping networks for both abstracted water and supply of fresh water to sites; – managed accommodation villages for FIFO sites; – a housing portfolio managing properties in the towns of Dampier, Wickham, Karratha, Pannawonica, Paraburdoo and Tom Price; – tailings storage facilities at several mine sites. All assets are subject to routine inspections and ongoing investment and maintenance programmes to ensure these remain fit-for-purpose.	Agreements for life of mine with Government of Western Australia. Mineral lease held under Iron Ore (Robe River) Agreement Act 1964. Area of ML248SA subject to current mining operations approx 11,563 ha.
Dampier Salt Port Hedland, Dampier and Lake Macleod		68.4% Rio Tinto. Dampier Salt is a joint venture between Rio Tinto (68%), Marubeni Corporation (22%) and Sojitz (10%)	Rio Tinto (Dampier Salt Limited)	Gascoyne and Pilbara regions, Western Australia	Road and port	Mining and mineral leases expiring in 2034 at Dampier, 2029 at Port Hedland and 2031 at Lake MacLeod. Mineral leases are held under Dampier Solar Salt Industry Agreement Act 1967, Leslie Solar Salt Industry Agreement Act 1966 and Evaporites (Lake MacLeod) Agreement Act 1967 respectively.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/investment requirements; and payment of taxes and government royalties. The current business also operates under an Indigenous Land Use Agreement (ILUA) which includes commitments for payments made to trust accounts; indigenous employment and business opportunities; and heritage and cultural protections.	First shipment in 1972 from Robe Valley. Interest acquired in 2000 through North Limited acquisition. First ore was shipped from West Angelas in 2002.	All mines operated by Rio Tinto within the property are open pit mines. The mining method employed uses conventional surface mining, whereby shovels and loaders are used to load drilled and blasted material into trucks for removal to waste dumps or feed to process plants. In addition to mining activities, Rio Tinto conducts both exploration and development drilling across the property.	Robe Valley deposits: goethite mineralisation occurs as pisolite ores within the paleo-channel of a channel iron formation. Mineralisation at West Angelas occurs as goethite/ haematite within the banded iron formations of the Marra Mamba Formation. Some detrital mineralisation also occurs.	Ore from the Robe Valley mines of Mesa A and Mesa J is processed through either dry crushing and screening plants or through wet processing plants using scrubbing and screening to remove finer particles. Crushed and deslimed ore from the Robe Valley mines is railed to Cape Lambert, where further dry crushing and screening through a dedicated processing plant produces lump and fines iron ore products. At West Angelas mine, dry crushing and screening is used to produce lump and fines iron ore products. The processing plants within the Hamersley Iron network vary considerably in age, and many plants have been subject to brownfields development since original construction. All plants are subject to an ongoing regime of sustaining capital investment and maintenance, underpinned by asset integrity audits, engineering inspections, engineering life cycles for key equipment and safety inspections and audits.	Supplied through the integrated Hamersley and Robe power network operated by Pilbara Iron.
State Agreement conditions are set by the Western Australian Government and broadly comprise environmental compliance and reporting obligations; closure and rehabilitation considerations; local procurement and community initiatives/investment requirements; and payment of taxes and government royalties.	Construction of the Dampier field started in 1969; first shipment in 1972. Lake MacLeod was acquired in 1978 as an operating field. Port Hedland was acquired in 2001 as an operating field.	Solar evaporation of seawater at Dampier and Port Hedland; underground brine at Lake MacLeod; extraction of gypsum at Lake MacLeod.	Salt is grown every year through solar evaporation in permanent crystallising pans. Gypsum is present in the top layer covering most of the Lake Macleod.	Salt is processed through a washing plant, consisting of screening washbelts at Lake MacLeod, Screwbowl classifiers and static screens at Port Hedland and sizing screens, counter-current classifiers with dewatering screens and centrifuges at Dampier. Dampier produces shipping-ready product for immediate shiploading. Washed salt at Lake MacLeod and Port Hedland is dewatered on stockpiles. Lake Macleod also mines and processes gypsum in leaching heaps.	Long-term contracts with Hamersley Iron and Horizon Power and on-site generation.

Group mines as at 31 December 2021

Copper

Production properties

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Escondida	30% Rio Tinto – 57.5% BHP, 10% JECO Corporation consortium comprising Mitsubishi, JX Nippon Mining and Metals (10%), 2.5% JECO 2 Ltd	BHP	Atacama Desert, Chile	Pipeline and road to deep sea port at Coloso; road and rail 2 concentrate pipelines from mine site to port facility at Coloso, 2 desalinisation plants at Coloso port along with water treatment plant for concentrate filtrate, 2 water pipelines and 4 pump stations for freshwater supply to site, Roadway to site, rail line for supplies and cathode transport, power transport facilities to tie site to power grid, Site offices, housing, and cafeteria facilities to support employees and contractors on site, warehouse buildings and laydown facilities to support operations and projects on site	Rights conferred by Government under Chilean Mining Code. Thirteen mineral rights leases with a total of 57,047 hectares.
Rio Tinto Kennecott Bingham Canyon	100% Rio Tinto	Rio Tinto Kennecott Copper	Near Salt Lake City, Utah, US	Pipeline, road and rail	Wholly owned – approximately 95,000 acres in total.
Oyu Tolgoi	Oyu Tolgoi is TRQ's principal and only material mineral resource property and is held through a 66% interest in Oyu Tolgoi LLC; the remaining 34% interest is held by the Government of Mongolia through Erdenes Oyu Tolgoi LLC. Rio Tinto, with other Rio Tinto affiliates, holds a 50.8% majority interest in TRQ, and is responsible for the day-to-day operational management and development of the project.	Rio Tinto	Khanbogd soum, Umnugovi province, Mongolia	Air and road	Three mining licences are 100% held by Oyu Tolgoi LLC: MV-006708 (the Manakht licence: 4,533 ha), MV-006709 (the Oyu Tolgoi licence: 8,490 ha), and MV-006710 (the Khukh Khad licence: 1,763 ha). Two further licences are held in joint venture with Entrée Gold LLCMV-015226 (the Shivee Tolgoi Licence) and MV-015225 (the Javkhlant Licence). The licence term under the Minerals Law of Mongolia is 30 years with two 20-year extensions. First renewals are due in 2033 and 2039 for the Oyu Tolgoi and Entrée Gold licences respectively.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
Annual tenement payments (during March per year)	Production started in 1990 and since then capacity has been expanded numerous times. In 1998 first cathode was produced from the oxide leach plant, and during 2006 the sulphide leach plant was inaugurated, a year after the start of Escondida Norte pit production. During 2016, the third concentrator plant was commissioned.	Two active surface open pit mines in production, Escondida and Escondida Norte with ore being processed via 3 processing options, Oxide leach, Sulfide RoM leach, or conventional flotation concentrators.	Consists of a series of porphyry deposits containing copper, gold, silver, and molybdenum.	Los Colorados, Laguna Seca Line 1, and Laguna Seca Line 2 Concentrators. OLAP – oxide leach facility, SL Rom leach facility and SX/EW facility.	Supplied from grid under various contracts with local generating companies.
Permit conditions are established by Utah and US Government agencies and comprise: – Environmental compliance and reporting – Closure and reclamation requirements	Interest acquired in 1989. In 2012, the pushback of the south wall commenced, extending the mine life from 2018 to 2032	Open pit	Porphyry and associated skarn deposits containing copper, gold, silver, and molybdenum.	Copperton concentrator, Garfield smelter, refinery, and precious metals plant, assay lab and tailings storage facilities.	Supply contract with Rocky Mountain Power.
Investment Agreement dated 6 October 2009, between the Government of Mongolia, Oyu Tolgoi LLC, TRQ, and Rio Tinto in respect of Oyu Tolgoi (Investment Agreement). Amended and Restated Shareholders Agreement dated 8 June 2011 among Oyu Tolgoi LLC, THR Oyu Tolgoi Ltd. (formerly Ivanhoe Oyu Tolgoi (BVI) Ltd.), Oyu Tolgoi Netherlands B.V. and Erdenes MGL LLC (ARSHA). Erdenes MGL LLC since transferred its shares in Oyu Tolgoi LLC and its rights and obligations under the ARSHA to its subsidiary, Erdenes Oyu Tolgoi LLC. Underground Mine Development and Financing Plan (Underground Development Plan) dated 18 May 2015, between TRQ, the Government of Mongolia, Erdenes Oyu Tolgoi LLC, THR Oyu Tolgoi Ltd., Oyu Tolgoi Netherlands B.V., Rio Tinto and Oyu Tolgoi LLC. Power Source Framework Agreement dated 31 December 2018, between the Government of Mongolia and Oyu Tolgoi LLC, including the amendment to the PSFA dated 26 June 2020. Electricity Supply Agreement dated 26 January 2022, between Southern Region Electricity Distribution Network SOSC, National Power Transmission Grid SOSC, National Dispatching Center LLC and Oyu Tolgoi LLC. In terms of key government permits, Oyu Tolgoi LLC secured a land use permit until 2035 and water use permit until 2039 as well as the mineral rights.	Oyu Tolgoi was first discovered in 1996. Construction began in late 2009 after signing of an Investment Agreement with the Government of Mongolia, and first concentrate was produced in 2012. First sales of concentrate were made to Chinese customers in 2013. In 2015, Underground Development Plan was signed with Government of Mongolia. Rio Tinto continues to work with the Government of Mongolia and TRQ to finalise formal termination of the Underground Development Plan.	Ore Reserves have been reported at the Oyut and Hugo North Deposits. The Oyut deposit is currently mined as an open pit using a conventional drill, blast, load, and haul method. The Hugo North deposit is currently being developed as an underground mine.	Consists of a series of porphyry deposits containing copper, gold, silver, and molybdenum.	One copper concentrator with a nominal feed capacity of 100ktpd currently comprising 2 SAG mills, 4 ball mills, rougher and cleaner flotation circuits and up to 1Mtpa copper concentrate capacity. Other major facilities that support the isolated operations include Maintenance workshops, heating plant, sealed airstrip and terminal, and camp facilities with up to 6,000 person capacity to accommodate current operations and the UG construction project. UG infrastructure in place includes several shafts for ore haulage, man haulage and ventilation plus a conveyor decline to surface and associated surface infrastructure.	Currently sources its power under an agreement with the Inner Mongolia Power International Cooperation Company Ltd. (IMPIC), via the Mongolian National Power Transmission Grid (NPTG) authority, with Grid power from China and supplementary diesel power generation at site. Signed Tavan Tolgoi Power Plant Power Source Framework agreement in December 2018.

Group mines as at 31 December 2021

Copper continued

Projects

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Resolution	55% Rio Tinto, 45% BHP	Rio Tinto	Superior, Arizona, Pinal County, US	Road, rail and water pipeline from Superior to Florence, AZ	Unpatented Mining Claims: Total of unpatented claims: 2,249 Total acres: 46,390 acres To hold the unpatented lode/placer mining claims we file annually with the Bureau of Land Management , a 'Notice of Intent to Hold' and a Maintenance Fee of $165.00 for each claim for the BLM. We then record the claims in the Arizona counties of Pinal and Gila at a rate of $30.00 each. Arizona State Land Department Exploration Permits: RCML have a total of 15 exploration permits with a total acreage of 4,162.89 acres. They have to be renewed once a year at a cost of either $10.00 or $20.00 per acre currently. Once we have the permits for 5 years a new permit will be applied for the acreage for that section of land. Exploration permits are only good for 5 years.
Winu	100% Rio Tinto	Rio Tinto	Great Sandy Desert, Western Australia, Australia	Road	Exploration Licence E45/4833 hosts the deposit. Several Miscellaneous Licences cover the road access route, associated roads and the emergency-use airstrip. A Mining Lease Application (M45/1288; 7,500ha) has been surveyed and is awaiting formal approval.
La Granja	100% Rio Tinto	RTX	Cajamarca, Northern Peru	Mountain road access only, 6hrs+ by 4x4	The present La Granja Mining Concession grants its titleholders the right to explore and exploit all existing mineral resources within the 3,900 hectares it covers. As mining operations have not yet started, a full EIA has not been required.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
Permitting: Resolution is in the permitting and study stage of the project. It is currently at the end of a multi-year process to complete its Environmental Impact Statement under the National Environmental Protection Act. Future permits will be required for operations such as air quality permits and aquifer protection permits.	The Magma Vein (formerly Silver Queen) was discovered in the 1870s and underground mining continued at the Magma Mine until 1998. In 1996, the Resolution deposit was discovered via an underground drillhole directed south from the Magma Mine workings. Kennecott Exploration (Rio Tinto) entered the project in 2001 and through an exploration "earn-in" agreement became operator in 2004.	Underground	Porphyry copper and molybdenum deposit.	Water treatment and reverse osmosis plant, historic tailings impoundments from the Magma Mine.	115kV power lines to Eat and West Plant sites with supply contract with SRP.
Annual exploration licence rental payments (annually in October).	The exploration licence was granted to Rio Tinto in October 2017 and Winu was discovered in December 2017. Exploration programmes have evolved into resource definition studies since that time. The initial Inferred Mineral Resource was announced in July 2020.	Winu is currently in the advanced stages of exploration and resource development. An open pit operation is planned following the receipt of full approvals for the mining operation.	Primary mineralisation is copper-gold-silver mineralisation hosted within sulphide breccias and quartz veins. A supergene enrichment profile caps most of the primary mineralisation.	Winu comprises a mobile exploration camp for up to 190 people, unimproved access roads and trails, and an emergency-use only gravel airstrip.	Power is provided by diesel generators.
Because of special status due to acquisition through privatisation, as well as the annual fee ($10m per year split 50:50 between federal government fees and the establishment of a social fund), RTMP's title on it is subject to completion and delivery of a Feasibility Study, and implementation of a mine of approval of the Feasibility Study by the Peruvian Government. The agreement is scheduled to expire (delivery of FS) in 2025, however, RTMP is seeking to implement a 3 year extension to January 2028.	Rio Tinto received the Mining Concession in 2005, after BHP and Cambior had returned the leases to the Peruvian Government. Numerous studies up to PFS occurred between 2005-2015. In 2015 the project was handed over to RTX and returned to Conceptual Study status. In 2017 the project was placed on care and maintenance whilst commercial options and closure and exit were evaluated by Rio Tinto.	This is an exploration site. Open pit is envisaged for exploitation if the business case is positive.	Porphyry and associated skarn deposits with high grade breccias. Copper with minor silver, and molybdenum.	A Pre-Feasibility Study (PFS) for a Starter Case mining 15 Mt of ore per annum, with dump leach processing only, and an Order of Magnitude (OoM) study for Large Case of approximately 160 Mt of ore per annum, with mill and concentrator as well as dump leaching was completed in 2013.	Currently on local grid for exploration activities (incl camp) with back up generators. An upgraded power link would be required for development of the asset.

Group mines as at 31 December 2021

Copper continued

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Simandou	45.05% Rio Tinto; 39.95% CIOH (Chinalco, Baowu, CCC Group, CRC Group);15% GoG	Rio Tinto	The Simandou South Mining Concession is located ~550km east-south-east of Conakry in the Republic of Guinea	Approximately 850km of sealed and unsealed roads; charter flights from Conakry to Beyla airstrip well maintained, unsealed road 40km to site.	Simandou South Mining Concession was ratified by the Guinea Government on 26 May 2014. The Concession duration is 25 years, renewed automatically for a further period of 25 years followed by further 10 year periods in accordance with the Guinean Mining Code. 369 km^2 area.

Minerals

Production properties

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Rio Tinto Borates – Boron	100% Rio Tinto	Rio Tinto	Boron, California, Kern County, United States	Road and rail	Land holdings include 13,493 acres (owned including mineral rights) for the mining operation, plant infrastructure, and tailings storage facility.
Rio Tinto Fer et Titane Lac Tio	100% Rio Tinto	Rio Tinto	Havre-Saint-Pierre, Province of Quebec, Canada	Rail, road and port (St Lawrence River)	A total of 6,534 hectares of licences including two mining concessions of total 609ha, granted by Province of Quebec in 1949 and 1951 which, subject to certain Mining Act restrictions, confer rights and obligations of an owner.
QIT Madagascar Minerals (80%)	QIT Madagascar Minerals is 80% owned by Rio Tinto and 20% owned by the Government of Madagascar.	Rio Tinto	Fort-Dauphin, Madagascar	Road and port	Mining lease covering 56,200 hectares, granted by central government.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
The Concession duration is 25 years, renewed automatically for a further period of 25 years followed by further 10 year periods in accordance with the Guinean Mining Code, provided Simfer has complied with its obligations under the Amended and Consolidated Basic Convention entered into with the Republic of Guinea, dated 26 May 2014. The Amended and Consolidated Basic Convention (ACdB) is still valid and provides surety of tenure. In 2012 the SEIA for the project was approved by the Republic of Guinea. A process is in place to ensure this approval is maintained. The Certificate of Compliance for the Simandou Mine SEIA is renewable on an annual basis and is currently valid until 28 January 2022.	No production	Open pit	Supergene-enriched itabirite hosted iron ore deposits. The deposits are part of a supracrustal belt with the BIF proto-ore likely deposited in a shallow marine setting within a forearc basin. The age of deposition is considered to be between 2.7 Ga and 2.2 Ga.	Run-of-mine ore is coarsely crushed at the mine site to P100 of – 80 mm through two identical primary and secondary crushing stations in a stacked arrangement. The coarsely crushed ore is then conveyed to the mine stockyard. The ore is reclaimed from the stockpiles and conveyed to the train load-out facility for loading into trains which transport materials to the port facility where it is shipped by bulk carrier to several ports in China. There it is further crushed, blended and in some instances ground to the required final product size for fines pellet feed. Other major facilities that support the isolated operations include power generation, explosives facilities, fuel and lubricants facilities, administration buildings, workshops, permanent village, etc.	Current designs contemplate that power for the mine site and other areas will be supplied by a diesel-powered fuel station. However, there is a plan to connect the facility to the power grid from local operator Electricite de Guinee as well. This will require an approx. 20 km connection line to the main grid once it is available and would substantially reduce energy costs and fuel consumption.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
Boron Operation currently has all State and Federal environmental and operational permits in place to continue the mining and processing operation. Regular updates to permits are ongoing.	Deposit discovered in 1906, underground mining operations began in 1925, 3 underground mining operations were consolidated and the mining method switched to open pit mining in 1956. Assets were acquired by Rio Tinto in 1967.	Open pit	Sedimentary sequence of tincal and kernite containing interbedded claystone enveloped by facies consisting of ulexite and colemanite bearing claystone, and barren claystone.	Boron Operation consists of the open pit mine, an ore crushing and conveying system, 2 process plants (Primary Process and Boric Acid Plant), Shipping facility, and tailings storage facilities.	On-site co-generation units and local power grid.
The property is held under Quebec provincial government mining concession permits (Concession minière No 368 and 381). Each is of one year duration renewable as long as the mine is in operation. RTFT has also a number of claims (exclusive exploration permits) covering ilmenite occurrences in the region of the mine. These claims are renewable every 2 years.	Production started 1950; interest acquired in 1989.	Open pit	Magmatic intrusion.	Lac Tio has a crushing facility, dedicated railway, stockpile at the train terminal, ship loader, office buildings at the mine and at the terminal and waste dumps.	Supplied by Hydro Quebec at regulated tariff.
The permit has a validity of 30 years as of 12 December 1996. Additional renewal for 10-years each period are granted at QMM's request. An annual fee is payable to government authorities following notification at the beginning of January.	Exploration project started in 1986; construction approved 2005. Ilmenite and zirsil production started 2008. QMM intends to extract ilmenite and zirsil from heavy mineral sands over an area of about 6,000 hectares along the coast over the next 40 years.	Mineral sand dredging	Coastal mineralised sands.	QMM has an operating Dredge, Dry Mine Unit, Heavy Mineral Concentrator, Mineral Separation Plant, Port and bulk loading facilities.	On-site heavy fuel oil generators; wind and solar project agreements with IPP are expected to take the asset to 50% RE by 2024.

Group mines as at 31 December 2021

Minerals continued

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Richards Bay Minerals	RBM is a joint venture between Rio Tinto (74%) and Blue Horizon – a consortium of investors and our Host Communities Mbonambi, Sokhulu, Mkhwanazi and Dube – which own 24%. The remaining shares are held in an employee trust.	Rio Tinto	Richards Bay, KwaZulu-Natal, South Africa	Rail, road and port	Mineral rights for Reserve 4 and Reserve 10 issued by South African State and converted to new order mining rights from 9 May 2012. Mining rights run until 8 May 2041 and covers 11,645 hectares including mined Tisand area.
Iron Ore Company of Canada (IOC)	IOC is a joint venture between Rio Tinto (58.7%), Mitsubishi (26.2%) and the Labrador Iron Ore Royalty Income Corporation (15.1%).	Rio Tinto	Labrador City, Province of Newfoundland and Labrador, Canada	Railway and port facilities in Sept-Îles, Quebec (owned and operated by IOC) Public highway Airport	Mining leases, surface rights and a tailings disposal licence are held by the Labrador Iron Ore Royalty Company (LIORC) under the Labrador Mining and Exploration Act. LIORC subleases these rights to IOC. The mining leases cover 10,356 hectares, the surface rights cover 8,805 hectares and the tailings licence covers 2,784 hectares. These subleased rights are valid until 2050. IOC also directly holds three small mining leases, but none produce saleable products. In addition to the above rights, IOC also holds a number of mineral licences, either directly or under sublease from LIORC.
Diavik	100% owned by Diavik Diamond Mines (2012) Inc.	Diavik Diamond Mines (2012) Inc. is a Yellowknife-based Canadian subsidiary of Rio Tinto plc in London, UK	Northwest Territories (NWT), Canada	Air, ice road in winter	Three mineral rights leases with a total acreage of 8,016 (3,244 ha). Mining leases are issued by the NWT Government. One lease was renewed in 2017 and two leases were renewed in February 2018. The new leases will expire after 21 years.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
RBM operates in three lease areas, Tisand, Zulti North and Zulti South, by means of a notarial deed. Tisand (which contains the stockpiled tails) and Zulti North leases are held by Tisand (Pty) Ltd. In September 2012, Rio Tinto completed the acquisition of BHP Billiton's entire interests in RBM. The acquisition resulted in Rio Tinto effectively doubling its holding (74%) in RBM. The remaining 26% of RBM is owned by a consortium of local communities and businesses (24%) and RBM employees (2%), in line with South Africa's Broad-Based Black Economic Empowerment legislation.	Production started 1977; initial interest acquired 1989. Fifth mining plant commissioned in 2000. One mining plant decommissioned in 2008. In September 2012, Rio Tinto doubled its holding in Richards Bay Minerals to 74% following the acquisition of BHP Billiton's entire interests.	Dune sand dredging	Coastal mineralised sands	RBM manages and operates several dredges, dry mining units, heavy mineral concentrators and a mineral separation plant. RBM also has a smelter with furnaces to produce titania slag, pig iron in addition to rutile and zircon.	Contract with ESKOM.
Several existing and valid Newfoundland and Labrador permits such as TMP Release, Tailings Disposal Licence, Approval for Asbestos Disposal Site at Main landfill Facility, Mill licence, PCB Storage Facility, Landfill, Water withdrawal and use of bodies of water, Dewatering & Excavation of Maggie Lake, Infilling of Carol Lake Lagoon and unnamed water body, Sewage System/Water Supply for Crusher Building. IOC holds also Federal Permits (Fish Habitat Compensation Agreement, Tailings Management Plan and dewatering).	Interest acquired in 2000 through acquisition of North Ltd. Current operation began in 1962 and has processed over one billion tonnes of crude ore. Annual capacity 23 million tonnes of concentrate of which 12 to 13 million tonnes can be pelletised.	Open pit	Oxide iron (specular hematite and magnetite)	Concentrator (gravity and magnetic separation circuits), Pellet plant, Warehouses, Workshops, Heating plant, Ore delivery system (crusher/conveyor and automated train system) Explosives plant, Train loadout facilities, Rail line (Labrador City to Sept-Îles), Stockyards, Shiploaders	Supplied by Newfoundland and Labrador Hydro.
Our key permit conditions are local employment, procurement and benefit sharing commitments; environmental compliance and reporting; environmental security and closure and rehabilitation planning; and payment of taxes and government royalties.	Deposits discovered in 1994-95. Construction approved in 2000. Diamond production started in 2003. Fourth pipe commenced production in 2018. Mine life through 2023-25. In November 2021, Rio Tinto became the sole owner of Diavik Diamond Mine. This followed the completion of a transaction for Rio Tinto's acquisition of the 40% share held by Dominion Diamond Mines in Diavik, following the Court of Queen's Bench of Alberta's approval.	Open pit and underground operations (Blast-hole stoping and Sub-level Cave methods).	Diamondiferous kimberlite deposit	Includes processing plant and accommodation facilities onsite.	On-site diesel generators; installed capacity 44MW and 9.2MW of wind capacity.

Group mines as at 31 December 2021

Minerals continued

Projects

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
Jadar	100% Rio Tinto	Rio Tinto	Loznica town, Serbia	Road and rail	The last extension of the Jadar exploration licence expired on 14 February 2020, with no legal basis for further extension of its term. During the Feasibility Study the Project has completed the Elaborate on Resources and Reserves (declaration based on Serbian law), obtained the Certificate on Resources and Reserves on 6th January 2021 and has submitted the request for exploitation field licence (with Serbian Feasibility Study being one of the supporting documents to this request). In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We remain committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.
Energy Resources of Australia – Ranger	86.3% Rio Tinto with the remaining 13.7% held by minority shareholders	Energy Resources of Australia	Northern Territory, Australia	Road, rail and port	ERA Mining Tenure comprises two leases: the Ranger Project Area (RPA, 79 km^2) which hosts the now mined out Ranger 1 and 3 and undeveloped R3 Deeps uranium deposits, and MLN1 (73 km^2), which hosts the undeveloped Tier 1 Jabiluka uranium deposit. Mining tenure granted by Federal Government as per Section 41 of the Atomic Energy Act. The Authority to mine and process at Ranger is due to expire on 8 January 2021, when "ERA shall cease or suspend, as the case may be, all mining operations permitted under this Authority by 8 January 2021".

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
The project is governed by two main pieces of Serbian legislation: Mining Law is administered by the Ministry of Mining and Energy (MME) and Planning and Construction Law is administered by the Ministry of Construction, Transportation and Infrastructure (MCTI). The permitting process base case foresees the following: – Mine, beneficiation plant and mine surface facilities are subject to the permitting procedure of MME. – Processing plant, industrial waste landfill and infrastructure (rail, roads, power and water pipelines) are subject to the unified permitting procedure under MCTI.	The Jadar deposit was discovered in 2004 by Rio Tinto Exploration geologists during a regional exploration program for borates in the Balkans. The deposit is in its majority composed of a mineral new to science named Jadarite with high concentrations of lithium and boron. Resource definition and processing workflow development and testing were conducted for over a decade. The Pre-feasibility Study (PFS) completed in July 2020 has shown that the Jadar project has the potential to produce both battery grade lithium carbonate and boric acid. Based on current estimates and subject to receiving all relevant approvals, permits and licences, first saleable production is expected to be no earlier than 2027 (previously 2026). In January 2022, the Government of Serbia cancelled the Spatial Plan for the Jadar project and required all related permits to be revoked. We remain committed to exploring all options and are reviewing the legal basis of the decision and the implications for our activities and people in Serbia.	Underground mine	Jadarite mineralisation is present in three broad zones containing stratiform lenses of variable thickness. These units are hosted in a much thicker gently dipping sequence mainly composed of fine-grained sediments affected by syn and post depositional faulting.	The planned site layout includes a concentrator to beneficiate the primary ore, a chemical plant to produce boric acid and lithium carbonate, paste plant, water and waste treatment plants, surface waste storage (dry stack), railroad spur and warehouses for product storage and loading / unloading, and office buildings.	Connected to the national electric grid. Electricity planned to be sourced from nearby hydroelectrical power plant.
RPA – Granted under s41 of the Atomic Energy Act – Authority to process uranium expires 8 Jan 2021. Lease expires 8 Jan 2026, allowing for 5 years of rehabilitation and closure activities. MLN1 – Northern Territory Mineral Lease granted in 1982 under the NT Mining Act for an initial period of 42 years – Expires in 2024, which can be renewed by the Minister for a further period not exceeding 10 years provided ERA has complied with the NT Mining Act and the conditions of MLN1	Mining commenced 1981. Interest acquired through acquisition of North 2000. Open pit mining ended 2012, since then ERA has been processing ore stockpiles. Processing of uranium ore finished on 8 January 2021 with the expiry of the RPA authority to mine and process uranium ore. Remaining reserves and resources within the RPA (including the Ranger 3 Deeps) were extinguished in accordance with JORC RPEEE guidelines, leaving only the Jabiluka resource as ERA's remaining asset. Activities are now focused on Closure and Rehabilitation of the Ranger minesite. Since commencing processing in 1982, Ranger mine has produced over 132,000 tonnes of uranium oxide.	Hard rock Open cut/ Stockpile	Paleo-Proterozoic, structurally-hosted “unconformity-type” uraninite.	Crushing (primary, secondary and tertiary crushing circuits); Grinding plant; Leaching circuit; Counter Current Decant circuit; solvent extraction circuit; precipitation, drying and packing circuit; Neutralisation and tailings disposal system.	On-site diesel generation.

Group mines as at 31 December 2021

Aluminium

Production properties

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
CBG Sangaredi	Rio Tinto Group 22.95%, Guinean Government 49%, Alcoa 22.95%, Dadco Investments Limited 5.1%	La Compagnie des Bauxites de Guinée	Sangaredi, Guinea	Road, air and port. Sangaredi-Kamsar railway (leasing rail infrastructure from ANAIM, wholly-owned by Government of Guinea).	Mining concession expires in 2040. Leases comprise 2,939 km^2.
Gove	100% Rio Tinto	Rio Tinto through Rio Tinto Alumina Gove P/L	Gove, Northern Territory, Australia	Road, air and port	All leases were renewed in 2011 for a further period of 42 years. The residue disposal area is leased from the Arnhem Land Aboriginal Land Trust. The Northern Territory government is the lessor of the balance of the leases; however, on expiry of the 42-year renewed term, the land subject to the balances of the leases will all vest to the Arnhem Land Aboriginal Land Trust. Leases comprise 233.5 km^2.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
The obligations of CBG relative to health and safety of workers and to the environment and to the rehabilitation of mined out areas are subject to the Mining Code (2011) and Environmental Code of the Republic of Guinea.	CBG is a JV created in 1963 and is registered in US (Delaware). Bauxite mining commenced in 1973. Shareholders are 51% Halco and 49% Government of Guinea. Rio Tinto holds a 45% interest in Halco. Expansion of the CBG bauxite mine, processing plant, port facility and associated infrastructure is currently near completion with ramp up to 18.5 million tonnes per annum underway. In 2015, CBG entered into an agreement to share the rail infrastructure in Multi-User Operation Agreement (MUOA) with other bauxite companies, GAC (EGA) and COBAD (RUSAL).	Open cut	Bauxite	The Sangaredi site is an open cut mine including the following operations: stripping, drilling, blasting, loading, hauling. Then, the bauxite is transported by railway cars approximately 135 km away from Sangaredi to Kamsar. In Kamsar, the installations include the following assets: locomotive repair shop, railway cars unloader, primary crusher, secondary crusher, scrubbers, conveyors, stacker, reclaimer, bauxite dryers, dry bauxite storage, bauxite sampling tower, power house, wharf, ship loader, etc. The crushing plant is used only to reduce oversize material – no screening required. Four bauxite dryers are installed in order to reduce the moisture content of the bauxite before shipping.	On-site generation (fuel oil).
Key permit conditions are prescribed by the Northern Territory Government in the form of a Mine Management Plan (MMP). The current MMP runs for a period of 12 years, until 2031, and authorises all activities at the operation. Lease payments are prescribed by the terms of the relevant leases.	Bauxite mining commenced in 1970, feeding both the Gove refinery and export market, capped at two million tonnes per annum. Bauxite export ceased in 2006 with feed intended for the expanded Gove refinery. Bauxite exports recommenced in 2008 and will increase in the coming years following the curtailment of the refinery production in 2014 and permanent shut decision made by the Board of Rio Tinto in October 2017. Current annual production capacity is 12.5 million tonnes on a dry basis	Open cut	Bauxite	Crushing plant only to reduce oversize material – no screening required.	On-site diesel fired power station.

Group mines as at 31 December 2021

Aluminium continued

Property	Ownership	Operator	Location	Access and Infrastructure	Title/lease/acreage
MRN Porto Trombetas	MRN's shareholders are: Rio Tinto (12%), Vale (40%), Hydro (5%), South 32 (14.8%), CBA (Companhia Brasileira de Alumínio 10%) and Alcoa (18.2%). *Alcoa's 18.2% is comprised of Alcoa Alumínio (8.58%), AWA Brasil (4.62%) and AWA LLC (5%), each a subsidiary of Alcoa (10%).	MRN is a non-managed JV. All decisions are approved by shareholders BoD	Porto Trombetas, Para, Brazil	Air or port	Mining concession granted by Brazilian Mining Agency (ANM), following the Brazilian mining code with no expiration date. The current 44 MRN mining leases cover 22 major plateaus, which spread across 143,000 hectares and all of them have the status of a mining concession.
Weipa/Ely	100% Rio Tinto	Rio Tinto through Rio Tinto Alumina Weipa P/L	Weipa, Queensland, Australia	Road, air and port	The Queensland Government Comalco (ML7024) lease expires in 2042 with an option of a 21-year extension, then two years' notice of termination; the Queensland Government Alcan lease (ML7031) expires in 2048 with a 21-year right of renewal with a two-year notice period. Leases comprise 2,716.9 km^2 ML7024 = 1340.8 km^2; ML7031 = 1376.1 km^2. This property with the associated 2 leases, includes the deposits known as Andoom, East Weipa, Amrun, Norman Creek and North of Weipa.

Key permit conditions	History	Property description / type of mine	Type of mineralisation	Processing plants and other available facilities	Power source
With the exception of concessions from Amazonas State, the MRN mining leases are within the Saracá-Taquera National Forest, a preservation environmental area. However, the right of mining is preserved initially by the Federal law which created the National Forest (that is subsequent to mining concessions), as well by the management plan, which acknowledges a formal mining zone within the confines of the National Forest. Environmental licensing is granted by Brazilian Environmental Agency (IBAMA) up to 2026 for East Zone. For West Zone it will require new licensing from 2027 to 2048.	Mineral extraction commenced in 1979. Initial production capacity 3.4 million tonnes annually. From 2003, production capacity up to 16.3 million tonnes per year on a dry basis. Due to market and tailings facilities restrictions, the planned production 12.5Mtpa on dry basis (up to 2038). The planned production from 2039 to 2048 is 15Mtpa.	Open cut	Consists of a series of bauxite tabular deposits with 2 mining plan sequencing: East Zone (1979 – 2026) and West Zone (2027-2048)	The beneficiation process is formed by a primary crusher, conveyors, scrubbers, secondary crushers, screenings, hydrocyclones and vacuum filters. The superfines tailings are pumped to a tailing system facility.	On-site generation fuel oil + diesel).
The respective leases are subject to the Comalco Agreement Act (Comalco Agreement) and Alcan Agreement Act (Alcan Agreement); the relevant State Agreements for the Weipa operations. Key permit conditions are prescribed by the Queensland Government in the relevant Environmental Authority applicable to each lease (ML7024 and ML7031, respectively). Lease payments are subject to the terms of the leases and the respective State Agreements.	Bauxite mining commenced in 1961 at Weipa. Major upgrade completed in 1998. Rio Tinto interest increased from 72.4% to 100% in 2000. In 1997, Ely Bauxite Mining Project Agreement signed with local Aboriginal land owners. Bauxite Mining and Exchange Agreement signed in 1998 with Comalco to allow for extraction of ore at Ely. The Western Cape Communities Co-Existence Agreement, an Indigenous Land Use Agreement, was signed in 2001. Following the ramp up to full production of Amrun the current annual production of the Weipa mine is 35.5 million tonnes.	Open cut	Bauxite	Andoom, East Weipa and Amrun – wet crushing and screening plants to remove ultra fine proportion.	On-site generation (diesel) supplemented by a solar generation facility.

Group smelters and refineries (Rio Tinto's interest 100% unless otherwise shown)

Smelter/refinery	Location	Title/lease	Plant type / Product	Capacity (based on 100% ownership)
Aluminium				
Alma	Alma, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium rod, t-foundry, molten metal, high purity, remelt	473,000 tonnes per year aluminium
Alouette (40%)	Sept-Îles, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium high purity, remelt	622,000 tonnes per year aluminium
Arvida	Saguenay, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium billet, molten metal, remelt	174,000 tonnes per year aluminium
Arvida AP60	Saguenay, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium high purity, remelt	60,000 tonnes per year aluminium
Bécancour (25.1%)	Bécancour, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium slab, billet, t-foundry, remelt, molten metal	454,000 tonnes per year aluminium
Bell Bay	Bell Bay, Northern Tasmania, Australia	100% freehold	Aluminium smelter producing aluminium slab, molten metal, small form and t-foundry, remelt	195,000 tonnes per year aluminium
Boyne Smelters (59.4%)	Boyne Island, Queensland, Australia	100% freehold	Aluminium smelter producing aluminium billet, EC grade, small form and t-foundry, remelt	584,000 tonnes per year aluminium
ELYSIS (48.24%)	Saguenay, Quebec, Canada	100% freehold	Aluminium zero-carbon smelting pilot cell producing aluminium high purity	275 tonnes per year aluminium
Grande-Baie	Saguenay, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium slab, molten metal, high purity, remelt	233,000 tonnes per year aluminium
ISAL	Reykjavik, Iceland	100% freehold	Aluminium smelter producing aluminium remelt, billet	212,000 tonnes per year aluminium
Jonquière (Vaudreuil)	Jonquière, Quebec, Canada	100% freehold	Smelter grade alumina	1,560,000 tonnes per year alumina
Kitimat	Kitimat, British Columbia, Canada	100% freehold	Aluminium smelter producing aluminium slab, remelt, high purity	432,000 tonnes per year aluminium
Laterrière	Saguenay, Quebec, Canada	100% freehold	Aluminium smelter producing aluminium slab, remelt, molten metal	257,000 tonnes per year aluminium
Queensland Alumina (80%)	Gladstone, Queensland, Australia	73.3% freehold; 26.7% leasehold (of which more than 80% expires in 2026 and after)	Refinery producing alumina	3,950,000 tonnes per year alumina
São Luis (Alumar) (10%)	São Luis, Maranhão, Brazil	100% freehold	Refinery producing alumina	3,830,000 tonnes per year alumina
Sohar (20%)	Sohar, Oman	100% leasehold (expiring 2039)	Aluminium smelter producing aluminium, high purity, remelt	395,000 tonnes per year aluminium
Tiwai Point (New Zealand Aluminium Smelters) (79.4%)	Invercargill, Southland, New Zealand	19.6% freehold; 80.4% leasehold (expiring in 2029 and use of certain Crown land)	Aluminium smelter producing aluminium billet, slab, small form foundry, high purity, remelt	373,000 tonnes per year aluminium
Tomago (51.6%)	Tomago, New South Wales, Australia	100% freehold	Aluminium smelter producing aluminium billet, slab, remelt	590,000 tonnes per year aluminium
Yarwun	Gladstone, Queensland, Australia	97% freehold; 3% leasehold (expiring 2101 and after)	Refinery producing alumina	3,250,000 tonnes per year alumina
Copper				
Rio Tinto Kennecott	Magna, Salt Lake City, Utah, US	100% freehold	Flash smelting furnace/Flash convertor furnace copper refinery and precious metals plant	335,000 tonnes per year refined copper

Group smelters and refineries (Rio Tinto's interest 100% unless otherwise shown)

Smelter/refinery	Location	Title/lease	Plant type / Product	Capacity (based on 100% ownership)
Minerals				
Boron	California, United States	100% freehold	Borates refinery	576,000 tonnes per year boric oxide
IOC Pellet plant (58.7%)	Labrador City, Province of Newfoundland and Labrador, Canada	100% freehold (asset), 100% freehold (land) under sublease from Labrador Iron Ore Royalty Corporation for life of mine.	Pellet induration furnaces producing multiple iron ore pellet types	13.5 million tonnes per year pellet
Richards Bay Minerals (74%)	Richards Bay, South Africa	100% freehold	Ilmenite smelter	1,050,000 tonnes per year titanium dioxide slag, 565,000 tonnes per year iron
Rio Tinto Fer et Titane Sorel Plant	Sorel-Tracy, Quebec, Canada	100% freehold	Ilmenite smelter	1,300,000 tonnes per year titanium dioxide slag, 1,000,000 tonnes per year iron

Group power plants (Rio Tinto's interest 100% unless otherwise shown)

Power plant	Location	Title/lease	Plant type / Product	Capacity (based on 100% ownership)
Iron Ore				
Cape Lambert power station (67%)	Cape Lambert, Western Australia, Australia	Lease	Two LM6000PS gas-fired turbines	80MW
Paraburdoo power station	Paraburdoo, Western Australia, Australia	Lease	Three LM6000PC gas-fired turbines	120MW
West Angelas power station (67%)	West Angelas, Western Australia, Australia	Miscellaneous licence	Two LM6000PF dual-fuel turbines	80MW
Yurralyi Maya power station (84.2%)	Dampier, Western Australia, Australia	Miscellaneous licence	Four LM6000PD gas-fired turbines One LM6000PF gas-fired turbine (dual-fuel potential)	200MW
Aluminium				
Amrun power station	Amrun, Australia	100% leasehold	Diesel generation	24MW
Gladstone power station (42%)	Gladstone, Queensland, Australia	100% freehold	Thermal power station	1,680MW
Gove power station	Nhulunbuy, Northern Territory, Australia	100% leasehold	Diesel generation	24MW
Kemano power station	Kemano, British Columbia, Canada	100% freehold	Hydroelectric power	896MW
Quebec power stations	Saguenay, Quebec, Canada (Chute-à-Caron, Chute-à-la-Savane, Chute-des-Passes, Chute-du-Diable, Isle-Maligne, Shipshaw)	100% freehold (certain facilities leased from Quebec Government until 2058 pursuant to Peribonka Lease)	Hydroelectric power	3,147MW
Weipa power stations and solar generation facility	Lorim Point, Andoom, and Weipa, Australia	100% leasehold	Diesel generation supplemented by solar generation facility	38MW
Yarwun alumina refinery co-generation plant	Gladstone, Queensland, Australia	100% freehold	Gas turbine and heat recovery steam generator	160MW

Group power plants (Rio Tinto's interest 100% unless otherwise shown)

Power plant	Location	Title/lease	Plant type / Product	Capacity (based on 100% ownership)
Copper				
Rio Tinto Kennecott power stations	Salt Lake City, Utah, US	100% freehold	Thermal power station	75MW
			Steam turbine running off waste heat boilers at the copper smelter	31.8MW
			Combined heat and power plant supplying steam to the copper refinery	6.2MW
Minerals				
Boron co-generation plant	Boron, California, US	100% freehold	Co-generation uses natural gas to generate steam and electricity, used to run Boron's refining operations	48MW
Energy Resources of Australia (Rio Tinto: 86.3%)	Ranger Mine, Jabiru, Northern Territory, Australia	Lease	Five diesel generator sets rated at 5.17MW; one diesel generator set rated at 2MW; four additional diesel generator sets rated at 2MW	35.8MW
IOC power station	Sept-Îles, Quebec, Canada	Statutory grant	Hydroelectric power	22MW
QMM power plant	Fort Dauphin, Madagascar	100% freehold	Diesel generation	24MW

Additional information

Independent Reasonable and Limited Assurance Report

of KPMG (KPMG Australia) to the Directors of Rio Tinto plc and Rio Tinto Limited

CONCLUSION

a) Assured Sustainability Information – Limited assurance

Based on the evidence we obtained from the procedures performed, we are not aware of any material misstatements in the Assured Sustainability Information presented in the Sustainability sections of the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021 for the year ended 31 December 2021, which has been prepared by Rio Tinto plc and Rio Tinto Limited (together Rio Tinto) in accordance with the Reporting Criteria.

b) GHG Emissions – Reasonable assurance

In our opinion, in all material respects, Rio Tinto's total Greenhouse Gas (GHG) emissions (equity basis) of 31.1 MtCO2-e (Scope 1 and 2) presented in the Sustainability sections of the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021 for the year ended 31 December 2021, has been prepared by Rio Tinto in accordance with the Reporting Criteria.

Assured Sustainability Information and GHG Emissions data

The Assured Sustainability Information is summarised below:

- Rio Tinto's assertion that it has incorporated the requirements of the International Council on Mining and Metals (ICMM) 10 Principles for sustainable development, and the mandatory requirements set out in the ICMM Position Statements, into its own policies, strategies and standards.
- Rio Tinto's assertions regarding the approach it has adopted to identify and prioritise its material sustainable development risks and opportunities set out in the Sustainability sections of the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021.
- Rio Tinto's assertions regarding the existence and status of implementation of systems and approaches used to manage the following selected sustainable development risk areas:
  - Health, safety and wellbeing
  - Business integrity and governance
  - Climate change
  - Local community relations
  - Cultural and heritage site management
  - Water management
- The following Rio Tinto performance data related to the selected sustainable development risk areas:
  - Fatalities at managed operations
  - All injury frequency rate (AIFR)
  - Lost time injury frequency rate (LTIFR)
  - Number of lost time injuries (LTIs)
  - New cases of occupational illness
  - Number of cases reported to the Business Conduct Office
  - GHG emissions intensity (equity basis)
  - Total energy (100% managed basis)
  - Total Scope 3 emissions (equity basis)
  - Community contributions
  - Cultural heritage disclosures
  - Tier 1 Water Target performance data and assertions

The GHG Emissions data is Rio Tinto's total GHG emissions (equity basis) disclosed in the Sustainability sections of the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021.

Our assurance does not extend to information in respect of earlier periods or to any other information included in the Sustainability sections of the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021 for the year ended 31 December 2021.

Reporting Criteria

The Reporting Criteria used for the reporting of the Assured Sustainability Information and GHG Emissions data are the ICMM Sustainable Development Framework: ICMM Principles (Revised 2015) and the definitions and approaches within the basis of reporting glossary presented on Rio Tinto's website at riotinto.com/reports.

Basis for Conclusion

We conducted our work in accordance with International Standard on Assurance Engagements ISAE 3000 (Revised) Assurance Engagements other than Audits and Reviews of Historical Financial Information and in respect of greenhouse gas emissions, International Standard on Assurance Engagements ISAE 3410 Assurance Engagements on Greenhouse Gas Statements issued by the International Auditing and Assurance Standards Board (Standards). In gathering evidence for our conclusions, our assurance procedures comprised:

- enquiries with relevant Rio Tinto personnel to understand and evaluate the design and implementation of the key systems, processes and internal controls relevant to the Assured Sustainability Information and GHG Emissions data;
- analytical procedures over the Assured Sustainability Information and GHG Emissions data;
- risk analysis to validate the completeness of Rio Tinto's materiality assessment;
- substantively tested performance data within the Assured Sustainability Information, on a sample basis at corporate and operational level, which included testing a selection of six operations including Oyu Tolgoi Operations, Oyu Tolgoi Underground Project, Tom Price and Marandoo, Boyne Smelters Limited, Quebec Operations (Grande Baie and Laterriere), and Rio Tinto Fer et Titane;
- substantively tested the GHG Emissions data, on a sample basis at corporate and operational level, which included testing a selection of eleven operations including Boyne Smelters Limited, Quebec Operations (Grande Baie, Laterriere, AP40, Avida, AP60 and Strathcona), Gladstone Power Station, Queensland Alumina Limited, Tomago, Yarwun, Bell Bay, Kitimat and Kemano, New Zealand Aluminium Smelters, Escondida, and Richards Bay Minerals;
- evaluated the design and effectiveness of controls implemented by the Rio Tinto Health, Safety and Environment (HSE) Services reporting function over the Assured Sustainability Information and GHG Emissions data;
- assessed Rio Tinto's incorporation of the requirements of the ICMM 10 Principles for sustainable development, and the mandatory requirements set out in the ICMM Position Statements, into its own policies, strategies and standards; and
- reviewed the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021 in its entirety to ensure they are consistent with our overall knowledge of Rio Tinto.

In accordance with the Standards we have:

- used our professional judgement to plan and perform the engagement to obtain limited assurance that we are not aware of any material misstatements in the Assured Sustainability Information, whether due to fraud or error;
- used our professional judgement to plan and perform the engagement to obtain reasonable assurance that we are not aware of any material misstatements in the GHG Emissions data, whether due to fraud or error;
- considered relevant internal controls when designing our assurance procedures, however we do not express a conclusion on their effectiveness; and
- ensured that the engagement team possess the appropriate knowledge, skills and professional competencies.

How the Standard Defines Reasonable Assurance, Limited Assurance and Material Misstatement

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

Reasonable assurance is a high level of assurance, but is not a guarantee that it will always detect a material misstatement when it exists.

Misstatements, including omissions, are considered material if, individually or in the aggregate, they could reasonably be expected to influence relevant decisions of the Directors of Rio Tinto.

Use of this Assurance Report

This report has been prepared for the Directors of Rio Tinto for the purpose of providing an assurance conclusion on the Assured Sustainability Information and GHG Emissions data and may not be suitable for another purpose. We disclaim any assumption of responsibility for any reliance on this report, to any person other than the Directors of Rio Tinto, or for any other purpose than that for which it was prepared.

Management's responsibility

Management are responsible for:

- determining that the Reporting Criteria is appropriate to meet their needs;
- preparing and presenting the Assured Sustainability Information and GHG Emissions data in accordance with the Reporting Criteria;
- establishing internal controls that enable the preparation and presentation of the Assured Sustainability Information and GHG Emissions data that is free from material misstatement, whether due to fraud or error;
- ensuring the basis of preparation in accordance with which the Assured Sustainability Information and GHG Emissions data has been determined and compiled is clearly and unambiguously set out in the Rio Tinto Annual Report 2021, the Rio Tinto Strategic Report 2021 and the Rio Tinto Sustainability Fact Book 2021; and
- telling us of any known and/or contentious issues relating to the Assured Sustainability Information and GHG Emissions data.

Our Responsibility

Our responsibility is to perform a limited assurance engagement in relation to the Assured Sustainability Information and reasonable assurance in respect of the GHG Emissions data for 31 December 2021, and to issue an assurance report that includes our conclusions.

Our Independence and Quality Control

We have complied with our independence and other relevant ethical requirements of the Code of Ethics for Professional Accountants (including Independence Standards) issued by the IFAC Ethical Standards Board, and complied with the applicable requirements of International Standard on Quality Control 1 to maintain a comprehensive system of quality control.

KPMG

KPMG

23 February 2022

Adrian V. King

Adrian King

Partner
Melbourne, Australia

Shareholder information

Organisational structure

The Rio Tinto Group consists of Rio Tinto plc (registered in England and Wales as company number 719885 under the UK Companies Act 2006 and listed on the London Stock Exchange), and Rio Tinto Limited (registered in Australia as ABN 96 004 458 404 under the Australian Corporations Act 2001 and listed on the Australian Securities Exchange).

Rio Tinto is headquartered in London with a corporate office in Melbourne.

Rio Tinto plc has a sponsored American Depositary Receipts (ADR) facility, with underlying shares registered with the SEC and listed on the New York Stock Exchange.

The London Stock Exchange ticker for Rio Tinto plc is RIO.L, the Australian Securities Exchange ticker for Rio Tinto Limited is RIO. AX and the New York Stock Exchange ticker for the ADR is RIO.N.

Nomenclature and financial data

Rio Tinto plc and Rio Tinto Limited operate together and are referred to in this report as Rio Tinto, the Rio Tinto Group or the Group. These expressions are used for convenience, since both companies, and other companies in which they directly or indirectly own investments, are separate and distinct legal entities. Likewise, the words “we”, “us”, “our” and “ourselves” are used in some places to refer to the companies of the Rio Tinto Group in general. These expressions are also used where no useful purpose is served by identifying any particular company or companies. We usually omit “Limited”, “plc”, “Pty”, “Inc.”, “Limitada”, “L.L.C.”, “A.S.” or “SA” from Group company names, except to distinguish between Rio Tinto plc and Rio Tinto Limited. Financial data in US dollars ($) is derived from, and should be read in conjunction with, the 2021 financial statements. In general, where we have provided financial data in pounds sterling (£) and Australian dollars (A$), it has been translated from the consolidated financial statements, and is provided solely for convenience; exceptions arise where data has been extracted directly from source records. Certain key information has been provided in US dollars, pounds sterling and Australian dollars in the 2021 financial statements.

History

Rio Tinto plc was incorporated on 30 March 1962 (then called The Rio Tinto-Zinc Corporation Limited (RTZ)) and was formed by the merger of The Rio Tinto Company Limited and The Consolidated Zinc Corporation Limited. The Rio Tinto Company was incorporated in 1873 to reopen ancient copper workings in Spain. The Consolidated Zinc Corporation Limited began operations in the early twentieth century as part of the Australian mining industry. Based at Broken Hill in New South Wales, it began mining silver, lead and zinc deposits and later expanded into lead and zinc smelting.

Rio Tinto Limited was incorporated on 17 December 1959 (then called The Rio Tinto Mining Company of Australia Pty Limited). In 1962 the Australian interests of The Consolidated Zinc Corporation Limited and The Rio Tinto Company Limited were merged to form Conzinc Riotinto of Australia Limited, a limited liability company under the laws of the State of Victoria, Australia. In 1980, Conzinc Riotinto of Australia Limited changed its name to CRA Limited.

Between 1962 and 1995, both RTZ and CRA discovered important mineral deposits, developed major mining projects and grew through acquisition.

RTZ and CRA began operating in 1995 through a dual listed companies structure. In 1997, RTZ became Rio Tinto plc and CRA became Rio Tinto Limited.

Dual listed companies structure

In 1995, Rio Tinto shareholders approved the terms of the dual listed companies’ merger (the DLC structure). The aim was to put shareholders of both companies in substantially the same position they would be in if they held shares in a single entity owning all assets of both companies.

Following the approval of the DLC structure, both companies entered into a DLC Merger Sharing Agreement (the Sharing Agreement). As part of this both companies agreed to be managed in a unified way, to share the same Board of Directors, and to put in place arrangements to provide shareholders of both companies with a common economic interest in the DLC structure.

To achieve this third objective, the Sharing Agreement fixed the ratio of dividend, voting and capital distribution rights attached to each Rio Tinto plc share and each Rio Tinto Limited share at an Equalisation Ratio of 1:1. This has remained unchanged ever since, although the Sharing Agreement makes clear this can be revised in special circumstances, for example where certain modifications are made to the share capital of one company (such as rights issues, bonus issues, share splits and share consolidations) but not to the other.

Outside the circumstances specified in the Sharing Agreement, the Equalisation Ratio can only be altered with the approval of shareholders under the class rights action approval procedure, described in the Voting arrangements section below. Any adjustments must be confirmed by the Group’s external auditors.

Consistent with the DLC structure, the directors of both companies aim to act in the best interests of Rio Tinto as a whole. The class rights action approval procedure exists to deal with instances where there may be a conflict of interest between the shareholders of the two companies.

To ensure that the Boards of both companies are identical, resolutions to appoint or remove directors must be put to shareholders of both companies as Joint Decisions, described in the Voting arrangements section below. The Articles of Association of Rio Tinto plc and the Constitution of Rio Tinto Limited make clear that a person can only be a director of one company if he or she is also a director of the other. This means that if a person were removed as a director of Rio Tinto plc, he or she would also cease to be a director of Rio Tinto Limited.

One consequence of the DLC merger is that Rio Tinto is subject to a wide range of laws, rules and regulatory reviews across multiple jurisdictions. Where these rules differ, Rio Tinto will comply with the requirements in each jurisdiction at a minimum.

Dividend arrangements

The Sharing Agreement ensures that dividends paid on Rio Tinto plc and Rio Tinto Limited shares are equalised on a net cash basis without taking into account any associated tax credits. Dividends are determined in US dollars (with the exception of ADR holders, paid in sterling and Australian dollars) and both companies are required to announce and pay dividends and other distributions at the same time or as close to this as possible.

The payment of dividends between companies and their subsidiaries, including the payment of dividends on the DLC dividend shares, provides the Group with flexibility to manage internal funds and distributable reserves to enable the payment of equalised dividend or equalised capital distributions.

If the payment of an equalised dividend would contravene the law applicable to one of the companies, they can depart from the Equalisation Ratio. In that situation, the relevant company must put aside reserves for payment on the relevant shares at a later date.

Rio Tinto shareholders have no direct rights to enforce the dividend equalisation provisions of the Sharing Agreement.

Voting arrangements

In principle, the Sharing Agreement enables the shareholders of Rio Tinto plc and Rio Tinto Limited to vote as a joint electorate on any matters that affect them in similar ways. These are referred to as Joint Decisions, and include the creation of new classes of share capital, the appointment or removal of directors and auditors, and the receiving of annual financial statements. All shareholder resolutions that include Joint Decisions are voted on a poll.

The Sharing Agreement also protects shareholders of both companies by requiring joint approval for decisions that do not affect the shareholders of both companies equally. These are known as class rights actions, and are voted on a poll. For example, fundamental elements of the DLC structure cannot be changed unless approved separately by the shareholders of both companies.

Exceptions to these principles can arise in situations such as where legislation requires the separate approval of a decision by the appropriate majority of shareholders in one company, and where approval of the matter by shareholders of the other company is not required.

Where a matter has been expressly categorised as either a Joint Decision or a class rights action, the directors cannot change that categorisation. If a matter falls within both categories, it is treated as a class rights action. In addition, if an issue is not expressly listed in either category, directors can decide how it should be put to shareholders for approval.

To support joint voting arrangements, both companies have entered into shareholder voting agreements, where a Special Voting Share is issued to a special purpose company (SVC) and held in trust for shareholders by a common trustee. Rio Tinto plc (RTP) has issued its Special Voting Share (RTP Special Voting Share) to Rio Tinto Limited (RTL) Shareholder SVC, while Rio Tinto Limited has issued its Special Voting Share (RTL Special Voting Share) to RTP Shareholder SVC. The total number of votes cast on Joint Decisions by the shareholders of one company are decided at a parallel meeting of the other company. The exact role of these SVCs is described below.

In exceptional circumstances, certain shareholders can be excluded from voting at their respective company's general meetings. For example, they may have acquired shares in the other company in excess of a given threshold without making an offer for all the shares in the other company. In this situation, votes cast by these excluded shareholders are disregarded.

Following the companies' general meetings, the overall results of the voting are announced to relevant stock exchanges and the media, and published at riotinto.com.

At a Rio Tinto plc shareholders' meeting during which a Joint Decision is considered, each Rio Tinto plc share carries one vote. The holder of the Special Voting Share has one vote for each vote cast by the public shareholders of Rio Tinto Limited in their parallel meeting. The holder of the Special Voting Share must vote in accordance with the votes cast by public shareholders for and against the equivalent resolution at the parallel Rio Tinto Limited shareholders' meeting. The holders of Rio Tinto Limited ordinary shares do not hold voting shares in Rio Tinto plc by virtue of their holding in Rio Tinto Limited, and cannot enforce the voting arrangements relating to the Special Voting Share.

Similarly, at a Rio Tinto Limited shareholders' meeting during which a Joint Decision is considered, each Rio Tinto Limited share carries one vote and the holder of its Special Voting Share will have one vote for each vote cast by the public shareholders of Rio Tinto plc in their parallel meeting. The holder of the Special Voting Share must vote in accordance with the votes cast for and against the equivalent resolution at the parallel Rio Tinto plc shareholders' meeting. The holders of Rio Tinto plc ordinary shares do not hold any voting shares in Rio Tinto Limited by virtue of their holding in Rio Tinto plc, and cannot enforce the voting arrangements relating to the Special Voting Share.

Capital distribution arrangements

If either company goes into liquidation, the Sharing Agreement ensures a valuation is made of the surplus assets of both companies. If the surplus assets available for distribution by one company on each of the shares held by its shareholders exceed the surplus assets available for distribution by the other company on each of the shares held by its shareholders, then an equalising payment must be made – to the extent permitted by applicable law – such that the amount available for distribution on each share held by shareholders of both companies reflects the Equalisation Ratio.

The aim is to ensure the shareholders of both companies have equivalent entitlements to the assets of the combined Group on a per share basis, taking account of the equalisation ratio.

The Sharing Agreement does not grant any enforceable rights to the shareholders of either company upon liquidation of either company.

Limitations on ownership of shares and merger obligations

The laws and regulations of the UK and Australia impose restrictions and obligations on persons who control interests in publicly listed companies in excess of defined thresholds. These can include an obligation to make a public offer for all outstanding issued shares of the relevant company. The threshold applicable to Rio Tinto plc under UK law and regulations is 30% and to Rio Tinto Limited under Australian law and regulations is 20% on both a standalone and a Joint Decision basis.

As part of the DLC merger, the Articles of Association of Rio Tinto plc and the Constitution of Rio Tinto Limited were amended with the aim of extending these laws and regulations to the combined enterprise. This amendment also ensures that a person cannot exercise control over one company without having made offers to the public shareholders of both companies.

This guarantees the equal treatment of both sets of shareholders, and that the two companies are considered as a single economic entity. The Articles of Association of Rio Tinto plc and the Constitution of Rio Tinto Limited impose restrictions on any person who controls, directly or indirectly, 20% or more of the votes on a Joint Decision. If, however, such a person has an interest in either Rio Tinto Limited or Rio Tinto plc only, then the restrictions only apply if they control, directly or indirectly, 30% or more of the votes at that company's general meetings.

If one of these thresholds is exceeded, the person cannot attend or vote at general meetings of the relevant company, cannot receive dividends or other distributions from the relevant company, and may be divested of their interest by the directors of the relevant company (subject to certain limited exceptions and notification by the relevant company). These restrictions continue to apply until that person has either made a public offer for all the publicly held shares of the other company, has reduced their controlling interest below the thresholds specified, or has acquired through a permitted means at least 50% of the publicly held shares of each company.

This arrangement ensures that offers for the publicly held shares of both companies would be required to avoid the restrictions set out above, even if the interests which breach the thresholds are held in just one of the companies. The directors do not have the discretion to exempt a person from the operation of these rules.

Under the Sharing Agreement, the companies agree to co-operate to enforce the above restrictions contained in their Articles of Association and Constitution.

Guarantees

In 1995, each company entered into a deed poll guarantee in favour of creditors of the other company. In addition, each company guaranteed the contractual obligations of the other and the obligations of other persons guaranteed by the other company, subject to certain limited exceptions.

Beneficiaries under deed poll guarantees can make demands on the relevant guarantor without first having recourse to the company or persons whose obligations are being guaranteed. The obligations of the guarantor under each deed poll guarantee expire upon termination of the Sharing Agreement and under other limited circumstances, but only in respect of obligations arising after such termination and, in the case of other limited circumstances, the publication and expiry of due notice.

Markets

Rio Tinto plc

The principal market for Rio Tinto plc shares is the London Stock Exchange, with shares trading through the Stock Exchange Electronic Trading Service (SETS) system.

Rio Tinto plc American Depositary Receipts (ADRs) are listed on the New York Stock Exchange.

Further details relating to Rio Tinto plc ADRs are available in Rio Tinto's Annual Report on Form 20-F.

Rio Tinto Limited

Rio Tinto Limited shares are listed on the Australian Securities Exchange (ASX).

The ASX is the principal trading market for Rio Tinto Limited shares. The ASX is a national stock exchange with an automated trading system.

Share ownership

Substantial shareholders in Rio Tinto plc

The following table shows holdings of 3% or more of voting rights in Rio Tinto plc's ordinary shares as per the most recent notification of each respective holder to Rio Tinto plc under the UK Disclosure and Transparency Rule 5. The percentage of voting rights detailed below was calculated as at the date of the relevant disclosures. The shareholders who have provided this notice or an equivalent as of 4 February are:

Rio Tinto Plc	Date of notice	Number of shares	Percentage of capital
BlackRock, Inc.[1]	4 Dec 2009	127,744,871	8.38
Shining Prospect Pte. Ltd	7 Dec 2018	182,550,329	14.02[2]
The Capital Group Companies, Inc.	26 Nov 2021	62,266,422	4.99

1. On 7 February 2022, BlackRock, Inc. filed an Amendment to Schedule 13G with the SEC and disclosed beneficial ownership of 108,907,723 ordinary shares in Rio Tinto plc as of 31 December 2021, representing 8.7% of that class of shares.
2. In its notification of major holdings filed on 7 December 2018, Shining Prospect Pte. Ltd, a Singapore-based entity owned by Chinalco (Aluminium Corporation of China), disclosed that its percentage of voting rights in Rio Tinto plc had increased to 14.02% on 18 October 2018. This was due to the on-market share buy-back programme of Rio Tinto plc shares and the number of shares held by Shining Prospect Pte. Ltd has remained unchanged.

Substantial shareholders in Rio Tinto Limited

Under the Australian Corporations Act 2001, any person with 5% or more voting power in Rio Tinto Limited is required to provide the Company with notice. The following table shows shareholders who have provided this notice or an equivalent as of 4 February 2022:

Rio Tinto Limited	Date of notice	Number of shares	Percentage of capital[3]
BlackRock, Inc.	5 Jul 2021	See footnote[4]	See footnote[4]
BlackRock, Inc.[5]	14 Dec 2021	26,708,061	7.19
Shining Prospect Pte. Ltd	9 Feb 2018	See footnote[6]	See footnote[6]
State Street Corporation	8 Nov 2021	19,832,353	5.34

3. The percentage of voting rights detailed was as disclosed in the notice received by the company, calculated at the time of the relevant disclosure.
4. In its substantial holding notice filed on 5 July 2021, BlackRock, Inc. and its associates disclosed a holding of 116,075,672 shares in Rio Tinto plc and 25,292,271 shares in Rio Tinto Limited, which gave BlackRock, Inc. and its associates voting power of 8.73% in the Rio Tinto Group on a Joint Decision Matter. Accordingly, in addition to being substantial shareholders of Rio Tinto Limited by virtue of interests held in Rio Tinto Limited's shares, through the operation of the Australian Corporations Act 2001 as modified to apply to the DLC structure, these entities disclosed voting power of 8.73% in Rio Tinto Limited.
5. On 1 February 2022, BlackRock, Inc. filed an Amendment to Schedule 13G with the SEC and disclosed beneficial ownership of 24,143,271 ordinary shares in Rio Tinto Limited as of 31 December 2021, representing 6.5% of that class of shares.
6. In its substantial holding notice filed on 9 February 2018 Shining Prospect Pte. Ltd disclosed that its holding of 182,550,329 Rio Tinto plc shares gave Shining Prospect Pte and its associates voting power of 10.32% in the Rio Tinto Group on a Joint Decision Matter. Accordingly, through the operation of the Australian Corporations Act 2001 as modified to apply to the DLC structure, these disclosed voting power of 10.32% in Rio Tinto Limited.

As far as is known, Rio Tinto plc and Rio Tinto Limited are not directly or indirectly owned or controlled by another corporation or by any government or natural person. Rio Tinto is not aware of any arrangement that may result in a change in control of Rio Tinto plc or Rio Tinto Limited. No shareholder possesses voting rights that differ from those attaching to Rio Tinto plc's and Rio Tinto Limited's securities.

As of 4 February 2022 the total amount of the Group's voting securities owned by the directors and executives in Rio Tinto plc was 164,486 ordinary shares of 10p each or ADRs. There were 29,570 holders of record of Rio Tinto plc's shares. Of these holders, 362 had registered addresses in the US and held a total of 299,086 Rio Tinto plc shares, representing 0.02% of the total number of Rio Tinto plc shares issued and outstanding as at such date. In addition, 141,020,443 Rio Tinto plc shares were registered in the name of a custodian account in London which represented 11.23% of Rio Tinto plc shares issued and outstanding. These shares were represented by 141,020,443 Rio Tinto plc ADRs held of record by 379 ADR holders. In addition, certain accounts of record with registered addresses other than in the US hold shares, in whole or in part, beneficially for US persons.

As of 4 February 2022 the total amount of the Group's voting securities owned by directors and executives in Rio Tinto Limited was 72,088 ordinary shares, in aggregate representing less than 1% of the Group's total number of ordinary shares in issue. There were 175,409 holders of record of Rio Tinto Limited shares. Of these holders, 260 had registered addresses in the US, representing approximately 0.04% of the total number of Rio Tinto Limited shares issued and outstanding as of such date. In addition, nominee accounts of record with registered addresses other than in the US may hold Rio Tinto Limited shares, in whole or in part, beneficially for US persons.

Unquoted equity securities in Rio Tinto Limited

As at 4 February 2022, there were Rio Tinto Limited unquoted equity securities on issue, comprising 63,146 unvested Bonus Deferral Awards held by 35 holders, 1,184,980 unvested Management Share Awards held by 908 holders and 1,304,170 unvested Performance Share Awards held by 190 holders, all of which were granted under the Rio Tinto Limited Equity Incentive Plan, and 993,886 unvested matching share rights were granted under the Rio Tinto Limited Global Employee Share Plan held by 12,089 holders. This information is provided in compliance with ASX Listing Rule 4.10.16.

Analysis of ordinary shareholders

	Rio Tinto plc				Rio Tinto Limited			
As at 4 February 2022	No. of accounts	%	Shares	%	No. of accounts	%	Shares	%
1 to 1,000 shares	22,325	75.50	6,863,956	0.55	151,046	86.11	39,242,167	10.57
1,001 to 5,000 shares	5,182	17.53	10,450,365	0.83	21,852	12.46	43,299,861	11.66
5,001 to 10,000 shares	561	1.90	3,947,759	0.31	1,749	1.00	11,954,629	3.23
10,001 to 25,000 shares	406	1.37	6,455,464	0.52	592	0.34	8,662,183	2.33
25,001 to 125,000 shares	574	1.94	33,744,184	2.69	123	0.07	5,427,581	1.46
125,001 to 250,000 shares	170	0.57	30,366,127	2.42	11	0.01	2,030,329	0.55
250,001 to 1,250,000 shares	229	0.77	121,545,672	9.68	23	0.01	11,370,649	3.06
1,250,001 to 2,500,000 shares	53	0.18	93,237,330	7.42	5	0.00	9,494,678	2.56
2,500,001 shares and over[1]	70	0.24	949,194,829[2]	75.58	8	0.00	239,734,137	64.58
			1,255,805,686[3]	100.00			371,216,214[4]	100.00
Number of holdings less than marketable parcel of A$500					2,583			

1. Excludes shares held in Treasury.
2. This includes 141,020,443 shares held in the name of a nominee on the share register. The shares are listed on the NYSE in the form of American Depositary Receipts (ADRs).
3. The total issued share capital is made up of 1,248,222,187 publicly held shares: 7,583,499 shares held in Treasury.
4. Publicly held shares in Rio Tinto Limited.

Twenty largest registered shareholders

The following table lists the 20 largest registered holders of Rio Tinto Limited shares in accordance with the ASX listing rules, together with the number of shares and the percentage of issued capital each holds, as of 4 February 2022.

Rio Tinto Limited	Number of shares	Percentage of issued share capital
HSBC Custody Nominees (Australia) Limited	115,099,599	31.01
J. P. Morgan Nominees Australia Limited	57,866,242	15.59
Citicorp Nominees Pty Ltd	38,626,119	10.41
National Nominees Limited	9,310,478	2.51
BNP Paribas Nominees Pty Ltd (Agency Lending DRP A/C)	7,645,695	2.06
BNP Paribas Noms Pty Ltd (DRP)	6,083,391	1.64
BNP Paribas Nominees Pty Ltd (Six Sis Ltd DRP A/C)	3,562,553	0.96
Citicorp Nominees Pty Limited (Colonial First State Inv A/C)	2,693,057	0.73
Argo Investments Limited	2,097,139	0.56
BNP Paribas Noms Pty Ltd (Global Markets DRP)	2,004,544	0.54
HSBC Custody Nominees (Australia) Limited (NT-Comnwlth Super Corp A/C)	1,987,024	0.54
Australian Foundation Investment Company Limited	1,921,031	0.52
BNP Paribas Nominees Pty Ltd (ACF Clearstream)	1,543,955	0.42
Custodial Services Limited	1,163,335	0.31
Netwealth Investments Limited <WRAP Services A/C)	1,004,873	0.27
BNP Paribas Nominees Pty Ltd (Hub24 Custodial Serv Ltd DRP)	807,338	0.22
CGU Insurance	726,663	0.20
Milton Corporation Limited	669,120	0.18
Merrill Lynch (Australia) Nominees Pty Limited	630,787	0.17
Diversified United Investment Ltd	465,126	0.13

Material contracts

Articles of Association, Constitution, and DLC Sharing Agreement

As explained on page 410, under the terms of the DLC structure shareholders of Rio Tinto plc and of Rio Tinto Limited entered into certain contractual arrangements designed to place the shareholders of both companies in substantially the same position as if they held shares in a single entity which owned all the assets of both companies. As far as is permitted by the UK Companies Act 2006, the Australian Corporations Act 2001 and ASX Listing Rules, this principle is reflected in the Articles of Association of Rio Tinto plc and in the Constitution of Rio Tinto Limited. The following summaries describe the material rights of shareholders of both Rio Tinto plc and Rio Tinto Limited.

Objects

At the 2009 AGMs, shareholders of Rio Tinto plc and Rio Tinto Limited approved amendments to their Articles of Association and Constitution whereby the object clauses were removed to allow the companies to have the widest possible scope of activities.

Directors' interests

Under Rio Tinto plc's Articles of Association, a director may not vote in respect of any proposal in which he or she, or any other person connected with him or her, has any interest, other than by virtue of his or her interests in shares or debentures or other securities of, in or through the company, except in certain circumstances, including in respect of resolutions:

- Indemnifying him or her or a third party in respect of obligations incurred by the director on behalf of, or for the benefit of, the company, or in respect of obligations of the company, for which the director has assumed responsibility under an indemnity, security or guarantee.
- Relating to an offer of securities in which he or she may be interested as a holder of securities or as an underwriter.
- Concerning another body corporate in which the director is beneficially interested in less than 1% of the issued shares of any class of shares of such a body corporate.
- Relating to an employee benefit in which the director will share equally with other employees.
- Relating to liability insurance that the company is empowered to purchase for the benefit of directors of the company in respect of actions undertaken as directors (or officers) of the company.
- Concerning the giving of indemnities in favour of directors or the funding of expenditure by directors to defend criminal, civil or regulatory proceedings or actions against a director.

Under Rio Tinto Limited's Constitution, a director may be present at a meeting of the Board while a matter in which the director has a material personal interest is being considered and may vote in respect of that matter, except where a director is constrained by Australian law.

The directors are empowered to exercise all the powers of the companies to borrow money, to charge any property or business of the companies or all, or any, of their uncalled capital, and to issue debentures or give any other security for a debt, liability or obligation of the companies or of any other person. The directors shall restrict the borrowings of Rio Tinto plc to the limitation that the aggregate amount of all monies borrowed by the company and its subsidiaries shall not exceed an amount equal to 1½ times the companies' share capital plus aggregate reserves unless sanctioned by an ordinary resolution of the company.

Directors are not required to hold any shares of either company by way of qualification. The Remuneration Report on pages 160-198 provides information on shareholding policies relating to executive and Non-Executive Directors. Please refer to the Directors' Report for information on the appointment of directors.

Rights attaching to shares

Under UK law, dividends on shares may only be paid out of profits available for distribution, as determined in accordance with generally accepted accounting principles and by the relevant law. Shareholders are entitled to receive such dividends as may be declared by the directors. Directors may also pay interim dividends to shareholders as justified by the financial position of the Group.

Under the Australian Corporations Act 2001, dividends on shares may only be paid if the company's assets exceed its liabilities immediately before the dividend is declared, the excess is sufficient for the payment of the dividend, the payment is fair and reasonable to the company's shareholders as a whole, and the payment does not materially prejudice the company's ability to pay its creditors. Any Rio Tinto plc dividend unclaimed after 12 years from the date the dividend was declared, or became due for payment, will be forfeited and returned to the company. Any Rio Tinto Limited dividend unclaimed may be invested or otherwise used by the Board for the benefit of the company until claimed or otherwise disposed of according to Australian law. Rio Tinto Limited is governed by the State of Victoria's unclaimed monies legislation, which requires the company to pay to the state revenue office any unclaimed dividend payments of A$20 or more that on 1 March each year have remained unclaimed for over 12 months.

Voting

Voting at any general meeting of shareholders on a resolution on which the holder of the Special Voting Share is entitled to vote shall be decided by a poll, and any other resolution shall be decided by a show of hands unless a poll has been duly demanded. On a show of hands, every shareholder who is present in person or by proxy (or other duly authorised representative) and is entitled to vote, has one vote regardless of the number of shares held. The holder of the Special Voting Share is not entitled to vote in a show of hands. On a poll, every shareholder who is present in person or by proxy (or other duly authorised representative) and is entitled to vote, has one vote for every ordinary share for which he or she is the holder. In the case of Joint Decisions, the holder of the Special Voting Share has one vote for each vote cast in respect of the publicly held shares of the other company.

A poll may be demanded by any of the following:

- The chairman of the meeting.
- At least five shareholders entitled to vote on the resolution.
- Any shareholder(s) representing in the aggregate not less than one tenth (Rio Tinto plc) or one 20th (Rio Tinto Limited) of the total voting rights of all shareholders entitled to vote on the resolution.
- Any shareholder(s) holding Rio Tinto plc shares conferring a right to vote at the meeting on which there have been paid-up sums in the aggregate equal to not less than one tenth of the total sum paid up on all the shares conferring that right.
- The holder of the Special Voting Share of either company.

A proxy form gives the proxy the authority to demand a poll, or to join others in demanding one.

The necessary quorum for a Rio Tinto plc general meeting is three members present (in person or by proxy or other duly authorised representative) and entitled to vote. For a Rio Tinto Limited general meeting it is two members present (in person or by proxy or other duly authorised representative).

Matters are transacted at general meetings by the proposing and passing of resolutions as:

- Ordinary resolutions (for example the election of directors), which require the affirmative vote of a majority of persons voting at a meeting for which there is a quorum.
- Special resolutions (for example amending the Articles of Association of Rio Tinto plc or the Constitution of Rio Tinto Limited), which require the affirmative vote of not less than three-quarters of the persons voting at a meeting at which there is a quorum.

The Sharing Agreement further classifies resolutions as Joint Decisions and class rights actions as explained on page 410.

Annual general meetings must be convened with 21 days' written notice for Rio Tinto plc and with 28 days' notice for Rio Tinto Limited. In accordance with the authority granted by shareholders at the Rio Tinto plc AGM in 2021, other meetings of Rio Tinto plc may be convened with 14 days' written notice for the passing of a special resolution, and with 14 days' notice for any other resolution, depending on the nature of the business to be transacted. All meetings of Rio Tinto Limited require 28 days' notice. In calculating the period of notice, any time taken to deliver the notice and the day of the meeting itself are not included. The notice must specify the nature of the business to be transacted.

Variation of rights

If, at any time, the share capital is divided into different classes of shares, the rights attached to each class may be varied, subject to the provisions of the relevant legislation, the written consent of holders of three-quarters in value of the shares of that class, or upon the adoption of a special resolution passed at a separate meeting of the holders of the shares of that class. At every such meeting, all of the provisions of the Articles of Association and Constitution relating to proceedings at a general meeting apply, except that the quorum for Rio Tinto plc should be two or more persons who hold or represent by proxy not less than one-third in nominal value of the issued shares of the class.

Rights upon a winding-up

Except as the shareholders have agreed or may otherwise agree, upon a winding-up, the balance of assets available for distribution after the payment of all creditors (including certain preferential creditors, whether statutorily preferred creditors or normal creditors) and subject to any special rights attaching to any class of shares, is to be distributed among the holders of ordinary shares according to the amounts paid-up on the shares held by them. This distribution should generally be made in cash. A liquidator may, however, upon the adoption of a special resolution of the shareholders, divide among the shareholders the whole or any part of the assets in specie or kind.

The Sharing Agreement describes the distribution of assets of each of the companies in the event of a liquidation, as explained on page 410.

Facility agreement

Details of the Group's $7.5 billion multi-currency committed revolving credit facilities are set out in note 29 to the 2021 financial statements.

Exchange controls and foreign investment

Rio Tinto plc

There are no UK foreign exchange controls or other restrictions on the import or export of capital by, or on the payment of dividends to, non-resident holders of Rio Tinto plc shares, or that materially affect the conduct of Rio Tinto plc's operations. It should be noted, however, that various sanctions, laws, regulations or conventions may restrict the import or export of capital by, or the payment of dividends to, non-resident holders of Rio Tinto plc shares. There are no restrictions under Rio Tinto plc's Articles of Association or under UK law that specifically limit the right of non-resident owners to hold or vote Rio Tinto plc shares. However, certain of the provisions of the Australian Foreign Acquisitions and Takeovers Act 1975 (the Takeovers Act) described below also apply to the acquisition by non-Australian persons of interests in securities of Rio Tinto plc.

Rio Tinto Limited

Under current Australian legislation, Australia does not impose general exchange or foreign currency controls. Subject to some specific requirements and restrictions, Australian and foreign currency may be freely brought into and sent out of Australia. There are requirements to report cash transfers in or out of Australia of A$10,000 or more. There is a prohibition on (or in some cases the specific prior approval of the Department of Foreign Affairs and Trade or Minister for Foreign Affairs must be obtained for) certain payments or other dealings connected with countries or parties identified with terrorism, or to whom United Nations or autonomous Australian sanctions apply. Sanction, anti-money laundering and counterterrorism laws may restrict or prohibit payments, transactions and dealings or require reporting of certain transactions.

Rio Tinto Limited may be required to deduct withholding tax from foreign remittances of dividends, to the extent that they are unfranked, and from payments of interest.

Acquisitions of interests in shares, and certain other equity instruments in Australian companies by non-Australian ("foreign") persons are subject to review and approval by the Treasurer of the Commonwealth of Australia under the Takeovers Act.

In broad terms, the Takeovers Act applies to acquisitions of interests in securities in an Australian entity by a foreign person where, as a result, a single foreign person (and any associate) would control 20% or more of the voting power or potential voting power in the entity. The potential voting power in an entity is determined having regard to the voting shares in the entity that would be issued if all rights (whether or not presently exercisable) in the entity were exercised.

The Takeovers Act also applies to direct investments by foreign government investors, in certain circumstances regardless of the size of the investment. Persons who are proposing relevant acquisitions or transactions may be required to provide notice to the Treasurer before proceeding with the acquisition or transaction.

The Treasurer has the power to order divestment in cases where relevant acquisitions or transactions have already occurred, including where prior notice to the Treasurer was not required. The Takeovers Act does not affect the rights of owners whose interests are held in compliance with the legislation.

Limitations on voting and shareholding

Except for the provisions of the Takeovers Act, there are no limitations imposed by law, Rio Tinto plc's Articles of Association or Rio Tinto Limited's Constitution, on the rights of non-residents or foreigners to hold the Group's ordinary shares or ADRs, or to vote that would not apply generally to all shareholders.

Directors

Appointment and removal of directors

The appointment and replacement of directors is governed by Rio Tinto plc's Articles of Association and Rio Tinto Limited's Constitution, relevant UK and Australian legislation, and the UK Corporate Governance Code. The Board may appoint a director either to fill a casual vacancy or as an addition to the Board, so long as the total number of directors does not exceed the limit prescribed in these constitutional documents. An appointed director must retire and seek election to office at the next AGM of each company. In addition to any powers of removal conferred by the UK Companies Act 2006 and the Australian Corporations Act 2001, the company may by ordinary resolution remove any director before the expiry of his or her period of office and may, subject to these constitutional documents, by ordinary resolution appoint another person who is willing to act as a director in their place. In line with the UK Corporate Governance Code, all directors are required to stand for re-election at each AGM.

Directors' powers

The Board manages the business of Rio Tinto under the powers set out in these constitutional documents. These powers include the directors' ability to issue or buy back shares. Shareholders' authority to empower the directors to purchase its own ordinary shares is sought at the AGM each year. The constitutional documents can only be amended, or replaced, by a special resolution passed in general meeting by at least 75% of the votes cast.

UK listing rules cross reference table

The following table contains only those sections of UK listing rule 9.8.4 C which are relevant. The remaining sections of listing rule 9.8.4 C are not applicable.

Listing rule	Description of listing rule	Reference in report
9.8.4 (1)	A statement of any interest capitalised by the Group during the year	Note 8 Finance income and finance costs and note 17 Deferred taxation
9.8.4 (12)	Details of any arrangement under which a shareholder has waived or agreed to waive any dividends	Note 11 Dividends

Shareholder security

Shareholders tell us that they sometimes receive unsolicited approaches, usually by telephone, inviting them to undertake a transaction in shares they own.

If a shareholder does not know the source of the call, they should check the details against the Financial Conduct Authority (FCA) website below and, if they have specific information, report it to the FCA using the consumer helpline or the online reporting form.

If a shareholder is worried that he or she is a victim of fraud and is resident in the UK, they should report the facts immediately using the Action Fraud helpline on 0300 123 2040. More information about potential scams and other investment-based fraud can be found at actionfraud.police.uk or fca.org.uk/scamsmart.

Metal prices and exchange rates

Metal prices – average for the year		**2021**	2020	Increase/ (decrease)
Copper	– US cents/lb	422	281	50%
Aluminium	– $/tonne	2480	1,702	46%
Gold	– $/troy oz	1799	1,770	2%

Average exchange rates against the US dollar			
Sterling	1.38	1.28	7%
Australian dollar	0.75	0.69	9%
Canadian dollar	0.80	0.75	6%
Euro	1.18	1.14	4%
South African rand	0.068	0.061	11%

Year-end exchange rates against the US dollar			
Sterling	1.35	1.36	-1%
Australian dollar	0.73	0.77	-6%
Canadian dollar	0.78	0.78	- %
Euro	1.13	1.23	-8%
South African rand	0.063	0.068	-7%

Financial calendar

2022		
18	January	Fourth quarter 2021 operations review
23	February	Announcement of results for 2021
10	March	Rio Tinto plc and Rio Tinto Limited ordinary shares and Rio Tinto plc ADRs quoted “ex-dividend” for the 2021 final dividend
11	March	Record date for the 2021 final dividend for Rio Tinto plc and Rio Tinto Limited ordinary shares and Rio Tinto plc ADRs
29	March	Final date for elections under the Rio Tinto plc and Rio Tinto Limited dividend reinvestment plans and under facilities for dividends to be paid in alternative currency for the 2021 final dividend
8	April	Annual general meeting for Rio Tinto plc, UK
12	April	Dividend currency conversion date (Rio Tinto plc holders electing to receive Australian dollars and Rio Tinto Limited holders electing to receive pounds sterling)
20	April	First quarter 2022 operations review
21	April	Payment date for the 2021 final dividend to holders of ordinary shares and ADRs
5	May	Annual general meeting for Rio Tinto Limited, Australia
15	July	Second quarter operations review 2022
27	July	Announcement of half-year results for 2022
11	August	Rio Tinto plc and Rio Tinto Limited ordinary shares and Rio Tinto plc ADRs quoted “ex-dividend” for the 2022 interim dividend
12	August	Record date for the 2022 interim dividend for Rio Tinto plc and Rio Tinto Limited ordinary shares and Rio Tinto plc ADRs
1	September	Final date for elections under the Rio Tinto plc and Rio Tinto Limited dividend reinvestment plans and under facilities for dividends to be paid in alternative currency for the 2022 interim dividend
15	September	Dividend currency conversion date (Rio Tinto plc holders electing to receive Australian dollars and Rio Tinto Limited holders electing to receive pounds sterling)
22	September	Payment date for the 2022 interim dividend to holders of ordinary shares and ADRs
18	October	Third quarter 2022 operations review

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Please refer queries about shareholdings to the investor centre of the respective registrar.

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Fax: +44 (0)370 703 6101
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Website: computershare.com

Holders of Rio Tinto American Depositary Receipts (ADRs)
Please contact the ADR administrator if you have any queries about your ADRs.

ADR administrator

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Investor Centre

Investor Centre is Computershare's free, secure, self-service website, where shareholders can manage their holdings online. The website enables shareholders to:

- View share balances
- Change address details
- View payment and tax information
- Update payment instructions

In addition, shareholders who register their email address can be notified electronically of events such as annual general meetings, and can receive shareholder communications such as the Annual Report or notice of meeting electronically online.

Rio Tinto plc shareholders

Website: www.investorcentre.co.uk

Rio Tinto Limited shareholders

Website: www-au.computershare.com/Investor

Forward-looking statements

This report includes "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. All statements other than statements of historical facts included in this report, including, without limitation, those regarding Rio Tinto's financial position, business strategy, plans and objectives of management for future operations (including development plans and objectives relating to Rio Tinto's products, production forecasts and reserve and resource positions), are forward-looking statements. The words "intend", "aim", "project", "anticipate", "estimate", "plan", "believes", "expects", "may", "should", "will", "target", "set to" or similar expressions, commonly identify such forward-looking statements.

Such forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of Rio Tinto, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements. Such forward-looking statements are based on numerous assumptions regarding Rio Tinto's present and future business strategies and the environment in which Rio Tinto will operate in the future. Among the important factors that could cause Rio Tinto's actual results, performance or achievements to differ materially from those in the forward-looking statements include, but are not limited to: an inability to live up to Rio Tinto's values and any resultant damage to its reputation; the impacts of geopolitics on trade and investment; the impacts of climate change and the transition to a low-carbon future; an inability to successfully execute and/or realise value from acquisitions and divestments; the level of new ore resources, including the results of exploration programmes and/or acquisitions; disruption to strategic partnerships that play a material role in delivering growth, production, cash or market positioning; damage to Rio Tinto's relationships with communities and governments; an inability to attract and retain requisite skilled people; declines in commodity prices and adverse exchange rate movements; an inability to raise sufficient funds for capital investment; inadequate estimates of ore resources and reserves; delays or overruns of large and complex projects; changes in tax regulation; safety incidents or major hazard events; cyber breaches; physical impacts from climate change; the impacts of water scarcity; natural disasters; an inability to successfully manage the closure, reclamation and rehabilitation of sites; the impacts of civil unrest; the impacts of the COVID-19 pandemic; breaches of Rio Tinto's policies, standard and procedures, laws or regulations; trade tensions between the world's major economies; increasing societal and investor expectations, in particular with regard to environmental, social and governance considerations; the impacts of technological advancements; and such other risks identified in Rio Tinto's most recent Annual Report and Accounts in Australia and the United Kingdom and the most recent Annual Report on Form 20-F filed with the SEC or Form 6-Ks furnished to, or filed with, the SEC. Forward-looking statements should, therefore, be construed in light of such risk factors and undue reliance should not be placed on forward-looking statements. These forward-looking statements speak only as of the date of this report. Rio Tinto expressly disclaims any obligation or undertaking (except as required by applicable law, the UK Listing Rules, the Disclosure Guidance and Transparency Rules of the Financial Conduct Authority and the Listing Rules of the Australian Securities Exchange) to release publicly any updates or revisions to any forward-looking statement contained herein to reflect any change in Rio Tinto's expectations with regard thereto or any change in events, conditions or circumstances on which any such statement is based.

Nothing in this report should be interpreted to mean that future earnings per share of Rio Tinto plc or Rio Tinto Limited will necessarily match or exceed its historical published earnings per share.

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