Creating a world fit for the future

Ricardo plc

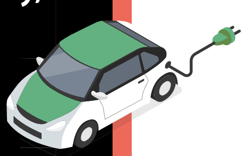
Annual Report & Accounts 2018/19

Who we are

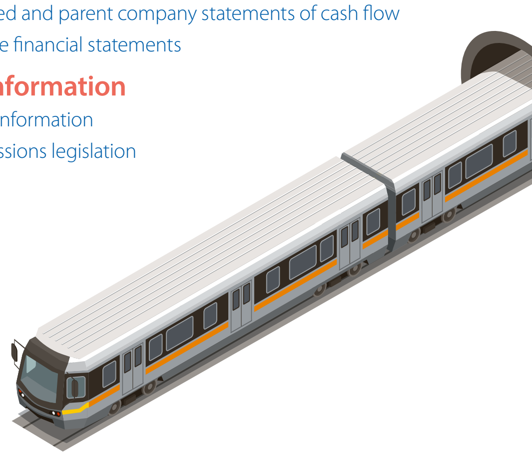
Ricardo is a global engineering, technical, environmental and strategic consultancy business. We also manufacture and assemble low-volume, high-quality and high-performance products and develop advanced virtual engineering tools for conventional and electrified powertrains as well as for complex physical systems. Our ambition is to be the world's pre-eminent organisation focused on the design, development and application of solutions to meet the challenges within the markets of Transport & Security, Energy, and Scarce Natural Resources & Waste. Our mission is *to create a world fit for the future*, and we will achieve this through the activities of our portfolio of businesses, each of them underpinned by our talented team of professionals.

Drawing on over 100 years of commitment to innovation in engineering, technology and business, Ricardo's engineers, consultants, scientists and support staff deliver class-leading products and services for the benefit of a broad and global client base – a client base which includes the world's major transportation original equipment manufacturers and operators, tier 1 suppliers, energy companies and government agencies.

Ricardo cultivates the talent and the engineering and scientific excellence of its professionals and invests in their development for the benefit of the individual, for our organisation, and for our stakeholders. At Ricardo, our diverse community is bound together by a simple desire to develop solutions to complex problems, and is driven by our corporate values of Respect, Integrity, Innovation, and Passion.



Contents



Group overview

Introduction to Ricardo

A selection of key projects from the year...

Energy saving service proves its value

DriveSmart, Ricardo's low-cost energy-saving solution for rail operators, marked its first year in operation at Edinburgh Trams by reporting an immediate 17% reduction in energy usage.

Digital resilience builds traction in rail sector

Train manufacturer Bombardier appointed the Ricardo-Roke collaboration to integrate cyber security assessments into the design and testing of its Aventra model – an important sign that managing digital risk is an increasing priority for major OEMs.

Ricardo and UK Government at IPCC in Kyoto

Ricardo Energy & Environment supported the UK government at the Intergovernmental Panel on Climate Change in Kyoto, Japan in May 2019, to refine greenhouse gas inventory methodological guidelines, facilitating the implementation of reporting structures under the Paris Agreement.

Smart energy management

Ricardo Energy & Environment has signed an agreement to collaborate with a joint venture between Tata Power and local government, to deliver innovation and improved quality of service for energy consumers in Delhi, India.

Defence technology for EVs

Following its deal to supply anti-lock brake and electronic stability control systems for the US military's HMMWV 'Humvees', Ricardo Defense has been selected by Bollinger to provide similar systems for the world's first all-electric sport utility trucks.

Helping NASA navigate 'big data'

Ricardo Defense is providing NASA with advanced software for the analysis and optimisation of large and complex data sets to facilitate detailed planning for future deep-space missions.

See case study on pages 58 to 61

Smarter rail electrification

Ricardo Rail is helping the Netherlands provinces of Fryslân and Groningen to explore affordable electrification of an existing low-traffic diesel-operated route network using partial catenaries and battery-equipped trains.

See case study page 50

Reducing motion sickness in autonomous vehicles

Engineers in Ricardo Innovations have been working to create a software package that aims to minimise the effects of motion sickness in the passengers of both autonomous and conventional vehicles.

See case study page 62

Supporting Australia's circular economy

Ricardo Energy & Environment has been contracted to support the New South Wales Environmental Protection Agency ('EPA') in Australia in the development of the state's circular economy strategy.

See case study on pages 54 to 57

Spark of inspiration for natural gas engines

Ricardo Software is collaborating with European research partners to create tools to develop a new form of compact natural gas engines giving diesel-like power and performance but with significantly reduced CO_2 and NO_x.

See case study page 70

At the centre of EU climate planning

Ricardo Energy & Environment has been assessing the National Energy & Climate Plans being developed by each EU Member State to ensure that the EU achieves binding 2030 targets on energy efficiency and greenhouse gas reductions.

The new BMW C 400 series

Ricardo Motorcycle partnered with BMW to develop a new generation of mid-sized scooters that distil the qualities of BMW's larger maxi-scooters into a novel series of smaller and more accessible urban mobility models.

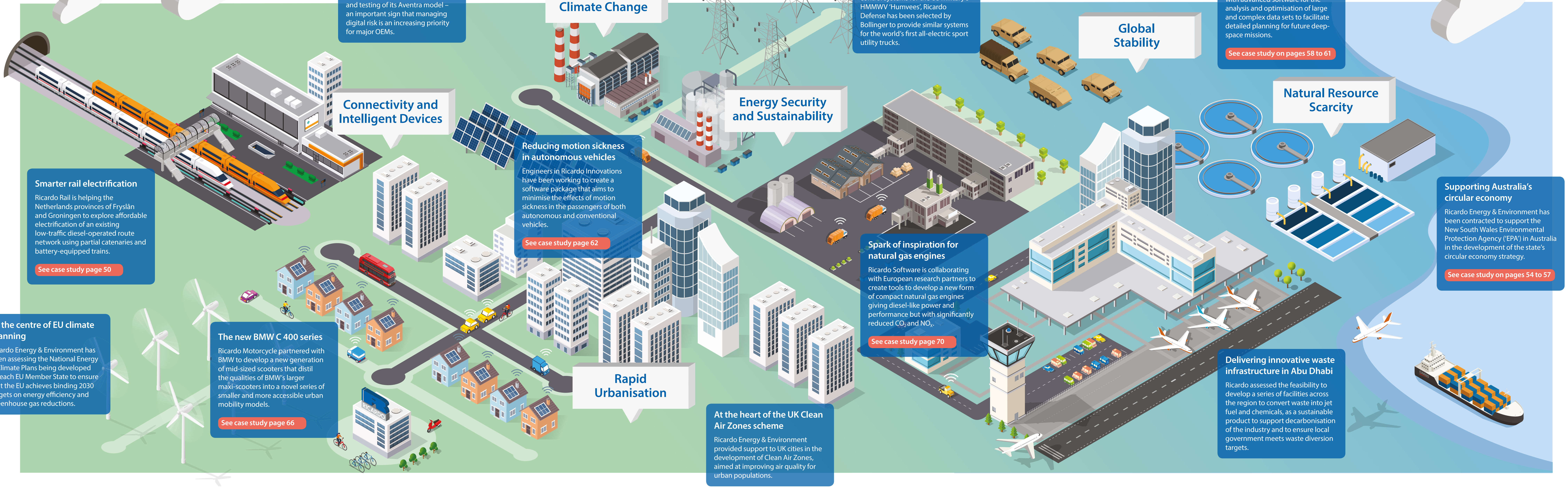
See case study page 66

At the heart of the UK Clean Air Zones scheme

Ricardo Energy & Environment provided support to UK cities in the development of Clean Air Zones, aimed at improving air quality for urban populations.

Delivering innovative waste infrastructure in Abu Dhabi

Ricardo assessed the feasibility to develop a series of facilities across the region to convert waste into jet fuel and chemicals, as a sustainable product to support decarbonisation of the industry and to ensure local government meets waste diversion targets.



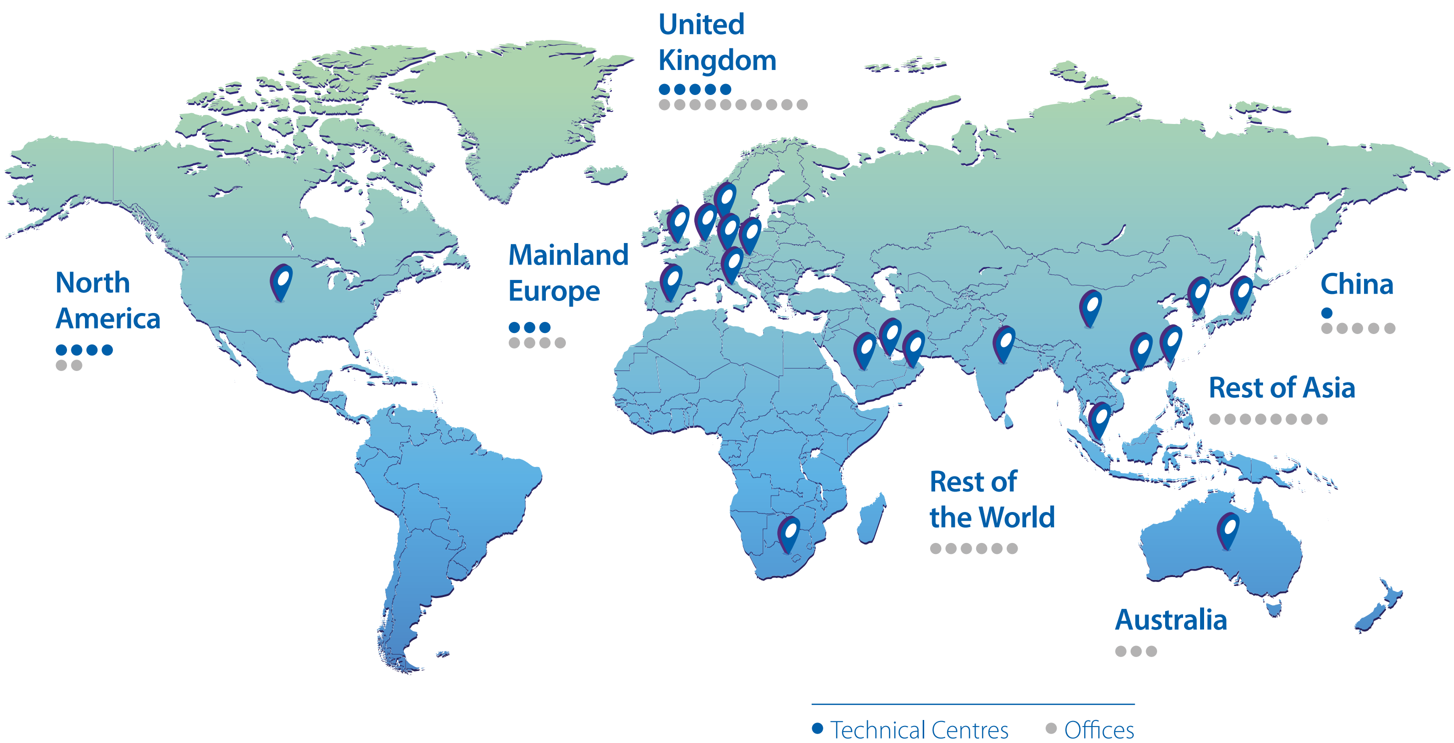
Our people

Three thousand dedicated and talented people in our global team of experts situated in key locations around the world.

3,000	88	20	51
people	nationalities	countries	sites

Consultants Engineers Scientists

Where we are



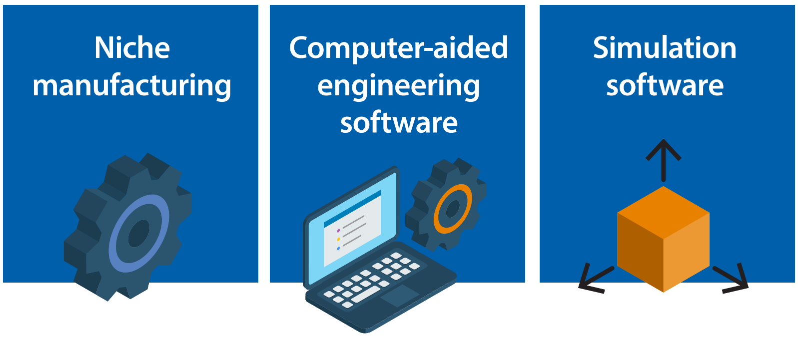
What we do

Technical Consulting

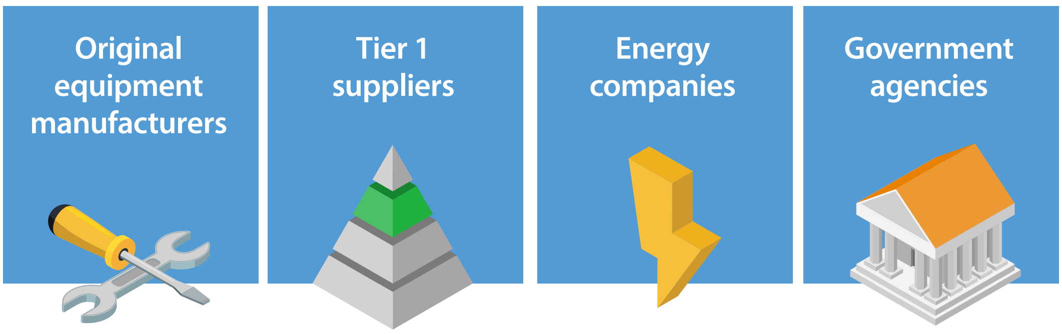
We provide engineering, technical, environmental and strategic consultancy services to clients across a range of market sectors. We also provide accreditation and independent assurance services to clients in the rail sector.

Performance Products

We manufacture and assemble high-quality prototypes and niche volumes of complex engine, transmission and vehicle products. We also develop advanced virtual engineering tools such as computer-aided engineering and simulation software for conventional and electrified powertrains, as well as for complex physical systems.



Who we work with

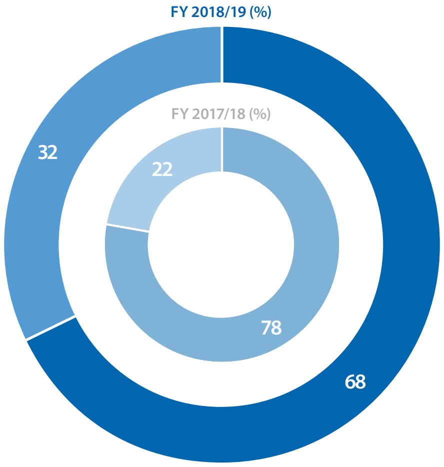


Order intake

Order intake for FY 2018/19 of **£386m** (FY 2017/18: £413m) split by our:

Operating segments

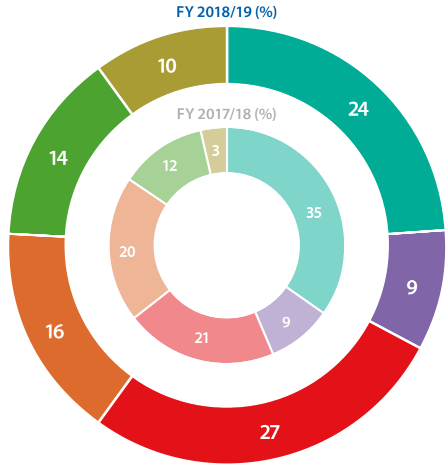
Our businesses aggregate into two distinct reportable operating segments:



- Technical Consulting
- Performance Products

Market sectors

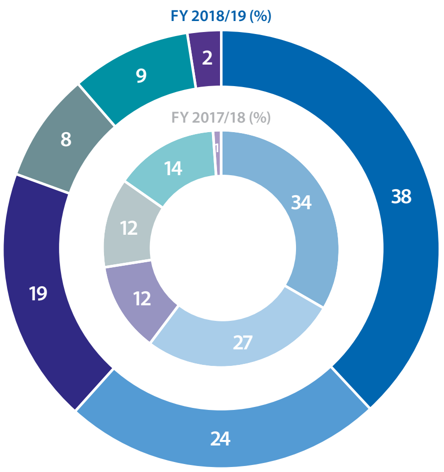
Our strategy of diversification into adjacent market sectors has continued to provide balance to our order intake:



- Automotive
- Off-Highway & Commercial Vehicles
- High-Performance Vehicles & Motorsport
- Rail
- Energy & Environment
- Defence

Geographies

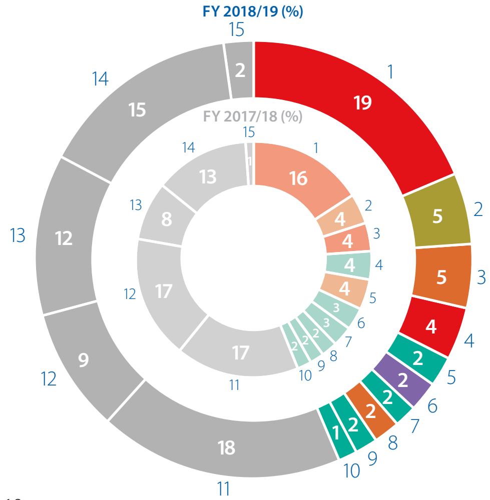
Our operations in selected market sectors span many different regions of the world:



- UK
- Mainland Europe
- North America
- China
- Rest of Asia
- Rest of the World

Customers

Our order intake arises from a global customer list that includes the world's major transportation original equipment manufacturers and operators, tier 1 suppliers, energy companies and government agencies:



1-10. Top 10
11. UK
12. Mainland Europe
13. North America
14. Asia
15. Rest of the World

Financial highlights

Order book(1)

+6%

FY	£m
2018/19	314
2017/18	295(*)
2016/17	248
2015/16	231
2014/15	140

Order intake(2)

-7%

FY	£m
2018/19	386
2017/18	413
2016/17	366
2015/16	361
2014/15	252

Revenue

+2%

FY	£m
2018/19	384.4
2017/18	378.5(*)
2016/17	352.1
2015/16	332.4
2014/15	257.5

Underlying(3) profit before tax

-1%

FY	£m
2018/19	37.0
2017/18	37.5(*)
2016/17	38.3
2015/16	37.7
2014/15	26.8

Underlying(3)(4) basic earnings per share

-3%

FY	pence
2018/19	53.7
2017/18	55.1(*)
2016/17	55.7
2015/16	55.2
2014/15	42.4

Dividend per share (paid and proposed)

+4%

FY	pence
2018/19	21.28
2017/18	20.46
2016/17	19.3
2015/16	18.1
2014/15	16.6

Statutory profit before tax

-2%

FY	£m
2018/19	26.5
2017/18	27.0(*)
2016/17	32.2
2015/16	33.0
2014/15	22.9

Statutory basic earnings per share

+12%

FY	pence
2018/19	37.1
2017/18	33.0(*)
2016/17	46.8
2015/16	48.6
2014/15	35.6

Net (debt)/funds

-82%

FY	£m
2018/19	(47.4)
2017/18	(26.1)
2016/17	(37.9)
2015/16	(34.4)
2014/15	14.3

Further detail is given in the Financial Review on pages 30 to 35.

(*) Financial information for FY 2017/18 has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

(1) Order book comprises the value of all unworked purchase orders and contracts received from customers at the reporting date and provides an indication of the amount of revenue that has been secured and will be recognised in future accounting periods, as set out in Note 18 to the financial statements on page 150.

(2) Order intake comprises the value of all purchase orders and contracts received from customers in the period and provides an indication of the level of revenue-generating activity in the Group. Order intake can be reconciled as closing order book (£314m) less opening order book (£295m(*)) and acquired order book (£30m), plus revenue (£384m) and order cancellations (£13m).

(3) Underlying measures exclude the impact on statutory measures of specific adjusting items as set out in Note 4 to the financial statements on page 139. Underlying measures are considered to provide a more useful indication of underlying performance and trends over time and can be found, together with a reconciliation to equivalent statutory measures, on the income statement in the financial statements on page 124.

(4) Underlying earnings also exclude the tax impact on statutory earnings of specific adjusting items as referred to in Footnote 3.

Our mission:

To create a world fit for the future

This year has seen a breakthrough in terms of awareness of the risks of climate change: public pressure has intensified for more ambitious action to reduce greenhouse gas emissions, and to accelerate the implementation of climate policies in the UK and elsewhere.

In October 2018 the UN's Intergovernmental Panel on Climate Change published a special report which, for the first time, set out starkly the impacts of a rise in the Earth's average temperature above pre-industrial levels of more than 1.5°C. A month later Swedish teenager Greta Thunberg began what has become an international movement of school strikes for climate change, followed by the Extinction Rebellion protests which brought central London to a standstill in April 2019. In May, the UK's Committee on Climate Change recommended that the UK adopt a new long-term emissions target of net zero greenhouse gases by 2050, and in June the UK became the first G7 country to legislate for net zero emissions, effectively eradicating its contribution to climate change by the middle of this century. Other G7 countries are now planning to introduce similar legislation within the next year.

Ricardo is here to provide leadership for our clients and to find solutions to these challenges

For more than 30 years, technical experts in Ricardo Energy & Environment have been supporting the UK Government and a wide range of authorities in cities, regions and nations around the world in their efforts to tackle dangerous climate change, working with many private and public-sector stakeholders along the way. Ricardo's experts not only contributed directly to the Committee on Climate Change's

Ricardo supporting mangrove planting during delivery of a capacity building workshop on climate change commitments in Jakarta

Ricardo's Glasgow-based environmental consultants supporting a range of activities for the UK's National Clean Air Day

net zero report: they have also been working with multiple organisations, in the UK and overseas, to identify how to meet more ambitious emissions reduction targets whilst maintaining economic growth.

And this resonates throughout the wider Ricardo Group as we work collaboratively across our 3,000 employees to address the risks and opportunities emerging from parallel global issues and megatrends that include rapid urbanisation, air quality and climate change, energy security and sustainability, connectivity and intelligent devices, scarcity of natural resources, and global stability. These megatrends are driving economic and social change, promoting growth in developing countries, and of course harnessing and encouraging the disruptive technology which will be so crucial in the uncertain world of the future.

Ricardo Energy & Environment presenting on air quality at a European Commission workshop

Whether it is the electrification and automation of the automotive sector, the demand for more efficient rail transport, the safety of military and emergency service vehicles, addressing the issues of a growing number of megacities, creating innovative software solutions and tools, or indeed tackling the impact of dangerous climate change, Ricardo is here to provide leadership for our clients and to find solutions to these challenges.

Strategic report

Sir Terry Morgan CBE – Chairman

Chairman's statement

Ricardo's continued diversification strategy has proved successful and enabled us to be resilient to the continued turbulence in the global automotive market. On that note, I would like to welcome into the Ricardo Group all employees of our two Australian acquisitions, Transport Engineering and PLC Consulting.

Ricardo will continue to pursue diversification in its acquisitions and invest in its core products and services **to create a world fit for the future**.

Results

For the year ended 30 June 2019, the Group delivered revenue of £384.4m, together with profit before tax of £26.5m and basic earnings per share of 37.1 pence. On an underlying basis, profit before tax was £37.0m and basic earnings per share was 53.7 pence.

As set out in more detail in the Chief Executive's Statement on pages 13 to 15 and the Financial Review on pages 30 to 35, the Group delivered a resilient set of results. There was a modest increase in revenue and underlying profit before tax was broadly in line with the prior year. This was despite challenging conditions in certain markets within our Technical Consulting business, which resulted in mixed performance across its divisions.

The results reflected the Group's continued focus on its strategic objectives of geographic and sector diversification through carefully targeted acquisitions and disposals. The acquisition of Australian rail consultancy, Transport Engineering, was completed on 31 May 2019 and its June results were in line with expectations. The Group completed the acquisition of Australian environmental consultancy, PLC Consulting, on 31 July 2019.

The Group's performance against its strategic objectives is outlined on pages 18 and 19. We also continued to invest in research and development, as described on pages 28 and 29, and in our people and our facilities.

People

I would like to thank all of our employees for their hard work and professionalism over the last year. As set out on pages 36 and 37, Ricardo is a people business and our employees underpin everything that the Group achieves.

Notable achievements during the year have included Ricardo Strategic Consulting being named by *Forbes* as one of America's leading management consultants, for the fourth consecutive year – from among more than 50,000 firms active within the US market.

In its second annual rating of the UK's top management consultancies, the *Financial Times* has again identified Ricardo Energy & Environment as a leader in the area of Sustainability in its listing of the UK's Leading Management Consultants 2019.

Ricardo received the Sir Henry Royce Memorial Foundation Award from The Worshipful Company of Carmen of London, recognising Ricardo for 'outstanding work in extending the frontiers of achievement, and the pursuit of excellence, in the field of transport worldwide.'

I would also like to congratulate all those other individuals and team members who have won awards under the various Ricardo recognition programmes during the year, together with those members of staff who have gained academic success or peer-group recognition in their chosen career paths.

Corporate governance

The Board firmly believes that robust corporate governance and risk management are essential to maintain the stability of the Group and its financial health. I am reporting separately on Corporate Governance on pages 78 to 83 of this Annual Report.

I am delighted that the FTSE4Good Index Series has confirmed Ricardo's continued inclusion for demonstrating strong Environmental, Social and Governance ('ESG') practices. This continued achievement bears testament to our commitment to the highest standards of corporate governance, which ultimately produces a better business and supports long-term performance.

The Board

On 6 September 2019, we announced the retirement of Peter Gilchrist CB from the Board following the close of this year's AGM. As a result, Ricardo has appointed two additional Non-Executive Directors, Russell King and Jack Boyer OBE. At the close of the AGM, Russell King will be appointed Chairman of the Remuneration Committee and Malin Persson will take on the role of Senior Independent Director. I have decided to stand down as Chairman of the Nomination Committee and Laurie Bowen will be appointed to this role.

I would like to thank each of our Non-Executive Directors for their counsel during the year.

Dividend

The dividend has grown each year on average by 7% over the last decade. The Board has declared a final dividend of 15.28 pence per share to give a total dividend of 21.28 pence, which is an increase of 4% on the prior year. This is in line with the Board's policy to pay progressive dividends and reflects its continued confidence in the prospects of the Group, whilst acknowledging the uncertain economic climate.

Outlook

Ricardo's strategy is underpinned by trends which will affect an ever-increasing number of people around the globe: growing populations, mass urbanisation, declining air quality, climate change, more stringent emissions legislation and growing scarcity of natural resources.

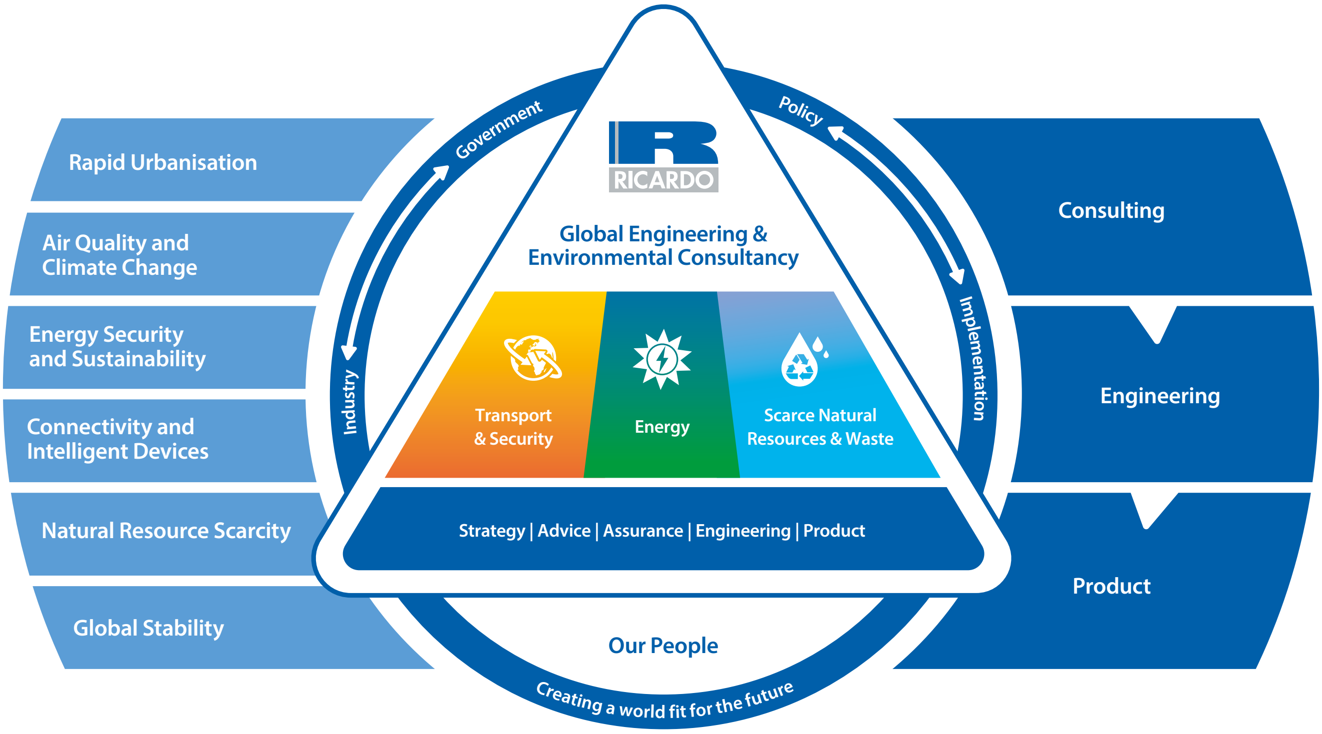
Despite the level of uncertainty in the political and economic landscape, including the continued downturn in the global automotive market, our diversified order book and the quality of our global experts across all sectors gives Ricardo a good platform for future growth.

Sir Terry Morgan CBE
Chairman

Ricardo's Non-Executive Directors and Chief Operating Officer, Mark Garrett, visit Shaanxi Fast Gear as part of a tour of Ricardo's Chinese and Hong Kong operations and key customers

Our strategy

Our mission is **to create a world fit for the future** by being the world's leading organisation for engineering, technical and environmental consultancy within the markets of Transport & Security, Energy, and Scarce Natural Resources & Waste.



See pages 13 and 14 for further information.

Our strategic objectives

1 Business growth

Profitable growth delivered by focusing on future trends and market demands driven by client needs, technology change and prevailing or impending policies and regulation

2 Risk mitigation

Reducing risk through the mitigation of business cyclicality and the avoidance of external dependency, whether geographic, technical, industry sector or client-related

3 World-class talent

Ensuring a working environment that attracts, develops and motivates a diverse, world-class team and fosters industry thought leadership

4 Operational excellence

Maintenance of an optimised cost base through an efficient global operation and the development of leading-edge tools, processes and capabilities to maximise value from our resources

5 Added value for clients

Provision of in-demand products and services through our commitment to market-leading research, development and innovation aimed at providing maximum and enduring benefits to our customers

See pages 18 and 19 for further information.

Dave Shemmans – Chief Executive Officer

Chief Executive's statement

In this financial year, Ricardo managed to deliver an increase in revenue and order book overall, despite a very turbulent backdrop in Automotive. This was driven by strong growth in Performance Products and Energy & Environment in particular. We successfully expanded in Australia, with the acquisition of Transport Engineering in May 2019 to support our Rail business, and PLC Consulting in July 2019 to broaden our Environmental consulting offering. We continue to invest in technologies, services and digital products to aid our blue-chip clients – together we create sustainable solutions to address the key issues of climate change, air quality, global stability and the management of scarce natural resources.

We deliver services and products to help build a cleaner, safer and more sustainable world – in essence, creating a world fit for the future. The demand for innovative solutions in the markets and geographies we serve, together with our diverse portfolio of businesses, gives us confidence in Ricardo's continued success.

Strategy

We strive **to create a world fit for the future** through the exploitation of new technology, delivered by the very highest quality professionals from around the globe – specialists who are acknowledged experts in their fields. Our strategy is connected by three core principles:

- Professionalism and technical excellence in everything that we do;
- Business growth underpinned by the enduring megatrends of rapid urbanisation, climate change, demand for cleaner and safer energy and transportation, digitalisation, global stability and the management of scarce natural resources; and
- Business resilience through the organic and inorganic development of a balanced portfolio of consultancy and manufacturing businesses, serving different markets and sharing common strategic, engineering and technical competencies.

Our customers in all of the sectors in which we operate demand innovative solutions to address the challenges of cleaner air, safer energy, electrified, connected and autonomous transport and the efficient use of natural resources.

Ricardo continues to develop and deliver leading-edge services and products to support its clients all over the world in their desire to address these global issues and help create a cleaner and safer future. Our Technical Consulting and Performance Products businesses share common competencies, allowing Ricardo to assist clients in all phases of a project or product life cycle, in parallel with building a portfolio of short- and long-term programmes.

This year we have increased our focus on digitalisation and cyber security. As digitalisation transforms businesses and industries, it is our strategy to evolve our processes and the services and products we deliver to our clients through the adoption of digital technologies.

Our global experts are crucial to the delivery of our strategy and to the success of our business. We strive to recruit the best talent and to retain a diverse and inclusive workforce through apprenticeships, graduate recruitment and industry hire programmes. We invest in the development of the skills and competencies of our staff, providing equal opportunities for all.

Our teams develop technologies and innovation relevant to the many sectors in which we operate, and which are necessary to accelerate the move to a cleaner and more sustainable world. It is this international team that brings technology and innovation to life with our clients through projects and long-term programmes which range from technology and market assessments, to policy development, product development and high-performance, niche manufacturing.

Further information on the execution of our strategy can be found between pages 18 and 19.

Highlights from the year

We closed the year with a good order intake of £386m and a year-end order book of £314m. The Group delivered an increase in revenue of 2% to £384.4m (FY 2017/18: £378.5m(*)) and underlying profit before tax was broadly in line with the prior year at £37.0m (FY 2017/18: £37.5m(*)). For statutory reporting purposes, profit before tax was £26.5m (FY 2017/18: £27.0m(*)). Further details on the results for the year are provided in the Financial Review on pages 30 to 35.

All our Performance Products businesses performed strongly, with increasing revenue across its High-Performance Vehicles & Motorsport, Defence and Software sectors. The High-Performance Vehicles & Motorsport and Defence sectors also saw an increase in profitability.

Within High-Performance Vehicles & Motorsport, our manufacturing and assembly business went from strength to strength, reaching the key milestone of delivering over 20,000 engines for McLaren within the past 10 years, and with a record output of over 5,000 engines this financial year. I am also pleased that we have signed a third-generation engine supply agreement with McLaren: this is the largest ever signed by Ricardo and will see us delivering engines through to the late 2020s.

The growth in Defence was due to the ramp-up in deliveries of its anti-lock brake and electronic stability control system (known as 'ABS brake kits') for the High-Mobility Multipurpose Wheeled Vehicle ('HMMWV', or Humvee). More than 1,500 units were successfully delivered to the US military during the financial year.

Our Technical Consulting business in Energy & Environment performed particularly well this year. Our Rail business performed in line with the prior year, as headwinds in orders and revenue across a number of geographies were mitigated through operational efficiency initiatives and strong management of its project portfolio.

Challenging prevailing conditions in the global automotive market continued to have an adverse impact on revenue and profitability in our Automotive businesses across Europe and the US. China also performed well, but the flow of orders slowed towards the end of the year.

Another loss was made in the US as it continues to reposition itself as a more agile operation with a greater focus on electrified and new-energy vehicles and through active test asset reduction plans. Our purchase of the Detroit facility post year-end removes the business from its long-term lease commitment and provides the flexibility to take further strategic actions.

The weaker performance across the Automotive business as a whole was largely offset by strong results elsewhere across the Group, demonstrating its resilience and the justification of our diversification strategy across market sectors and geographies.

This year we have made further progress in the development

(*) Financial information for FY 2017/18 has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

Ricardo delivered over 5,000 engines to McLaren this year across an increased number of engine variants, including the 720S Spider

Ricardo assisted BMW Motorrad with the C 400 series scooters (see case study on pages 66 to 69)

of this diversification strategy, initially with the organic expansion into the Australian market by our Energy & Environment business, winning several projects related to waste and resources management and growing its local team, followed by the acquisition of PLC Consulting Pty Ltd ('PLCC'), subsequently renamed Ricardo Energy Environment and Planning Pty Ltd, which was completed after the year-end in July 2019. We also acquired Transport Engineering Pty Ltd during the year, subsequently renamed Ricardo Rail Australia Pty Ltd, a leading railway technical advisor and consultancy with capabilities complementary to those of our existing Rail business; this gives Ricardo a sizeable footprint in the rapidly growing Australian rail market.

We continue to evolve our strategy and our capabilities in electrification, cyber security and digitalisation, all of which are trends that have an impact across all the markets we serve and where Ricardo is already delivering innovative solutions.

We deliver state-of-the-art electrification programmes for on-vehicle applications and off-vehicle infrastructure. Such programmes have included the development of: a compact, high-performance 48V e-motor; an e-axle transmission; a single-speed EV transmission which draws upon research and technology that we have proven in markets from supercars to Formula E; and a ground-breaking field trial by UK Power Networks exploring the use of smart grid technology to unlock spare capacity for increased electric vehicle use.

We further developed our collaborative relationship with Roke, with the launch of our combined 'Digital Resilience Lab'. We delivered the first Ricardo-Roke project in the rail sector to implement a new approach for managing digital risk in connected transport systems, focusing on the Bombardier Aventra passenger train. The project blended Roke's expertise in cyber security and supporting critical national infrastructure with Ricardo's domain knowledge of rail operations, rolling stock design, systems engineering and passenger interactions.

We have prepared for a range of possibilities for Brexit and any disruption that may arise around the intended transition date. For instance, we have secured a European accreditation route for our Rail business to supplement our existing UKAS accreditation, which allows us to continue to offer our services across Europe. We have also assessed inventory holding patterns for our McLaren production line to prepare for the possibility of European customs disruption.

We are now bidding our European research funding programmes through our office in the Netherlands, having worked closely with the EU to ensure we can continue to be a partner in the provision of leading-edge technology in the future. We also continue to closely monitor the potential impact of Brexit and the ongoing uncertainty around the movement of staff between the UK and the European Union, and to ensure we have a robust supply chain for any overseas resources required.

Our success is a result of our people and their skills, our technical expertise, our innovation and passion – all of which are channelled into solving the global and societal issues for which solutions are demanded, and which our clients clearly face. Our mission is **to create a world fit for the future**.

Further examples of how Ricardo's community has delivered innovative solutions and created value for its clients across the world are summarised below and presented in the Case Studies section from pages 48 to 73.

- **Rail:** Smarter rail electrification
- **Energy & Environment:** Supporting Australia's circular economy
- **Defence:** Helping NASA navigate 'big data'
- **Automotive:** Reducing motion sickness in autonomous vehicles
- **Motorcycle:** Smart, urban, and every inch a BMW
- **Software:** Spark of inspiration for natural gas engines

Outlook

Our continued focus is on addressing the core issues created by increasing global population, industrialisation and urbanisation through the application and provision of leading-edge consulting, engineering and product solutions. This is underpinned by our strategy of diversification in the geographies and markets of the customers that we serve – all of which gives us confidence for Ricardo's continued growth and relevance on the world stage.

Current political and economic uncertainties aside, we are well positioned for growth from a strong, diversified order book and pipeline, recurring revenue from long-term production programmes and the benefit of recent acquisitions.

Dave Shemmans
Chief Executive Officer

Market overview

Megatrends

Market drivers

Rapid urbanisation

- Increasing demand for public services and infrastructure as well as the expansion of the 5G network and connected products driving the development of smart cities;
- Growth in urban mass-transit systems and international high-speed rail;
- Increasing demand for transport and energy solutions which improve efficiency and reduce carbon emissions; and
- Increasing emphasis on waste reduction and environmentally sound waste management.

Air quality and climate change

- Air quality is a key global health concern;
- Increasingly challenging long-term greenhouse gas emissions targets set as part of the Paris Agreement;
- Stricter fuel economy and CO_2 regulations in most developed countries; and
- Continued interest and investment in low carbon fuels, hybrid technologies, fuel cells and electrification.

Energy security and sustainability

- Significant growth in renewable energy sources required to reach the targets set as part of the Paris Agreement;
- Consumer demand and policies at government and city level driving the electrification agenda; and
- Increasing focus on decarbonisation of the energy sector.

Ricardo's key capabilities

Rapid urbanisation

- Experts in critical and complex railway systems and providers of rail engineering assurance services;
- Working with cities across the world on policy, optimisation, validation and integration of smart systems;
- Recognised industry solutions provider for vehicle electrification and autonomous vehicle systems; and
- Extensive capability in waste treatment technologies, supporting customers in the categorisation and assessment of different technologies for capacity, feedstock suitability, outputs and energy recovery efficiency.

Air quality and climate change

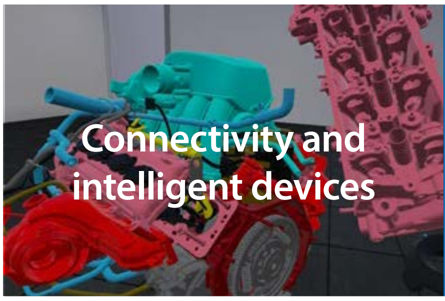
- Technology leadership in vehicle fuel economy, powertrain electrification and battery electric vehicles;
- Respected international authority on urban air quality;
- Longest established specialist air quality team in the world;
- Solutions provider for vehicle emissions reduction and aftertreatment technology; and
- Supplier of software solutions to deliver the more fuel efficient and sustainable automotive products of the future, powered by internal combustion engines, electric motors and hybrid technologies.

Energy security and sustainability

- Supporting governments and public organisations to define energy and electric vehicle strategies and policy;
- Leading capability in power sector investment planning, renewable electricity and heat transmission and distribution, smart grids, international electricity markets and industry regulation;
- World-leading experts with deep understanding of the technical and economic challenges of developing intelligent networks in urban energy systems and in rural and off-grid settings; and
- Drawing upon expertise in hybrids and electrical control systems, batteries and engines applicable across the automotive and rail sectors.

Competitive landscape

- Ricardo serves customers across a number of markets, all of which are highly competitive and undergoing rapid change;
- Our customers include privately and publicly-owned businesses of different sizes, governments, government organisations, inter-governmental and international agencies and public authorities;
- Our Technical Consulting business, which primarily operates in the automotive, rail and energy sectors, serves major transportation original equipment manufacturers ('OEMs') and operators, new entrants into electric and autonomous vehicles, tier 1 and niche component suppliers, and other private and public-sector clients around the world;
- We compete against a small number of large consultancies in international markets as well as against a larger number of small, specialised consultancies present in national and local markets. These competitors include engineering, environmental and strategic consultancies, as well as providers of certification and assurance services to the rail sector;



Connectivity and intelligent devices

- Rapid growth in the use of sophisticated digital data generation and analysis systems in many sectors for increased safety and efficiency;
- Development of connected autonomous and intelligent transport technologies leading to Mobility as a Service ('MaaS'); and
- Increasing application of artificial intelligence technology and virtualisation of engineering processes to reduce development costs and bring products to market faster.

- Our 'Intelligent Rail' suite of products and services offers bespoke analysis tools and methodologies designed to address the needs of the rail sector;
- Our Virtual Reality Engineering Design Review application promotes effective and efficient design optimisation by geographically dispersed teams; and
- Our Strategy Consulting Mobility service helps customers to exploit the opportunities of new and connected transportation technologies to maximum commercial, environmental and societal effect.

Natural resource scarcity

- Growing water scarcity impacting industries and countries;
- The acceleration of soil erosion and degradation leading to a decrease in the extension of cultivable land;
- Biodiversity, oceans and forests under increasing stress; and
- Increasing emphasis on waste reduction in all sectors of the economy.

- Strong technical expertise and practical experience across all aspects of sustainable water and environmental management;
- Extensive experience of providing high-quality economic analysis and insight to governments and businesses worldwide to inform the decision-making processes for scarce natural resources allocation;
- Our environmental experts help clients understand their agricultural challenges and implement sustainable solutions that deliver effective results; and
- Helping private and public-sector organisations to develop and apply circular economy strategies.

Global stability

- Exponential increase of products and critical infrastructure connected to the Internet, driving demand for cyber resilience solutions to prevent cyber threats which have the potential to create havoc in organisations and governments;
- Growing demand from governments and society for solutions to address the risks of climate change; and
- Continuing unrest in many nations requiring UN and NATO forces to maintain and upgrade their defensive capabilities.

- Digital resilience partnership with Roke working on the cyber security of connected infrastructure across rail, automotive and energy sectors;
- Climate finance experts provide strategic advice, technical analysis and modelling, capacity building, and training;
- Crisis management team offers services aimed at enabling clients to develop their own levels of preparedness and resilience in the face of unexpected weather events, natural disasters, terrorism and cybercrime; and
- Our Defence business delivers world-class products and systems, enabling our customers to 'protect those who protect us'.

- Our Performance Products business competes with divisions of automotive OEMs and providers of niche-volume production solutions in other performance-driven markets. We also compete with a range of developers of engineering and complex systems simulation software serving many of the markets in which we operate; and
- At Ricardo our key differentiators are our leading technical and strategic capabilities, the proven track record of our dedicated and talented teams of consultants, engineers, and scientists delivering innovative services and products across all of the markets we serve. We are also distinguished by our development of advanced niche-volume production solutions for the automotive industry and other high-performance markets.

Strategic performance

The Board monitors performance indicators related to our strategic objectives

1 **Business growth:** profitable growth delivered by focusing on future trends and market demands driven by client needs, technology change and prevailing or impending policies and regulation

More detail on these principal risks together with how they are mitigated is presented on pages 45 and 46

Performance indicator | Commentary | Principal risks

Order book
£m

We closed the year with a record order book of £314m, up 6% on the prior year. This included £13m for ABS brake kits and £30m from the Transport Engineering acquisition.

Order intake in Technical Consulting declined, primarily in our European Automotive business and towards the end of the year in China, as a result of the continued global uncertainty across the industry. Our legacy Rail business was also impacted by lower volumes in the current year. In the prior year, order intake in both Automotive and Rail benefitted from several large, multi-year orders. These impacts were partially offset by strong growth in Performance Products in the current year.

Principal risks: Customers and markets; Brexit

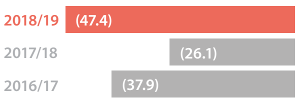
Revenue
£m

There has been a significant reduction in revenue in Technical Consulting, primarily in our European Automotive business. This has largely been offset by growth in Performance Products, driven by sales of ABS brake kits and higher volumes of engines and transmissions. In considering growth on a like-for-like basis in Technical Consulting, had Control Point Corporation been owned for the full year, revenue in FY 2017/18 would have been £2.2m higher. Technical Consulting revenue in FY 2018/19 includes £1.4m from Transport Engineering following its acquisition in the year.

More details of this are described in the Financial Review section on pages 30 to 35, and also in the Technical Consulting and Performance Products sections on pages 20 to 25 and 26 to 27, respectively.

Principal risks: Contracts; Customers and markets; Brexit

Net debt
£m



The Group had a net cash outflow of £21.3m in the year. This includes £18.9m spent on acquisitions, net of cash acquired, £3.5m of acquisition-related payments, and a net £2.5m cash outflow from restructuring activities. Contributions of £4.3m were also paid to the defined benefit pension scheme.

Principal risks: Contracts; Financing; Defined benefit pension scheme

2 **Risk mitigation:** reducing risk through the mitigation of business cyclicality and the avoidance of external dependency, whether geographic, technical, industry sector or client-related

Performance indicator | Commentary | Principal risks

Sector diversity
Number of sectors exceeding 10% of revenue

Four of our six sectors exceeded 10% of revenue, demonstrating that the Group remains well diversified across its critical market sectors.

Revenue in our Automotive sector as a proportion of total Group revenue reduced by 6%. This was offset by growth in High-Performance Vehicles & Motorsport and Defence.

Principal risks: Customers and markets; Technology

Customer dependency
Number of customers exceeding 5% of revenue

The number of customers from whom revenue was generated that exceeded 5% of total revenue has remained consistently low over the last three years.

Revenues from one customer represent approximately £74.5m (19%) of the Group's revenue.

Whilst we retain a small number of key client relationships, we continue to have a diverse customer base.

Principal risks: Customers and markets; Brexit

3 **World-class talent:** ensuring a working environment that attracts, develops and motivates a diverse, world-class team and fosters industry thought leadership

Performance indicator	Commentary	Principal risks

Employee and knowledge retention

Voluntary employee turnover % per annum

The level of voluntary attrition has remained stable and is consistent with current expectations, but continues to be at a relatively high level primarily due to some significant changes to organisational structures within our Automotive business.

Active employment markets also continue to impact our voluntary attrition levels, with high demand for our experienced consultants, engineers and scientists from around the world who are experts in their respective fields.

Principal risks: People; Brexit

4 **Operational excellence:** maintenance of an optimised cost base through an efficient global operation and the development of leading-edge tools, processes and capabilities to maximise value from our resources

Performance indicator	Commentary	Principal risks

Underlying[(1)] operating profit margin

%

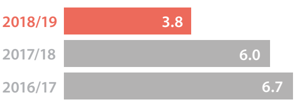
The decrease in the Group's underlying[(1)] operating profit margin was primarily due to Technical Consulting, driven by lower revenues in the Automotive business. This was partially offset by higher margins in Energy & Environment, which benefitted from increased order intake in the current year, combined with prior year profitability being adversely impacted by recruitment ahead of growth in orders. This was further offset by increased margins in Performance Products, driven by the ramp up in the ABS brake kits programme.

Further details are described in the Financial Review from pages 30 to 35.

Principal risks: Contracts; Customers and markets

Environment

tCO_2e per employee for scope 1 and scope 2 emissions



Scope 1 emissions vary based on project mix. We encourage improvements to reduce underlying emissions and to improve effective use of resources on projects.

Our emissions per employee decreased again this year, primarily due to reduced test activity in Automotive and the impact of the sales of the Chicago and Schechingen test facilities in the prior year, together with a reduction in tonnes of carbon dioxide equivalent ('tCO_2e') per kWh in UK electricity generation.

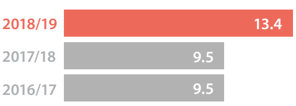
Principal risks: Laws and regulations

5 **Added value for clients:** provision of in-demand products and services through our commitment to market-leading research, development and innovation aimed at providing maximum and enduring benefits to our customers

Performance indicator	Commentary	Principal risks

Research and development spend

£m



The reported R&D spend increased due to expensed research on innovative engineering activities, capitalised costs to develop new technology, tools and processes in our Technical Consulting business, together with continued investment in developers of our software products in our Performance Products business.

Further details of active R&D projects are given in pages 28 and 29.

Principal risks: Technology; Customers and markets

Customer satisfaction

Ratings out of 10 across a range of measures

Customer satisfaction remains consistently strong at over 8 out of 10 over the past three years.

Principal risks: Contracts; Customers and markets

(*) Financial information for FY 2017/18 has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

(1) Underlying measures exclude the impact on statutory measures of specific adjusting items as set out in Note 4 to the financial statements on page 139. Underlying measures are considered to provide a more useful indication of underlying performance and trends over time and can be found, together with a reconciliation to equivalent statutory measures, on the income statement in the financial statements on page 124.

Technical Consulting

Performance

Ricardo's Technical Consulting business generates around 70% of the Group's revenue and underlying operating profit from its consultancy businesses working in our global market sectors of Energy & Environment, Rail, Automotive, Off-Highway & Commercial Vehicles, and Defence.

Highlights can be found on pages 22 to 25. As set out in Note 2 to the financial statements, revenue and underlying operating profit decreased by 6% to £270.5m (FY 2017/18: £286.8m(*)) and by 9% to £27.7m (FY 2017/18: £30.4m(*)), respectively.

Order intake in the year stood at £261m (FY 2017/18: £323m). This was largely due to the award of several large and non-recurring multi-year programmes in the prior year, combined with reduced levels of orders in the current year. The lower volume of orders had an adverse impact on operational efficiency and underlying operating profit margin, which decreased to 10.2% (FY 2017/18: 10.6%(*)). New orders were still balanced across all core regions and with good levels of diversification across different market sectors.

Ricardo Energy & Environment performed strongly and expanded its geographic presence and portfolio of services in the year. The business won a number of projects in the waste and resources sectors in Australia and acquired PLC Consulting post year-end. The business has also seen growth in demand for its services in several areas, including air quality, energy and digital solutions.

More stringent regulations in urban environments and stakeholders' ambitions to improve the quality of city life have driven the demand for our air quality services, while our energy practice has won projects in both the UK and internationally to support the evolution of energy networks and the development and application of renewable energy and innovative clean energy technologies.

In addition to our traditional consultancy services, customers are also interested in digital solutions and products which can help them tackle environmental issues; we have seen good demand in this area. Our National Chemical Emergency Centre has also continued to grow and expanded its services with the development of a new crisis management offering.

Ricardo Rail's performance was achieved despite a backdrop of challenging market conditions that had an adverse impact on its revenue in certain geographies. The business delivered a number of innovative projects, applying its extensive system engineering, cyber security and assurance capabilities. The business also entered the growing Australian market, with the acquisition of Transport Engineering ('TE'), subsequently renamed Ricardo Rail Australia, a leading rail engineering consultancy with capabilities that are highly complementary to our existing offering.

Our Automotive businesses saw a low level of activity, particularly in Europe, as demand for passenger-car outsourced engineering services was dampened by Brexit, trade policy actions and the initiatives of original equipment manufacturers ('OEMs') to reduce costs and rebalance investments towards vehicle electrification and autonomy. The automotive industry as a whole is experiencing reduced sales globally, with many OEMs undergoing restructuring plans as they adjust their headcounts to new sales levels and a rapidly changing technological landscape, as necessitated through increased electrification. The demand for our services in both the Motorcycle and Off-Highway & Commercial Vehicles markets remained at a good level – albeit not at the level required to offset the significant reduction in volumes of orders in the Passenger Car market. We have won projects that are focused on electrified and connected products, platooning technology and fuel-cell technology across these sectors.

As the industry moves towards increased digitalisation of processes and products, we have increased our investment in cyber security, simulation and digitalised capabilities to deliver innovative solutions which benefit our clients. The collaboration

(*) Financial information for FY 2017/18 has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

with Roke to develop cyber resilience solutions for vehicles, critical infrastructure and rail systems has resonated with clients and we have signed a memorandum of understanding to maximise the benefits of our joint offer.

Ricardo Defense operates in both the US and the UK and delivered a strong performance in the year, underpinned by the continued demand for our capabilities in software development, and the electrification and hybridisation of powertrains. The performance of the US business acquired in the prior year, formerly Control Point Corporation, has provided robust revenue growth and, together with the core Ricardo Defense business, is building strong momentum in this sector.

Business model

Ricardo's Technical Consulting business provides engineering, technical, strategic and environmental consulting services to private and public-sector customers, primarily in the Energy & Environment, Rail, Automotive, Off-Highway & Commercial Vehicles, and Defence markets, together with accreditation and independent safety assurance services in the Rail sector. Our services are delivered for a scope of work which is specific to our customers' needs and our projects range in length from a few weeks or months to programmes that extend over several years.

Our services are based on the multi-industry knowledge and deep technical expertise of our staff, on the application of intellectual property and know-how developed through our investment in research and development ('R&D'), and on our excellence in the management of projects, resources and customer relationships. Our capabilities are complemented by a wide range of design, test and development tools and equipment, together with the application of shared engineering processes across our worldwide network.

People are at the heart of our success and our staff include experienced professional consultants, engineers and scientists with a mix of backgrounds, cultures, expertise and outlook. We also have a thriving graduate and apprenticeship recruitment programme.

Our global infrastructure helps us to meet the needs of our customers in the different industries and sectors we serve. Ricardo has 51 sites in 20 countries, with technical centres in the US, the UK, the Netherlands, Italy, the Czech Republic and China, supported by offices where a local presence is needed to service our customers.

Bombardier's Aventra passenger train is the subject of the first rail project for the Ricardo-Roke Digital Resilience collaboration, which is providing an in-depth cyber security assessment of the vehicle

Market sector highlights

Energy & Environment

Ricardo Energy & Environment developed further in the UK, expanded internationally and saw growth across a variety of its sectors and services.

This year we have seen good growth in Australia where we have won projects in the waste and resources area, ranging from strategic circular economy studies to detailed feasibility assessments for waste-to-energy technology. After the year-end we completed the acquisition of PLC Consulting, which has strong technical advisory capability in the full infrastructure and environmental planning life cycle, and complements and extends Ricardo's existing energy and environment capabilities.

International growth elsewhere has been driven by specific themes in the industry, including international measurement, reporting and verification work at national and city level, and the provision of tailored capacity building and technical assistance to support actions for the mitigation of greenhouse gas ('GHG') emissions.

Other areas where we have seen robust demand are in energy, environmental and transport policy, and air quality.

The widely forecasted changes in energy demand, linked to the significant predicted uptake in electric vehicles ('EVs'), have seen our energy and transportation specialists win projects to support the evolution of the energy network and recharging infrastructure, as well as planning for fleets to utilise EVs.

This year we have also further developed our energy sector innovation activities and have supported the UK Government's Department for Business, Energy and Industrial Strategy ('BEIS') with technical advice for its Energy Innovation Investment Portfolio.

Our internationally renowned specialists in air quality have seen growing demand to help design and develop air-quality

Ricardo Energy & Environment's air quality experts in Nigeria as part of a project supporting sub-Saharan African megacities in transformational climate change mitigation

Ricardo's Glasgow-based environmental consultants supporting a range of activities for the UK's National Clean Air Day

strategies and plans that improve health outcomes. This year we have been involved in delivering a significant project for air-quality improvements in the Greater Beijing-Tianjin-Hebei region of China, while in the UK we continued to support central and local government around clean air zones.

We have also seen strong demand from the European Commission. A core project has been strengthening the capacity of EU member states to implement effective national policies for reducing GHG emissions from sources such as transport, agriculture and buildings; the work has ranged from the identification of potential new policy options to the assessment of the impacts realised by existing policies. Demand for environmental support at airports also continued to grow in the year.

In addition to our traditional consultancy services, we have seen growing interest in digital solutions and products to enable customers to gather greater insight from their data and become proactive in tackling environmental issues. The combination of our in-house digital development team and environmental specialists enables us to create robust market-differentiated solutions.

Our National Chemical Emergency Centre ('NCEC') continued to perform well. NCEC celebrated its 100th customer in China, as part of its partnership with the Chinese National Registration Centre for Chemicals. NCEC developed a new crisis management service, which has achieved traction with customers, including a contract with the UK Environment Agency to provide training on incident response to over 1,200 of its employees.

Rail

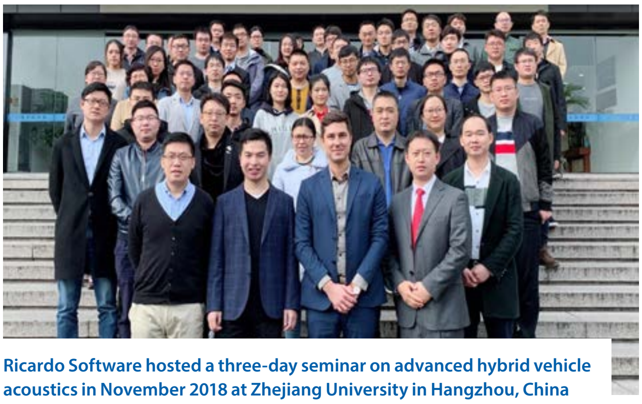
We acquired TE on 31 May 2019, which not only marks our entry into Australia's thriving domestic rail market, but also reinforces our capabilities within the Asia-Pacific region by providing additional resources in key technical disciplines such as safety engineering, 'Reliability, Availability, Maintainability and Safety' ('RAMS') analysis, systems integration, human factors and rolling stock testing.

The following major assignments were secured during the financial year:

- Ricardo's appointment by the UK-based rolling stock owner, Porterbrook, to integrate a hybrid powerpack into a Diesel Multiple Unit ('DMU') to test the vehicle's ability to switch to

battery power when moving through an urban area. This is a first in the UK rail industry;
- A new framework agreement with Spain's national rail infrastructure manager, Adif, to provide assurance services for planned track and signalling upgrade programmes; and
- Safety assessment roles on the Seoul Metro system and Singapore's SMRT network.

This year also saw the completion of works for Amsterdam's North-South metro route, which commenced operations in the summer of 2018. Ricardo has provided technical support for the programme for almost a decade, with teams working on rolling stock, infrastructure and power-supply aspects of the project. The experience has enhanced the team's reputation within the industry for applying a systems engineering approach to major programmes.



Ricardo Software hosted a three-day seminar on advanced hybrid vehicle acoustics in November 2018 at Zhejiang University in Hangzhou, China

The Group also secured the first rail project for the Ricardo-Roke Digital Resilience collaboration to provide an in-depth cyber security assessment of Bombardier's Aventra passenger train, a landmark for the industry. The contract is one of the first examples of a major train manufacturer seeking to integrate cyber security assessments into its design and testing processes. It is also illustrative of how the industry's major stakeholders are paying closer attention to the risks and vulnerabilities that will emerge from a more digitally-oriented rail service, and our teams have been actively recruiting to ensure that we can continue to support the industry in this growing area of concern.

Automotive

Whilst air quality and CO_2 reduction remained a top global priority for the sector, the passenger-car market has been impacted by Brexit and tariff actions from the US administration, which has resulted in a slowdown in the European market

Ricardo Energy & Environment has signed an agreement to collaborate with a joint venture between Tata Power and local government, to deliver innovation and improved quality of service for energy consumers in Delhi, India and in China towards the end of the year. OEMs have announced significant cost-reduction programmes designed to maintain trading performance whilst protecting new product developments in all aspects of vehicle electrification – everything from mild hybrids to full battery electric vehicles ('BEVs'), connected vehicles, vehicles with greater autonomy, and virtual product development. These changes have led to uncertainty in outsourcing trends, with reduced levels of orders across our Automotive business globally.

We have secured a range of programmes across all areas of our business: in vehicle systems, hybrid and electric systems, advanced drivelines and in core powertrains, focused on both new and upgraded products. The application of fuel cell technology into a wide range of on-road vehicles has become a priority for many in the industry and has resulted in a significant increase in opportunities for Ricardo.

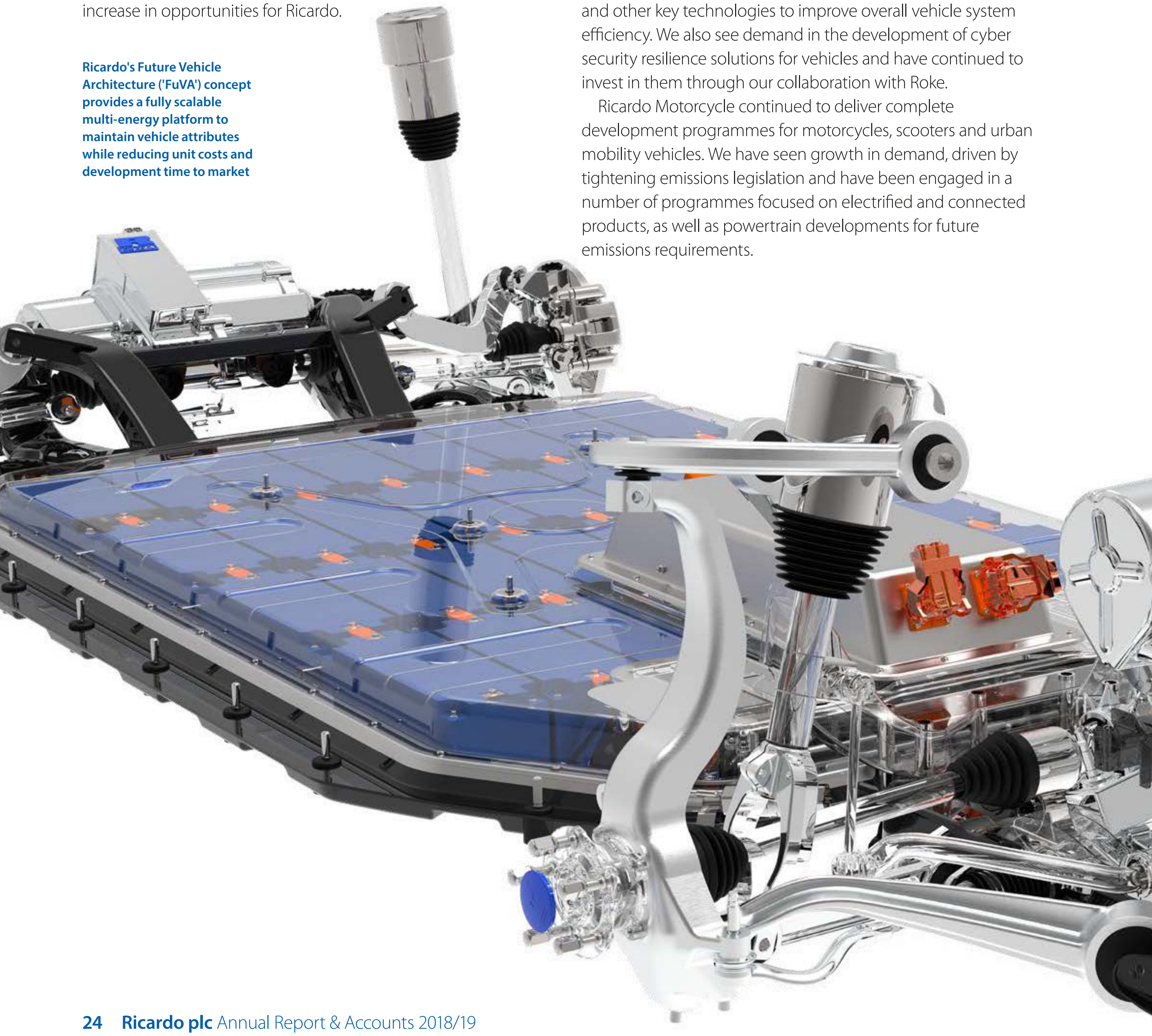
Consistent with the industry-wide trend towards increased electrification, we continue to follow our strategy of reducing international combustion-focused test facilities to create a more flexible cost base and we are marketing our test assets in Detroit for sale.

We have increased the level of investment in developing new simulation and digital capabilities, with the clear goal of delivering differentiated solutions to our customers. In the automotive sector the costs associated with new-vehicle development programmes can be significantly offset as levels of digitalisation increase during the development phase. Our goal in deploying such tools and processes is to halve the development duration and cost within the next ten years.

In the meantime, we continue to invest in advanced electrification, internal combustion, transmission solutions and other key technologies to improve overall vehicle system efficiency. We also see demand in the development of cyber security resilience solutions for vehicles and have continued to invest in them through our collaboration with Roke.

Ricardo Motorcycle continued to deliver complete development programmes for motorcycles, scooters and urban mobility vehicles. We have seen growth in demand, driven by tightening emissions legislation and have been engaged in a number of programmes focused on electrified and connected products, as well as powertrain developments for future emissions requirements.

Ricardo's Future Vehicle Architecture ('FuVA') concept provides a fully scalable multi-energy platform to maintain vehicle attributes while reducing unit costs and development time to market



Off-Highway & Commercial Vehicles

Ricardo's wide range of powertrain and system integration capabilities has enabled the business to meet global customer demands for enhanced vehicle performance at a lower total cost of ownership, whilst meeting all existing and predicted legislation. We are delivering a number of new product programmes for core engine and transmission systems for clients in Europe and Asia.

Based on our proven track record in platooning technology, we secured a new contract to develop a demonstration platform for two Asian OEMs. We also continue our long-term strategic relationship with Shaanxi Fast Gear, the largest supplier of transmissions for off-highway and commercial vehicles to the Chinese market. This collaboration is based at Ricardo's Midlands Technical Centre ('MTC') in the UK, alongside ongoing advanced technology development programmes being delivered jointly in Xi'an, where Fast Gear is based.

In the US, we have continued to focus on supporting our key clients with in-market On-Board Diagnostics ('OBD') compliance verification and also to work with Toyota in further developments of its fuel cell technology in the commercial vehicle market. As fuel cell powertrains once again become an attractive solution due to the wider availability of renewable energy sources of hydrogen generation, this unique capability has created wider opportunities with other clients and in other territories.

Ricardo continues to work with Toyota to further develop its fuel cell technology in the commercial vehicle market

Ricardo continues to provide the power generation and marine markets with services in failure analysis, investigation, and specialist new product design and development. In these markets we see increasing demand for high-speed diesel generator sets and main propulsion systems for marine vessels, as well as the conversion of engines for gas or dual-fuel operation. We have also seen fresh opportunities to leverage this core capability into the rail sector as designers and operators look to hybridise existing diesel propulsion fleets as a medium-term alternative to full electrification.

Defence

In the US, Ricardo Defense continues to successfully deliver wide-ranging engineering programmes across light and heavy land and sea theatres of operation and is the partner of choice for many OEMs. The business expertise in defence systems includes the visualisation, analysis and manipulation of large and complex data sets used in operational planning. This year Ricardo Defense was awarded a contract by the United States' National Aeronautics and Space Administration ('NASA') to develop advanced data analysis and optimisation software which will be used in the planning of future deep-space missions.

Ricardo Defense also provides enterprise software which enables the electronic distribution of technical data with ensured data integrity and cyber security. The software includes bi-directional messaging and data synchronisation between network nodes and provides resilient features for disconnected, intermittent network environments. Low rate initial production ('LRIP') started with installation on aircraft carriers and amphibious ships. Full production for fleetwide application is planned.

During the financial year, our UK Defence business established a special vehicles team that will support niche engine, driveline and powerpack programmes for defence vehicles, as well as for other commercial projects. We are also engaging in discussions on future hybridisation and electrification projects for new and existing vehicle fleets.

Outlook

We have a good order book across our sectors and regions, and we are confident that our balanced portfolio of businesses will help Ricardo Technical Consulting withstand the temporary volatility and softness in some of the markets we serve, and that the business will deliver future revenue and profit growth.

Performance Products

Performance Products continues to supply to customers in the top tier of motorsport, including M-Sport and its World Rally Championship Ford Fiesta

Performance

The Performance Products business accounts for around 30% of the Group's revenue and underlying operating profit. A large share of the revenue of the business is generated through the supply of products and services to a single customer.

As described in Note 2 to the financial statements, revenue increased by 24% to £113.9m (FY 2017/18: £91.7m) and underlying operating profit increased by 28% to £11.9m (FY 2017/18: £9.3m). Operating profit was higher than the prior year, primarily due to increased volumes of engines for McLaren and the ramp up in volumes on the anti-lock brake and electronic stability control systems ('ABS brake kits') programme for the US Army. Operating profit margins increased to 10.4% (FY 2017/18: 10.1%). Order intake significantly increased by 39% to £125m (FY 2017/18: £90m) for the year. In addition, Ricardo was awarded a contract by the UK Ministry of Defence ('MoD') to manufacture drive units for the Combat Vehicle Reconnaissance (Tracked) ('CVR(T)') vehicle.

The strategy of the Performance Products business is focused on the development of long-term strategic relationships with customers and the consistent delivery of high-quality products and services. This strategy underpins the success of the business, which continues to win new and large contracts which extend over several years.

Further details of activities within the year can be found within the market sector highlights on page 27.

Business model

Ricardo's Performance Products business manufactures and assembles high-quality prototypes and niche volumes of complex engine, transmission and vehicle products, which are designed by either our motorsport products design team, by Ricardo's Technical Consulting business, or by our customers.

We manage the complete supply chain and earn revenue through the supply of products that we manufacture or assemble; revenue is also generated by the manufacturing consultancy services that we provide. The majority of our programmes extend over many years and several of them include agreements for the supply of spare parts and other support services.

At the heart of our capabilities are our people and their skills in product design and development, production and operations management, industrial engineering and supply chain management.

Our operations include a transmissions manufacturing facility at our Midlands Technical Centre, an engine assembly facility at our Shoreham Technical Centre, and an ABS brake kit assembly facility at our Detroit Technical Center. All are supported by Ricardo's global network of technical and engineering centres in the US, the UK, the Netherlands, Italy, the Czech Republic and China.

The Performance Products business also includes the activities of Ricardo Software, which develops advanced virtual engineering tools for conventional and electrified powertrains, as well as for complex systems modelling and simulation. Our computer-aided engineering ('CAE') software and technical support services are provided to both long-established and new-entry customers from around the world and across all of the sectors in which we operate.

Our proprietary leading-edge simulation software enables users to quickly and accurately design, analyse and optimise new products. Through technology exploration and process innovation we enable customers to reduce their development costs and bring products to market faster and with greater confidence. In addition, our dedicated solutions team helps to accelerate development cycles with increasingly complex systems by applying customised and integrated CAE toolchains, such as dynamic transmission analysis and virtual calibration.

Market sector highlights

High-Performance Vehicles & Motorsport

Demand for the production of McLaren engines has grown in line with expectations. This year we delivered over 5,200 (FY 2017/18: 4,300) engines across an increased number of engine variants, including the McLaren 570S Coupé, 570GT, 570S Spider, 720S, 720S Spider and the Senna.

We manufacture and assemble the world's most advanced transmissions and have made good progress in the preparations for the supply contract for the Aston Martin Red Bull Valkyrie hypercar transmission, which is due to enter production in early 2020. We also continued to support Bugatti with the supply of the complete driveline system for the Chiron, and maintained our supply of transmissions for the Porsche 991 Cup race cars.

Ricardo remains a key supplier to the motorsport sector. This year the Performance Products business developed upgrades for the M-Sport World Rally Championship ('WRC') programme and won contracts to support key manufacturers within the Formula E Championship for the third consecutive season.

We continued to manufacture for Formula One, the Japanese Super Formula Championship, Indy Lights and the World Series Formula V8 3.5. We also operated supply programmes for Ricardo-designed transmissions for BMW, the Multimatic-built Ford GT3, the M-Sport Ford Fiesta WRC, and the M-Sport Bentley GT customer racing programme, as well as for other top-flight rally and GT customers.

Defence

In the US, Ricardo Defense has delivered 1,650 ABS brake kits for the High-Mobility Multipurpose Wheeled Vehicle ('HMMWV', or Humvee). Ricardo's ABS brake kit system has also been selected by Bollinger Motors for series production application on its fully-electric sport utility truck.

In the UK, Ricardo continues to support the British Army's fleet of Cougar and Weapons Mount Installation Kit ('WMIK') vehicles with the supply of spare parts. This year we were also awarded the contract by the UK MoD to refurbish 700 final drive transmissions for the CVR(T) Mark 1. The work undertaken will include stripping, inspecting and manufacturing replacement components, including the main rotational components of the unit, before reassembly and testing. Deliveries commenced in the summer of 2019, with the refurbishment programme expected to be completed over the next two years.

Outlook

We remain confident in the continued and sustained growth of Ricardo Performance Products. This is underpinned by the segment's strong order book and pipeline of opportunities for new assembly and manufacturing programmes, several of which include aftermarket opportunities.

Ricardo Defense technicians installing ABS brake kits to the Humvee ambulance to improve braking performance, vehicle stability and occupant safety

Mark Garrett – Chief Operating Officer

Research and Development

Continued R&D investment supports Ricardo's growth and business diversification strategy. We evaluate the benefit to our clients of our latest innovations, focusing on delivering technology aligned with enduring market drivers. We understand the needs of our clients and provide solutions, both to create opportunities and to help those customers succeed in a world where the megatrends of today are shaping the global economy of tomorrow.

Global megatrends, among them rapid urbanisation, air quality and climate change, energy security and sustainability, connectivity and intelligent devices, global stability and natural resource scarcity, are changing the way in which cities, countries and economies interact both domestically and internationally. The research initiatives and investment to develop solutions by Ricardo's dedicated Innovations division directly address these key market drivers and are fully aligned with the Group's strategy as set out on page 12.

The following sections highlight key research and development projects through which Ricardo Innovations is managing to find solutions to the some of the macro issues described above – issues that are faced by both governments and industry alike.

Air quality and climate change

DownToTen: Measuring exhaust particles down to 10nm

Current legislated measurement of particle number ('PN') emissions from vehicles addresses particle sizes greater than 23 nanometres ('nm'). As a consequence, particle filters that virtually eliminate the larger carbon soot particles from exhaust emissions are now fitted to many vehicles. There is minimal understanding, however, of how particles in the sub-23nm region can affect human health and the environment.

DownToTen will help measure the emissions and standardise the measurement process for particle emissions in the sub-23nm range, so that regulators, original equipment manufacturers ('OEMs') and other manufacturers will have a set of comprehensive measurements and tools to assist future developments.

The final objective of the project is a Particle Number-Portable Emissions Measurement System ('PN-PEMS') demonstrator for highly effective determination of PN emissions from vehicles in real-world operation.

CryoPower: Heavy-duty power with near-zero emissions

Dolphin N2, an entity which is independent of Ricardo, was launched last year to further commercialise and technically develop the intellectual property arising from over a decade of research into near-zero emissions technology.

The revolutionary split-cycle engine reduces CO_2 output by 30% and potentially eliminates NO_X and soot emissions altogether. Known as CryoPower, the engine achieves this by injecting liquid nitrogen during the combustion process, achieving superior thermodynamic performance.

In addition to demonstrating the potential of CryoPower, the team has also developed a simplified engine concept known as ThermoPower. This concept uses the same basic engine architecture as CryoPower but without the use of liquid nitrogen. ThermoPower is particularly suited to packaging-sensitive vehicle applications and represents a lower cost, more readily adoptable solution. It achieves over 50% thermal efficiency, which is equivalent to a fuel economy improvement of 15% in comparison with the best current heavy-duty engines, whilst retaining the low-emissions potential of CryoPower.

Energy security and sustainability

PowerDrive Line: Ultra-fast advanced battery charging

Delivering improvements in battery technology is a fundamental requirement to enable the electrification of vehicles and to satisfy consumer demands on price, range and charging time.

The PowerDrive Line team is exploring innovative solid-state battery technology to improve cell safety, but without sacrificing calendar and cycle life or energy and power density. This technology will also facilitate ultra-fast charging, enabling any hybrid or electric vehicle to be charged in as little as 15 minutes.

Our focus is on enabling fast-charge capability through effective thermal management strategies, materials selection and high-voltage electronics, whilst further developing our Battery Management Systems ('BMS') technology.

HIFI-ELEMENTS: Accelerating battery pack development

Vehicles and their sub-systems are complex, and their development requires expertise from many different domains of science and technology. For any given functionality, OEMs require a reduction in the cost and time it takes to bring a product to market. Concurrently, legislators and consumers demand an improvement in energy efficiency, safety and comfort.

The overall goal of the HIFI-ELEMENTS project is to provide OEMs and suppliers of electric vehicle technologies with the following:

- A standardised functional model interface with specifications for various e-drive components;
- A standardised metadata model for third-party electric vehicle development;
- A reduction of more than 50% in development and testing time with new streamlined workflows;
- A near ten-fold Increase in validation test coverage with these newly developed workflows; and
- A reduction of up to 20% in vehicle energy consumption from early system-level optimisation.

Connectivity and intelligent devices

5StarS: Cyber security assurance framework

5StarS addresses the increased threat from cyber attacks linked to the proliferation of connected and autonomous road vehicles. The consortium of UK automotive and research companies will develop a 5-star consumer rating framework, analogous to that of the existing European New Car Assessment Programme ('NCAP') vehicle safety ratings, but for vehicle cyber security. This will provide consumers with a transparent and clear grading of the cyber security of a vehicle, enabling manufacturers to maximise return on their investment in their cyber-secure systems.

Tools developed through the 5StarS vehicle vulnerability assessment are enabling customers to secure connected vehicle systems as part of our Digital Resilience collaboration with Roke.

Ricardo launched a new Digital Resilience Lab with Roke in September 2018, enabling controlled cyber security testing via wired and wireless connections

Ian Gibson – Chief Financial Officer

Financial review

The Group has generated revenue and underlying profit before tax in line with the prior year, with mixed performance across our constituent businesses. Within Technical Consulting, our Automotive businesses in Europe and the US continued to be significantly impacted by challenging market conditions, causing a reduction in revenue and operating profit. Our Rail business has also seen a reduction in order volumes in Europe and Asia. These challenges have been largely offset by a combination of excellent growth in our Energy & Environment business, as well as in Performance Products.

The successful acquisition of Transport Engineering in May 2019 contributed £0.3m to the Group's underlying profit before tax of £37.0m and £30m to the Group's year-end order book of £314m. Net debt has increased to £47.4m, which reflects the Transport Engineering acquisition.

GROUP RESULTS

The Group's headline financial results are presented on page 5. The Group's overall order intake reduced by 7% to £386m in the year. In Technical Consulting, this reflects a combination of large multi-year programmes won in the prior year, and lower orders in both Automotive and Rail this year. In Performance Products, order intake increased through a combination of growth in McLaren engine volumes and orders for ABS brake kits. The closing order book was £314m, which includes £30m from Transport Engineering ('TE'), subsequently renamed Ricardo Rail Australia, a Sydney-based technical rail services provider acquired on 31 May 2019. The performance of TE has been reported in the Technical Consulting segment.

Reported Group revenue increased by 2% to £384.4m (FY 2017/18: £378.5m(*)). Organic revenue increased by 1%, after normalising for the impact of the acquisitions of TE in the current year and Control Point Corporation ('CPC') in September 2017 of the prior year. Underlying operating profit, which excludes net finance costs and specific adjusting items, as set out in more detail in Note 4 to the financial statements, was in line with the prior year at £39.6m (FY 2017/18: £39.7m(*)), with an underlying operating profit margin of 10.3% (FY 2017/18: 10.5%(*)). Underlying profit before tax was down 1% to £37.0m (FY 2017/18: £37.5m(*)). On an organic underlying basis, operating profit and profit before tax reduced by 2% and 3%, respectively.

On a reported basis, FY 2018/19 operating profit was £29.1m (FY 2017/18: £29.2m(*)) and profit before tax was £26.5m (FY 2017/18: £27.0m(*)), both in line with the prior year. This includes specific adjusting items of £10.5m (FY 2017/18: £10.5m), which comprise amortisation of acquired intangible assets of £4.0m (FY 2017/18: £4.3m), acquisition-related expenditure of £1.8m (FY 2017/18: £1.4m) and reorganisation costs of £3.4m

Headline trading performance	Reported revenue	Underlying Operating profit	Underlying Profit before tax	Reported profit before tax
FY 2018/19 (£m)	**384.4**	**39.6**	**37.0**	**26.5**
Less: Transport Engineering[1] (£m)	(1.4)	(0.3)	(0.3)	(0.3)
Organic FY 2018/19 (£m)	**383.0**	**39.3**	**36.7**	**26.2**
FY 2017/18[*] (£m)	378.5	39.7	37.5	27.0
Add: Control Point Corporation[2] (£m)	2.2	0.2	0.2	0.2
Organic FY 2017/18 (£m)	380.7	39.9	37.7	27.2
Growth (%)	**2**	**-**	**(1)**	**(2)**
Organic growth[3] (%)	**1**	**(2)**	**(3)**	**(4)**
Constant currency organic growth[4] (%)	**-**	**(2)**	**(3)**	**(4)**

(FY 2017/18: £4.8m) primarily in respect of the continued restructuring of the Automotive business. The reduction in reorganisation costs has been predominantly offset by the impact of equalisation of Guaranteed Minimum Pensions ('GMP') of £1.3m.

Closing net debt increased to £47.4m (FY 2017/18: £26.1m), after £21.2m of cash consideration paid in respect of the TE acquisition (£18.9m net of cash acquired), £3.5m of acquisition-related payments, which includes deal costs, earn-outs and retention payments in respect of the CPC acquisition in the prior year, and a £2.5m net cash outflow from restructuring activities. Net working capital increased by £7.3m in the year, primarily due to the ramp up in the ABS brake kits programme.

SEGMENTAL RESULTS

The segmental results for the Group's operating segments are as follows:

Reported revenue	Technical Consulting	Performance Products	Total
FY 2018/19 (£m)	**270.5**	**113.9**	**384.4**
Less: Transport Engineering[1] (£m)	(1.4)	-	(1.4)
Organic FY 2018/19 (£m)	**269.1**	**113.9**	**383.0**
FY 2017/18[*] (£m)	286.8	91.7	378.5
Add: Control Point Corporation[2] (£m)	2.2	-	2.2
Organic FY 2017/18 (£m)	289.0	91.7	380.7
Growth (%)	**(6)**	**24**	**2**
Organic growth[3] (%)	**(7)**	**24**	**1**

Underlying operating profit	Technical Consulting	Performance Products	Total
FY 2018/19 (£m)	**27.7**	**11.9**	**39.6**
Less: Transport Engineering[1] (£m)	(0.3)	-	(0.3)
Organic FY 2018/19 (£m)	**27.4**	**11.9**	**39.3**
FY 2017/18[*] (£m)	30.4	9.3	39.7
Add: Control Point Corporation[2] (£m)	0.2	-	0.2
Organic FY 2017/18 (£m)	30.6	9.3	39.9
Growth (%)	**(9)**	**28**	**-**
Organic growth[3] (%)	**(10)**	**28**	**(2)**

(*) Comparative financial information has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

(1) The organic result for the year excludes the performance of acquisitions in the year on a like-for-like basis with FY 2017/18. TE was acquired on 31 May 2019. Excluding TE, revenue for FY 2018/19 would have been £1.4m lower. Underlying operating profit and profit before tax for FY 2018/19 would both have been £0.3m lower.

(2) The organic result for the prior year includes the performance of acquisitions in the prior year on a like-for-like basis with FY 2018/19. CPC was acquired on 8 September 2017. Had CPC been acquired and consolidated from 1 July 2017 such that results for FY 2017/18 were on a like-for-like basis with FY 2018/19, revenue for FY 2017/18 would have been £2.2m higher. Underlying operating profit and profit before tax for FY 2017/18 would both have been £0.2m higher.

(3) Organic growth is calculated as the growth in the result for the year compared to the organic result for the prior year and provides an indication of growth on a like-for-like basis with the prior year.

(4) Constant currency organic growth is calculated by reference to the result for the year retranslated using prior year foreign exchange rates and provides an indication of growth on a like-for-like basis with the prior year, excluding the impact of foreign exchange.

Technical Consulting results

Segmental operating results for Technical Consulting are also discussed on pages 20 and 21. Technical Consulting delivered revenue and underlying operating profit of £270.5m (FY 2017/18: £286.8m(*)) and £27.7m (FY 2017/18: £30.4m(*)), respectively. After normalising for the impact of the acquisitions of TE in FY 2018/19 and CPC in FY 2017/18, organic underlying operating profit reduced by 10% to £27.4m (FY 2017/18: £30.6m(*)).

Ricardo Energy & Environment performed strongly, with increased order intake and operating profit compared to the prior year. It has won increased levels of work internationally, particularly in Australia, with prospects in this region looking even better following the post year-end acquisition in July 2019 of PLC Consulting ('PLCC'), subsequently renamed Ricardo Energy Environment and Planning, a Melbourne-based planning, environmental and infrastructure consultancy.

It was a mixed year for Ricardo Rail. The business was impacted by lower volumes in Europe and Asia, resulting in a small decline in organic underlying profit. However, the successful acquisition of TE in May 2019 made an immediate impact, offsetting the organic decline and adding breadth and depth to Ricardo Rail's existing capabilities.

Our European Automotive business suffered from significantly lower order intake and revenue in the year, as a result of the continued uncertain market and difficult trading conditions. The impact on profitability was marked, but we took quick restructuring actions, including headcount reductions in the UK, which mitigated the effect on the business.

Our US Automotive business ended the year with an increased loss compared to the prior year, as results did not improve in the second half of the year as anticipated. The business continues to focus on new-energy vehicle opportunities and realigning its cost base in order to reduce losses and reposition itself as a more lean and agile consulting operation.

We saw a good performance in Automotive in China, which has led to further revenue and profit growth in the year. The order book and pipeline of opportunities remain strong, although we did see some evidence of a slowdown in orders towards the end of the financial year.

The Defence Consulting business performed well, with its increased order intake driven by strong customer relationships in the US market.

Our Strategic Consulting business delivered growth in line with expectations.

Performance Products results

Segmental operating results for Performance Products are also discussed on page 26. Performance Products had an excellent year, increasing revenue and underlying operating profit by 24% to £113.9m (FY 2017/18: £91.7m) and 28% to £11.9m (FY 2017/18: £9.3m) respectively on the prior year.

The performance for the year was driven by increased volumes of engines for McLaren and the ABS brake kits programme for the US Army, with deliveries ramping up throughout the year in line with our expectations. Growth in these programmes has been complemented by the award of the UK MoD Combat Vehicle Reconnaissance (Tracked) ('CVR(T)') programme, and the Bugatti and Porsche transmission programmes, as well as growth in new software licence sales.

(*) Comparative financial information has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.

Basis of preparation

The financial statements have been prepared in accordance with International Financial Reporting Standards ('IFRS') and International Financial Reporting Standards Interpretations Committee ('IFRS IC') interpretations adopted by the European Union ('EU') and the Companies Act 2006 applicable to companies reporting under IFRS. The Group's principal accounting policies are detailed in Note 1 to the financial statements on pages 128 to 136. Those accounting policies that have been identified as being particularly sensitive to complex or subjective judgements or estimates are disclosed in Note 1(c) to the financial statements on pages 129 and 130.

New accounting standards

The Group adopted both IFRS 9 *Financial Instruments* and IFRS 15 *Revenue from Contracts with Customers* as of 1 July 2018. The full retrospective method of transition was adopted for IFRS 15, resulting in a restatement of comparative financial information. The net-of-tax reduction to retained earnings as of 1 July 2017 was £4.5m, with a further reduction in FY 2017/18 of £1.2m. The net-of-tax-reduction to retained earnings due to IFRS 9 as of 1 July 2018 was £2.7m. Further detail is set out in Notes 38(a) and 38(b) to the financial statements respectively.

We have completed our work to assess the potential impact of IFRS 16 *Leases*, which becomes effective to the Group for the year commencing 1 July 2019. As set out in more detail in Note 1(x) to the financial statements, the expected transitional impact from the application of IFRS 16 is a reduction to opening reserves as at 1 July 2019 of approximately £5.0m. A reduction to profit before tax for the year ending 30 June 2020 of up to £1.0m is also expected, based on the Group's portfolio of lease contracts as at 30 June 2019.

Acquisitions and acquired intangible assets

As set out in more detail in Note 12(a) to the financial statements, the Group acquired the entire issued share capital of TE on 31 May 2019 for an initial cash consideration of £21.2m (AUD 38.6m) with a further payment made in August 2019 of £0.5m (AUD 0.9m) to adjust for cash and normalised levels of net working capital. There is fair value of contingent cash consideration of £5.1m (AUD 9.4m), based upon an initial probability-weighted assessment of expected earn-out payments dependent on TE achieving certain post-acquisition financial performance targets. The maximum cash outflow that could be required to acquire TE is £29.9m (AUD 54.5m).

This investment added provisional goodwill of £17.9m (AUD 32.7m) to the Ricardo Rail cash-generating unit and provisional acquired intangible assets of £9.7m (AUD 17.8m), which have a net book value at year-end of £9.5m (AUD 17.5m). The amortisation of these for the post-acquisition period in the financial year of £0.2m (AUD 0.3m) has been charged to the income statement as a specific adjusting item, together with £0.5m of expenditure incurred in relation to the TE acquisition.

A preliminary exercise to assess the fair value of the identifiable net assets of TE commenced during the year and will be finalised by the end of the next financial year. The provisional assessment of identifiable net assets acquired is £8.9m (AUD 16.1m).

Specific adjusting items

As set out in more detail in Note 4 to the financial statements, the Group's underlying profit before tax for the year excludes costs incurred during the year that have been charged to the income statement as specific adjusting items of £10.5m (FY 2017/18: £10.5m), comprised of amortisation of acquired intangible assets of £4.0m (FY 2017/18: £4.3m), acquisition-related expenditure of £1.8m (FY 2017/18: £1.4m), reorganisation costs of £3.4m (FY 2017/18: £4.8m) and GMP equalisation costs of £1.3m.

The acquisition-related expenditure of £1.8m included £0.5m of fees to acquire TE, with £0.3m related to the remaining cost incurred on a pro rata basis for the retention of specific individuals as part of the CPC acquisition in the prior year. Fees of £0.2m were also incurred to complete the post year-end acquisition of PLCC, as set out in more detail in Note 39(a) to the financial statements on page 173. The remainder primarily related to the costs of running an M&A function, together with fees incurred on aborted acquisition processes. Of the fees incurred, £0.8m remained unpaid at the year-end.

The Group largely completed its restructuring of the European Automotive business during the year, which resulted in £2.3m of redundancy-related and dual running costs in the UK and Prague, together with costs in relation to onerous contracts of £0.3m as well as contractor and professional costs of £0.3m. These costs were paid for during the year, together with £1.6m of redundancy costs accrued at the end of the prior year in relation to the downsizing of the Group's operations in Germany. Remaining proceeds of £2.5m, held in escrow at the end of FY 2017/18 for the sale of the Schechingen Technical Centre in Germany, were received as expected in July 2018. In addition, £0.5m of redundancy costs were incurred in restructuring the Rail business in the Netherlands in a planned response to a reduction in volumes with its largest customer.

Following a court ruling in October 2018, companies are now required to equalise pension benefits to address inequalities in the calculations of GMP between men and women. This has resulted in a charge of £1.3m for an increase in the Group's pension liabilities, given the non-recurring nature and significance of the amount.

Research and Development

The Group continues to invest in R&D and spent £13.4m (FY 2017/18: £9.5m) before government grant income of £2.2m (FY 2017/18: £1.6m). Costs capitalised this year in accordance with IFRS were £7.6m (FY 2017/18: £5.1m), reflecting our continued investment in developers in our Software business, together with new technology, tools and processes in our European Automotive and Energy & Environment businesses. An overview of current R&D activities is presented on pages 28 and 29.

The total Research and Development Expenditure Credit ('RDEC') recognised in the current year is £7.1m (FY 2017/18: £8.0m). This comprised an estimated RDEC credit in respect of the current year of £6.9m (FY 2017/18: £6.9m), together with £0.2m (FY 2017/18: £1.1m) arising from the routine amendment of open applications as a result of further analysis of the qualifying expenditure incurred.

Net finance costs

Finance income was £0.5m (FY 2017/18: £0.4m) and finance costs were £3.1m (FY 2017/18: £2.6m) for the year, giving net finance costs of £2.6m (FY 2017/18: £2.2m). The increase was primarily due to a higher non-utilisation fee charged on the £150m borrowing facility in place throughout the year, compared to the £75m facility that was in place throughout the prior year, together with the impact of increased borrowings to finance the acquisition of TE and other capital investments.

Taxation

The total tax charge for the year was £6.6m (FY 2017/18: £9.3m[*]) and the total effective tax rate reduced to a more normal level for the Group of 24.9% (FY 2017/18: 34.4%[*]). Last year's effective tax rate increased substantially, primarily due to the one-off derecognition of a remaining net deferred tax asset of £2.2m (EUR 2.5m) as part of the restructuring of our activities in Germany, which was completed that year.

The underlying effective tax rate for the year was 22.2% (FY 2017/18: 21.3%[*]).

Deferred tax assets of £6.7m (FY 2017/18: £8.9m[*]) include £4.9m (USD 6.3m) (FY 2017/18: £5.5m (USD 7.2m)) of R&D tax credits in the US which continue to be recognised and have partially been utilised during the year. The Directors have considered the recoverability of these assets and remain satisfied that it is probable that sufficient taxable profits will be generated in the foreseeable future, against which the recognised assets can be utilised.

Earnings per share

Basic earnings per share increased by 12% to 37.1p (FY 2017/18: 33.0p[*]). The Directors consider that underlying earnings per share provides a more useful indication of underlying performance and trends over time. Underlying basic earnings per share for the year decreased by 3% to 53.7p (FY 2017/18: 55.1p[*]).

Basic earnings per share, with a reconciliation to an underlying basic earnings per share, which excludes the net-of-tax impact of specific adjusting items, is disclosed in Note 10 to the financial statements on page 142.

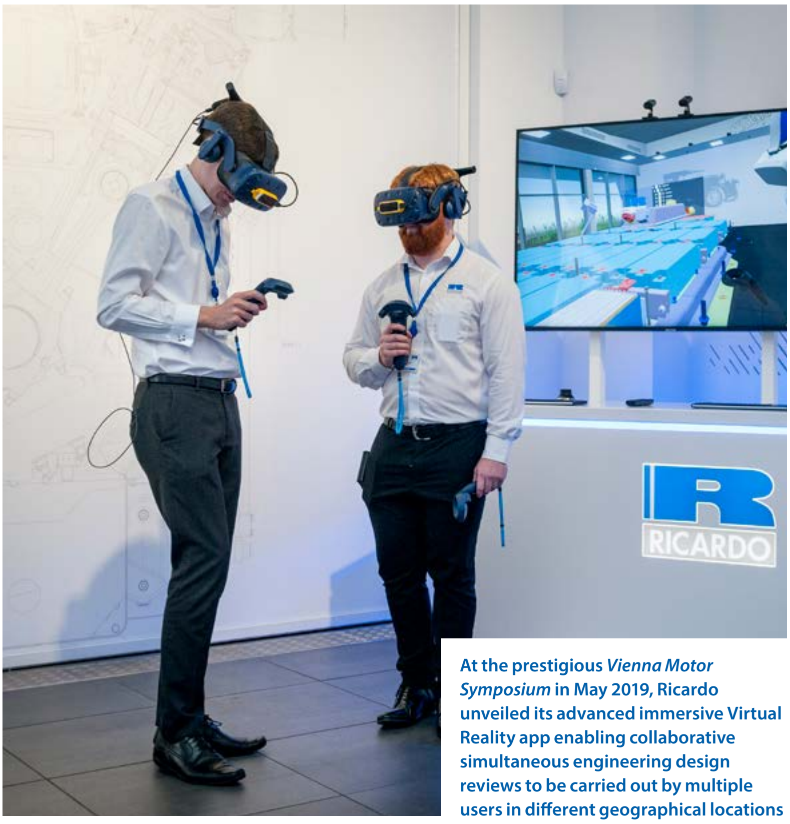
Dividend

As set out in Note 11 to the financial statements on page 142, the total dividend for the year has increased by 4% to 21.28p per ordinary share (FY 2017/18: 20.46p) and amounts to £11.4m (FY 2017/18: £10.9m), reflecting the Board's continued confidence in the prospects of the Group. The proposed final dividend of 15.28p (FY 2017/18: 14.71p) will be paid on 21 November 2019 to shareholders who are on the register of members at the close of business on 8 November 2019, subject to approval at the Annual General Meeting on 14 November 2019.

Capital investment

Cash spend on property, plant and equipment was £7.6m (FY 2017/18: £7.7m) as we continue to invest in our business operations. This spend included new and upgraded test cell equipment, machinery and IT hardware, together with refurbishments of existing office spaces.

(*) Comparative financial information has been restated for the transitional impact of adopting IFRS 15 *Revenue from Contracts with Customers* from 1 July 2018 and is presented on a like-for-like basis with FY 2018/19. The impact of the restatement is set out in Note 38(a) to the financial statements on pages 170 and 171.



At the prestigious *Vienna Motor Symposium* in May 2019, Ricardo unveiled its advanced immersive Virtual Reality app enabling collaborative simultaneous engineering design reviews to be carried out by multiple users in different geographical locations

During the year the Group commenced a process to market the Detroit Technical Center ('DTC') test cell assets for sale. After the year-end on 21 August 2019, we purchased the freehold property at DTC for £14.2m (USD 17.3m) and immediately marketed it for sale, together with the DTC test cell assets. This is set out in Notes 19 and 39(b) to the financial statements on pages 151 and 173 respectively.

These activities will have the dual effect of removing the US Automotive business from its long-term lease commitment and provide the ability to realign its cost base with its strategy as a more operationally efficient consultancy.

Net debt

Closing net debt was £47.4m (FY 2017/18: £26.1m). The Group had a net cash outflow for the year of £21.3m (FY 2017/18: £11.8m), after consideration paid in respect of acquisitions of £21.2m (£18.9m net of cash acquired) (FY 2017/18: £4.6m), acquisition-related payments of £3.5m (FY 2017/18: £1.7m), and a net cash outflow from restructuring activities of £2.5m (FY 2017/18: £2.3m inflow). Our restructuring of the Automotive business has been broadly cash neutral over the last two financial years, with the FY 2017/18 net cash inflow of £2.3m offset by an outflow of £2.0m in FY 2018/19. An additional £0.5m was spent in FY 2018/19 on restructuring the Rail business in the Netherlands.

The composition of net debt is defined in Note 33 to the financial statements on page 166.

Net working capital increased by £7.3m in FY 2018/19, arising from higher trade receivables and inventory requirements, primarily due to the ramp up in the ABS brake kits programme.

Banking facilities

At the end of the year, the Group held total banking facilities of £166.4m (FY 2017/18: £90.9m), which included committed facilities of £150.0m (FY 2017/18: £75.0m). The committed banking facility consists of a £150m multi-currency Revolving Credit Facility ('RCF') which provides the Group with committed funding through to July 2023. In addition, the Group has uncommitted facilities including overdrafts of £16.4m (FY 2017/18: £15.9m), which mature throughout this and the next financial year and are renewable annually.

Committed banking facilities of £79.1m (FY 2017/18: £49.8m), net of direct issue costs, were drawn primarily to fund acquisitions and for general corporate purposes. These are denominated in Pounds Sterling and have variable rates of interest dependent upon the Group's adjusted leverage, which range from 1.4% to 2.2% (FY 2017/18: 1.6% to 2.6%) above LIBOR.

Foreign exchange

On consolidation, revenue and costs are translated at the average exchange rates for the year. The Group is exposed to movements in the Pound Sterling exchange rate, principally from work carried out with customers that transact in Euros, US Dollars and Chinese Renminbi. Compared to the prior year, the average value of the Pound Sterling weakened by 4.0% against the US Dollar, but strengthened by 0.5% against the Euro and 0.7% against the Chinese Renminbi.

Had the results for the year been stated at exchange rates consistent with those of the prior year, revenue would have been £2.6m lower and underlying profit before tax and reported profit before tax would both have been £0.1m lower.

Pensions

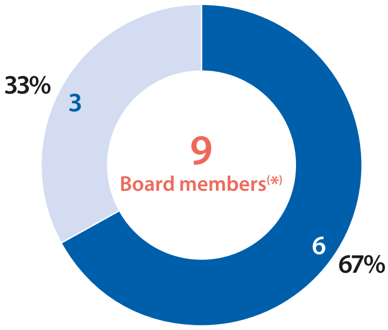
The Group's defined benefit pension scheme operates within the UK. The fair value of the scheme's assets at the end of the year was £137.5m (FY 2017/18: £131.0m). The accounting deficit measured in accordance with IAS 19 *Employee Benefits* was £8.5m before tax (FY 2017/18: £4.6m), or £7.1m after tax (FY 2017/18: £3.8m).

The £3.9m increase in the pre-tax pension accounting deficit during the year was due to £15.8m from changes in financial and demographic assumptions, £1.3m of non-recurring past service costs as a result of the High Court's ruling on GMP equalisation and £0.1m of net finance costs. These adverse movements were partially offset by a £7.9m return on plan assets, £4.3m of cash contributions paid to the scheme and a £1.1m reduction in liabilities arising from the take-up of member option exercises during the year.

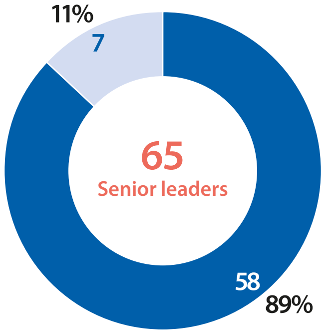
Ricardo has committed to continue to fund the pension deficit and increased its contributions to £4.6m per annum from 1 July 2019 until 31 July 2022.

Our people

Gender diversity as at 30 June 2019



(*) Includes Company Secretary



Male Female

(*) Excludes contractors

We spend decades of our lifetime in a workplace – far too much time to spend on 'just a job'. At Ricardo, we want every one of our employees to be inspired by our mission **to create a world fit for the future**. We are committed to safety and sustainability in mobility and energy generation, whilst also protecting scarce natural resources as well as fully embracing and promoting opportunities for new and innovative transportation technologies. We want our people to know that their work is worthwhile and to be clear about their personal contribution and prospects on our exciting journey.

In order to provide the best possible work experience, Ricardo aims to give every employee the opportunity to be their best and play to their strengths every day. We promote a diverse and inclusive culture in how we recruit and recognise individuals, and we endeavour to offer the right career opportunity for all – women and men, consultants, engineers, scientists and support staff – valuing a specialist contribution as much as a management role. From the moment they start with us, we encourage our employees to engage actively in their own career development by stretching their wings, broadening their horizons and experience, and deepening their knowledge. In addition to any formal training, this might be through taking part in one of our various internal strategic or improvement-oriented projects, working on a customer project at a different technical centre or at a customer location, or by going on an international assignment.

We are particularly passionate about growing and nurturing our talent base. Continuous effort goes into the improvement of our apprentice and graduate schemes. In Ricardo Automotive and Ricardo Rail, our established international graduate schemes provide an exciting mix of learning on-the-job as part of real-life customer projects, classroom training for technical and interpersonal skills, and international exposure through our graduate exchange programmes. In the UK, we are also running a variety of apprenticeship programmes across all divisions: this mirrors the UK Government's push for more apprentice positions through the apprenticeship levy introduced in April 2017. In close collaboration with the relevant universities, new courses are about to be implemented which support the further development of apprentice programmes under the umbrella of the levy.

OUR PEOPLE

Evgeniy Shapiro

VECTIS Development Manager
Ricardo Software

From its first release in 1992, Ricardo's VECTIS Computational Fluid Dynamics suite has been at the leading edge of modelling science, contributing to virtual product development both within Ricardo and throughout our worldwide customer base.

The challenges being faced by the global automotive industry to reduce emissions and improve energy efficiency demand ever higher accuracy and robustness of simulation software. In my role as VECTIS Development Manager, my aim is to help develop innovative computational tools and methodologies that deliver predictive analysis capability across the diverse range of applications of VECTIS. In this way, my team helps our software users and customers to create the more efficient products of the future.

With our ambitious growth plans, key tasks of our human resource agenda are international recruitment and the ability of staff to move around the globe for work. In this regard we continue to closely monitor the impact of Brexit and the ongoing uncertainty around the movement of staff between the UK and the European Union. We are an employer of choice for top-level science and engineering opportunities – as evidenced by the number of applications received from highly rated schools, colleges and universities around the world – and we offer technical and non-technical graduate and apprenticeship roles as well. Our recruitment processes and employee value proposition are under continuous review to ensure that we attract not only highly qualified engineers and scientists, but also a broader and more diverse range of consultants and professionally qualified candidates from fields such as finance, human resource management, risk management and marketing.

The emphasis on recruitment and employer branding is also driven by a change in employee movements. We saw a similar attrition rate to the prior year, in line with our expectations of the employment market: experienced consultants, engineers and scientists are highly sought after in all our industries and all companies are trying to respond to the changing way in which work is viewed. One trend revolves around having shorter employment periods and changing work patterns. A further factor was a focused review aimed at ensuring our divisions are structured correctly for the current business environment, and in some cases there was a necessity for redundancies.

We want all our employees to be happy and engaged throughout their time with us – in terms of the culture of the organisation, their ongoing personal development as well as competitive remuneration and benefits packages – and we work very hard to achieve this. During the year we have also enhanced our well-being programme to improve the support we offer to our employees in respect of mental and physical welfare.

Like most businesses we are learning to adapt to a faster-moving employment market where a person's career will no longer be in just one or two companies. Our recruitment is therefore fast, cost-efficient and flexible, and we place a lot of emphasis on a positive leavers' experience as we regard every ex-employee as a possible customer and promoter of our business. We also see an increasing number of former employees returning to Ricardo, which is a positive result of these efforts.

Ricardo fosters a culture that not only promotes excellence but also diversity and inclusion. We continue to concentrate our efforts on promoting female career advancement, especially in science and engineering roles. This includes hiring female apprentices, graduates and professionals, and challenging any implicit bias in the recruitment and promotion processes. Our employer branding, fresh on-boarding process and new mentoring programme received very good feedback, and are all designed to be more appealing to, and supportive of, women.

The gender pay report, which large UK companies are now obliged to publish on an annual basis, has been submitted for the second time. We are pleased to report that our efforts have borne tangible results and show an improvement in the gender pay gap, as well as an increase in female representation. Details can be found in our public *Gender Pay Gap Report* on www.ricardo.com.

Our Chairman, Sir Terry Morgan, and Chief Executive Officer, Dave Shemmans, are members of the *30% Club*, a cross-sector initiative of business leaders with the mission to support gender diversity from entry level to executive positions, and with a target to achieve 30% female representation across its members. This target is shared by Ricardo, and demonstrates our commitment to diversity at the highest echelons of our organisation.

Our reputation as an international leader in engineering, technical, environmental and strategic consultancy is based on the outstanding capabilities of our people. Every day our employees impress us with their dedication and innovative solutions. We hope to inspire them with our mission **to create a world fit for the future**.

OUR PEOPLE

Rob Simmonds

Programme Manager
Ricardo Performance Products

"As a programme manager for Ricardo Performance Products, I am responsible for the successful delivery of transmission and driveline projects that meet the exacting requirements of our global and high-end motorsport client base. Over recent years, I have been responsible for programmes including the four-wheel drive systems of M-Sport's 2017 and 2018 World Rally Championship winning Ford Fiesta WRC and the transmission of the M-Sport Bentley GT3.

This is an industry in a state of rapid change, with an increasing diversity of applications and OEM motorsport programmes that are funded through sales of the competition vehicle itself. As such, while we continue to deliver the ultimate in competitive performance, we also need to focus on the needs of the consumer for reliability, extended service intervals and ultimately, complete ease of ownership."

Corporate responsibility and sustainability

Why it matters to Ricardo

Ricardo has a proactive and engaged approach to corporate responsibility and sustainability. The environment is a key driver for our strategy and this is seen in many of our activities, and **creating a world fit for the future** provides the central focus for all of our teams. This is embedded in what we do and the solutions we deliver.

We have a strong connection with many of the United Nations' Sustainable Development Goals ('SDGs'), published on www.un.org/sustainabledevelopment. These connections link to our value streams, our internal operations and our stakeholders, particularly our communities.

Sustainable Development Goal	Value streams	The way we operate	Stakeholders
3 GOOD HEALTH AND WELL-BEING	• Emissions reduction (Automotive) • Air quality and smart cities (Energy & Environment)	• Provision of a safe working environment, well-being programmes and employee benefits	• Governments and local communities, employees and their families
5 GENDER EQUALITY	• Ensuring a diverse range of experiences in our delivery and leadership teams	• Promoting gender equality at all levels in the business; reduction in gender pay gap	• Clients, employees and their families
6 CLEAN WATER AND SANITATION	• Water resource and management planning	• Monitoring water use on larger sites	• Clients, governments and local communities
7 AFFORDABLE AND CLEAN ENERGY	• Renewables, energy grids (Energy & Environment) • New vehicle technologies, sunlight to traction (Innovations)	• Reducing energy consumption and sourcing renewable energy in the UK; • Use of virtual product development ('VPD') tools in our project delivery, needing fewer prototypes	• Clients, governments and local communities
11 SUSTAINABLE CITIES AND COMMUNITIES	• City environmental planning, waste and resource planning (Energy & Environment) • Efficient and innovative urban transport systems (Rail and Automotive)	• Working in partnerships with local communities around our larger sites to reduce collective energy use	• Clients, governments and local communities, employees and their families
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	• Resource efficiency strategies and advice, Life Cycle Assessment (Energy & Environment)	• Reducing energy and resource use	• Clients, businesses, governments and local communities
13 CLIMATE ACTION	• Greenhouse gas ('GHG') emissions reduction (Automotive) • GHG inventories, climate change mitigation and adaptation, climate finance (Energy & Environment)	• GHG reporting and reducing carbon footprint	• Clients, governments and local communities

SUSTAINABLE DEVELOPMENT GOALS

United Nations' Sustainable Development Goals web site:: www.un.org/sustainabledevelopment

Edinburgh Trams was 'Highly Commended' at the *Global Light Rail Awards 2019* for the successful introduction of the SmartDrive system, co-developed with Ricardo Rail

We rely on the innovation, talent, technical and communication skills from our employees, and we invest in their development for the benefit of all our stakeholders. Our values and policies are designed to ensure that we and our suppliers operate ethically, honestly and meet human rights obligations.

Ricardo's employees are engaged as active members of the communities in which most of our larger sites operate. There is a strong focus on working to promote Science, Technology, Engineering and Maths ('STEM') subjects in schools and colleges, as this links directly to the next generation of consultants, engineers, and scientists who will be the core of our future value chain.

As a responsible employer, we seek to protect and care for our employees by providing a safe and healthy work environment and by minimising the environmental impact of our operations.

The environment – a strategic driver in action

The environment is at the heart of what we do and is embedded in our strategy, as shown on page 12:

- Transport & Security activities are driven by worldwide trends in climate change, emissions reduction and fuel economy legislation;
- Energy activities are similarly driven by the need to provide more sustainable and efficient solutions for power generation from renewable and clean energy sources; and
- Scarce Natural Resources & Waste activities provide solutions to improve air quality, reduce environmental impacts and improve efficiency in the use of natural resources and waste management.

We support these sectors with research and development activities to enhance our capabilities. These are described on pages 28 and 29.

Environmental thought leadership

With growing pressure to reduce negative impacts on the environment and stem the effects of climate change, Ricardo's teams of multi-disciplinary environmental experts continue to support governments and private sector organisations around the world through their consultancy and regular thought leadership.

Ricardo has continued to support the drive to reduce vehicle emissions through increased electrification. This has included our experts delivering a popular webinar series, bringing together organisations from across industries to help them gain better insight on how to transition to low carbon vehicles, how to change fleets and to find new approaches to transport operations and infrastructure.

Ricardo's experts in sustainable transport and energy have also provided key contributions to important industry papers. These have included the UK Committee on Climate Change's recent independent guidance to the UK Government on achieving a net zero carbon target by 2050, and the British Vehicle Rental and Leasing Association's ('BVRLA') *Road to Zero* paper.

Ricardo Energy & Environment supporting the C40 Climate Action Planning ('CAP') Africa Programme in Ghana, focused on scenario planning for climate change mitigation

This year our climate finance and climate change experts delivered the next phase of Ricardo's contribution to the Climate Finance Accelerator, an innovative international initiative involving the UK Government and other international donors. Experts from Ricardo supported a range of countries – including Mexico, Columbia and Nigeria – in improving their readiness to source and utilise funding to accelerate the implementation of their climate change commitments.

Ricardo's team of chemical risk and crisis management experts has also been delivering a wide range of industry thought leadership. It has focused on helping organisations from around the world to better understand the complex global chemical regulations and to enable them to deliver best practice in chemical safety and management – directly helping to protect company reputation, the environment, and to save lives.

Environmental benefits

Ricardo delivers many positive environmental outcomes which are the result of the work we undertake in the Technical Consulting business. These can be categorised as:

- Ricardo- and customer-funded engineering projects to develop low-emission and high-efficiency technologies for incorporation into products around the world;
- Lower carbon usage through the delivery of engineering projects which lead to more efficient consumer products being manufactured by our customers;
- Environmental consultancy, largely undertaken by Ricardo Energy & Environment; and
- Improvements in operating efficiency carried out by Ricardo Rail for rail operators and rolling stock manufacturers.

These products and services will have an impact on future levels of emissions, waste, energy usage, water consumption and noise across many of the sectors we serve. The cumulative benefits of projects we complete each year save many multiples of our operational carbon footprint over the life of the products we engineer.

The very nature of Ricardo Energy & Environment's consultancy work provides a further significant environmental benefit: we work with businesses, governments and international organisations to help find solutions to some of the most pressing environmental challenges.

We have a comprehensive environmental consulting capability which provides:

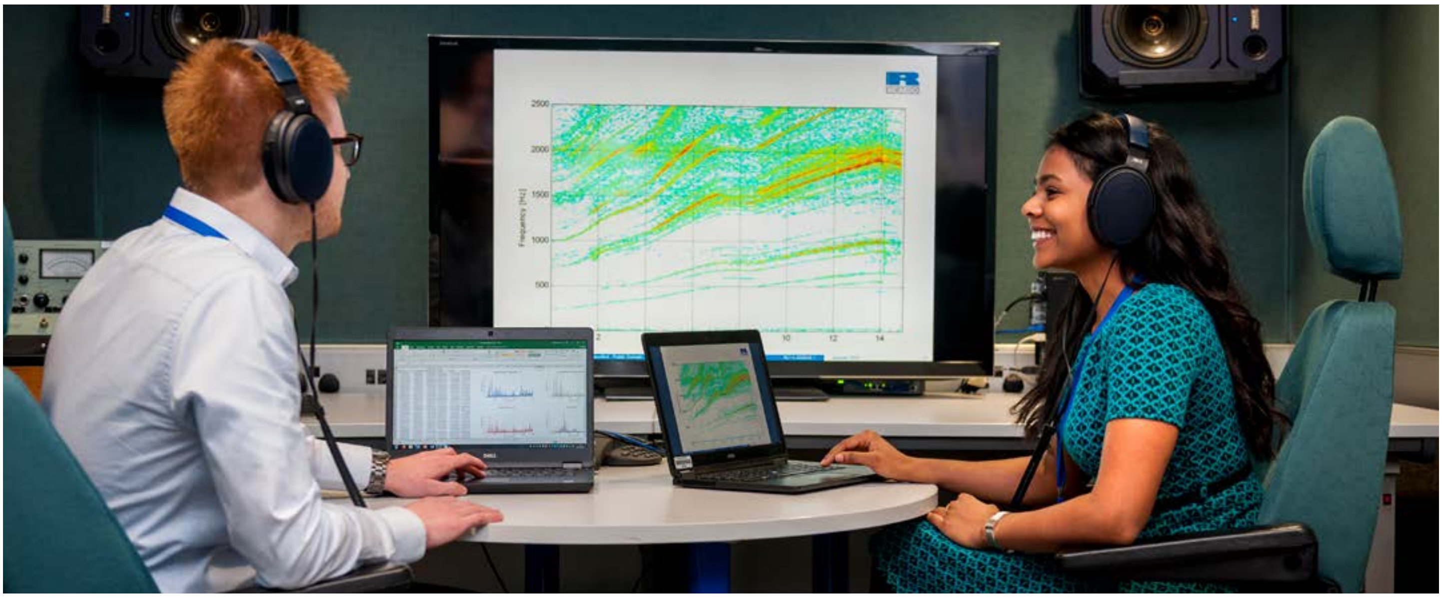
- Excellence in thought leadership around economic, societal and environmental interactions;
- Extensive understanding of the climate change challenges facing organisations, including scarcity of natural resources, strategic sustainability and energy management;
- Deep understanding of policy drivers, environmental strategy and economics, providing insight and project delivery for business and industry; and
- Modelling and data management to identify and realise value for organisations.

Operational environmental impact and greenhouse gas emissions

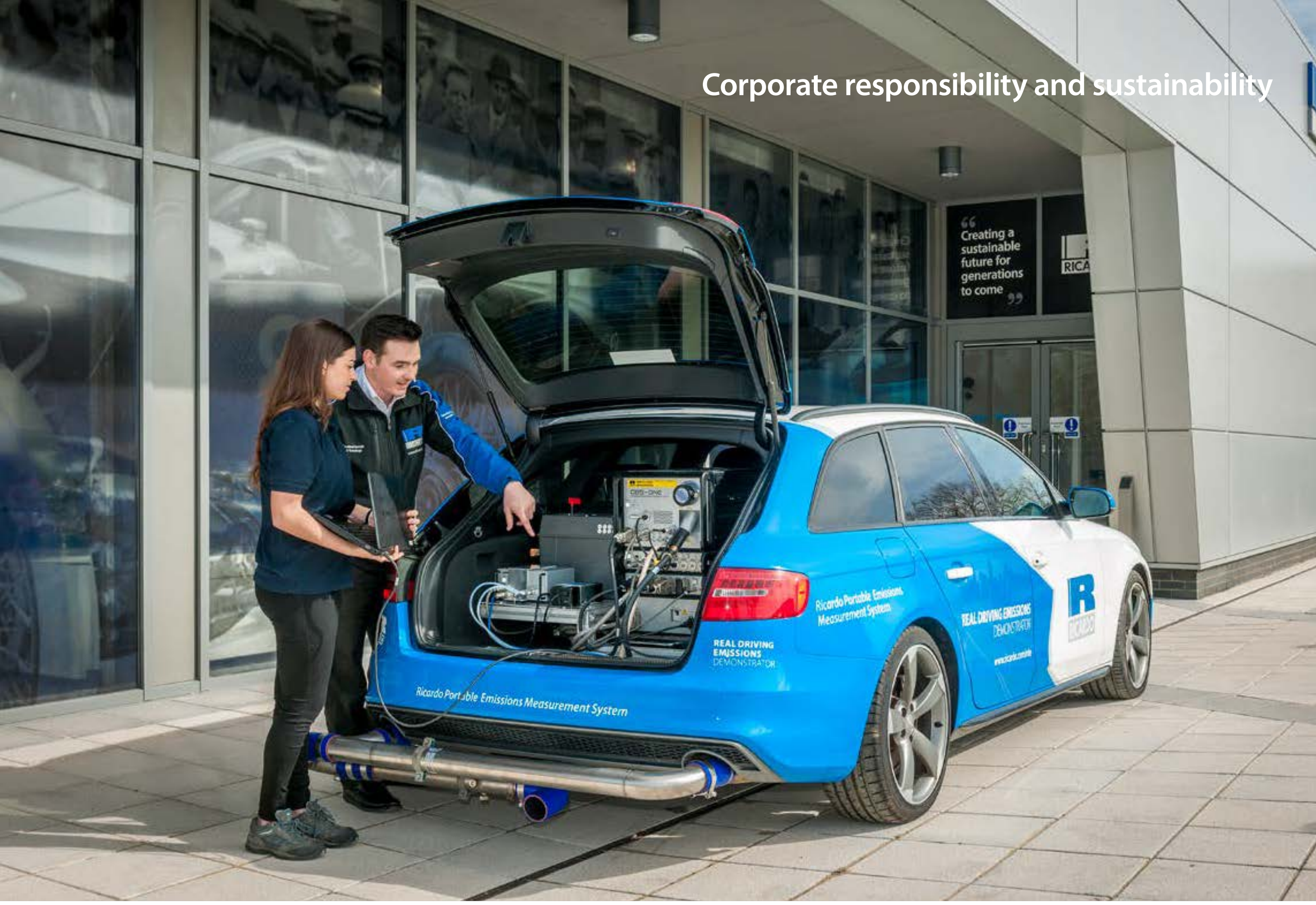
At Ricardo we are committed to keeping the environmental impact of the Group's facilities and activities to a minimum, as well as ensuring that our services have positive impacts on society. The Board's commitment to this is embodied in our environmental policy, which is available through our intranet and to the public through our website, www.ricardo.com. The drivers for this policy are as follows:

- Relevant Sustainable Development Goals;
- Delivering services that enable strategic improvements for our customers and the end users of their products and services;
- The need for continuous improvement; and
- The desire to be responsible members of the local communities in which Ricardo operates.

The impact of our operations, particularly testing and manufacturing, are the largest contributors to our operational carbon footprint and greenhouse gas ('GHG') emissions. Our



Corporate responsibility and sustainability



testing for customer- and research-funded programmes primarily uses fuels and electrical energy; in addition, there is energy required for heating some of our sites. The full effect of the prior year sales of our Chicago and Schechingen test facilities on the Group's emissions has contributed to the improvement. Our manufacturing energy use is predominantly power for machine tools and assembly facilities and gas used in our heat treatment plant. Our Scope 2 use is all electricity. We do not currently measure our Scope 3 emissions, but have developed methodologies to measure the most material Scope 3 emissions in future years.

We comply with the Companies Act 2006 (Strategic and Directors' Report) Regulations 2013 on GHG emissions and have stated our comparative history in our Strategic Performance on page 19. As this requires the inclusion of fuels used in engine and vehicle testing, variability in results year-on-year can be expected due to the varied mix in types of test and engine size.

Projects to reduce energy consumption and manage waste responsibly are actively encouraged and have become more important as unit fuel costs increase; waste streams have also become more significant as the manufacturing activities of our Performance Products business have grown.

We focus our operational carbon footprint improvements on underlying energy efficiency prior to the use of fuels for testing which varies based on client requirements. We continue to use tonnes of carbon dioxide equivalent ('tCO_2e') per employee as an intensity measure.

This year we also continued to calculate our market-based Scope 2 emissions in the UK, as well as our location-based emissions, which have been reported above using UK Government and International Energy Agency ('IEA') factors in

Operational carbon footprint and GHG emissions

tCO_2e ('000s)	FY 2018/19	FY 2017/18	FY 2016/17
Scope 1(*)	**4.1**	8.6	8.1
Scope 2	**6.4**	8.9	10.2
Total	**10.5**	17.5	18.3
tCO_2e per employee	**3.8**	6.0	6.7

(*) The operational control test is applied to determine if an emission is within Scope 1.

accordance with the GHG Protocol's Scope 2 guidance. Our UK operations are our biggest consumer of electricity, where we directly procure all electricity from renewable or zero-emissions sources. This means that when using the market-based approach which looks at actual energy generation sources, our Scope 2 emissions are reduced by over 50%. Even so, we still strive to continually reduce our underlying consumption via efficiency improvements. We have seen significant reduction in fuel and electricity use as a result of the sales of the Chicago and Schechingen test facilities in the prior year. We have also seen less fuel use in remaining automotive test facilities due to an increased focus on smaller engines.

Other environmental impacts include waste streams, which are monitored to identify potential improvement opportunities and to ensure legislative compliance. Higher risk areas of our facilities, such as fuel storage and distribution systems, have containment and inspection regimes which meet local legislative requirements.

Many of Ricardo's customers require certification for their key suppliers in respect of the environmental management system standard, ISO 14001. We are accredited to this standard in the majority of our locations. The achievement of the standard is defined by appropriate policies, processes and procedures as part of the management system in each division. Many of these are closely linked to both quality and health and safety procedures.

The suite of ISO certifications and the supporting internal and external audit programmes are used to check policy effectiveness, share best practice, identify improvement opportunities and ensure compliance. Staff training in health and safety and environmental matters is a priority and is reviewed annually as part of normal appraisal processes.

Governance – corporate responsibility

The Board reviews the key elements of corporate responsibility on an annual basis. To underline the importance of integrity in all relationships between employees and stakeholders, we have ethics, fraud prevention and whistleblowing policies which are communicated to all employees. A summary of these is communicated externally through our Code of Conduct, which includes the policy elements to meet our human rights obligations.

Under our ethics policy we do not permit bribery, anti-competitive or corrupt business practices in any dealings. Under our fraud prevention policy, we do not allow intentional acts by one or more individuals within the business to use deception or theft to gain unjust or illegal advantage. Under our whistleblowing policy, we provide a procedure for any employee to raise any malpractice concerns in an appropriate manner, with protection to the whistleblower. Ethics and whistleblowing policies and reports are reviewed annually by the Audit Committee.

Modern slavery

We continue to adhere to the requirements of the Modern Slavery Act 2015 and have published an updated statement for this financial year on our website. This subject is reviewed annually by the Audit Committee.

Human rights

The Group firmly believes in the principles behind the Universal Declaration of Human Rights. We support this by having a strong commitment to compliance with laws and regulations in the regions in which we operate, and by expecting the same from our suppliers. We articulate this through our Values and Code of Conduct, the relevant policy elements of which are:

- Being honest, ethical and above reproach with each other and with our stakeholders in all our business dealings;
- Treating all others as we would like to be treated ourselves;
- Not engaging in activity that can be considered as trafficking in persons, including the use of forced labour, child labour or procurement of immoral services for the performance of contracts;
- Not harassing or discriminating against any employee or job applicant, either directly or indirectly;
- Encouraging all our employees to take an active role against all forms of discrimination and harassment; and

In July the *R-Tour 2019*, a 900-mile, 10-day charity cycle ride visiting all of Ricardo's UK sites, raised a total of £50,000 for Mind, a UK charity that works to raise awareness and provide advice regarding mental health

- Employing or contracting with staff who are appropriately vetted and have the proven right to work in the country of employment for the type of work being undertaken.

The Group's position on human rights is supported through a number of ethics and employment policies which are designed to ensure we conduct business in a legal and ethical manner at all times.

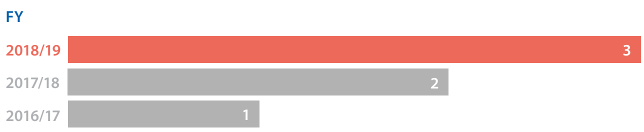
Health and safety

Ricardo is committed to compliance with local health and safety legislation, to a safe working environment and to a very low level of reportable accidents. We support training in health and safety internal audits and inspections, and we are now certified to ISO 45001 in our technical centres and larger offices in the US, the UK, the Netherlands, Italy, the Czech Republic and China. Our health and safety policy is available through our intranet and to the public through our website.

We recognise the level of reportable accidents as a measure of performance in health and safety. The number of reportable accidents increased in this financial year, but the overall level is still low and shows the continued success of our health and safety policies. We continue to focus on reducing accidents and near-misses as part of our commitment to continuous improvement and loss prevention.

Health and safety

Reportable accidents(*)



(*) Based on current definitions of the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations ('RIDDOR')

Chief Executive Officer, Dave Shemmans, together with fellow volunteers at the Midsummer Ball in June 2019, an evening that raised a total of £70,000 for children's charities, including the Chestnut Tree House children's hospice

Suppliers

Relations with our suppliers are essential in achieving client and shareholder satisfaction. Our policy is that key suppliers should be certified to ISO 9001, ISO 14001 and ISO 45001 standards, and all suppliers are encouraged to obtain these certifications. Local suppliers are used where commercially practical. There are no significant supply contracts which are essential to the business of the whole Group, and we are not reliant upon any suppliers that would jeopardise the independence of the business.

Initiatives are managed by our Head of Global Procurement and savings are delivered by consolidating the supply base and reducing the total cost of doing business. We strongly encourage our suppliers to comply with our Code of Conduct or their own equivalent policies.

Local communities

It is our policy and objective to make a positive contribution to all regions and communities in which we operate, particularly in education in areas local to our main sites. Many of the larger Ricardo offices support local community activity and give charitable donations, particularly where employees participate in community or charitable fundraising activities. The focus is on creating sustainable links and on improving the image and understanding of the business and the engineering and scientific professions in the community.

Community engagement in promoting Science, Technology, Engineering and Maths ('STEM') subjects and diversity has been a key part of our employee involvement. A wide range of activities have been undertaken, namely:

- Partnerships with schools near our larger UK sites, supporting curriculum delivery and teacher engagement in STEM;
- The automatic enrolment of many of our UK graduates as STEM ambassadors when they join the business;
- Sponsorship of regional STEM events attended by over 14,000 students seeking career opportunities from many employers; and
- Support of university teaching from Ricardo Software with its products – in 200 locations, across approximately 40 countries.

We also work with our local communities to provide business input on economic regeneration, and we actively engage in local partnerships, particularly in the area where our Shoreham Technical Centre is located, where we are the largest private-sector employer.

Donations

We often match staff donations to charitable activities, particularly where there is active staff participation in events. Financial contributions to charities in the financial year were £43,710 (FY 2017/18: £36,237). The effectiveness of these policies is informally measured by community feedback.

Ricardo employees supporting the local environment with its annual waste and recycling activities at the Oxford science campus

Risk management and internal control

The Board has overall accountability for ensuring that risk is effectively managed across the Group. We consider that effective risk management is critical to the achievement of Ricardo's strategic objectives and the long-term sustainable growth of our business. Such systems are designed to manage, rather than eliminate, the risk of failure to achieve Ricardo's objectives and can only provide reasonable assurance against material misstatement or loss.

Risks are reviewed by all business areas on a half-yearly basis and measured against a defined set of likelihood and impact criteria. Risks are measured both before and after the mitigating effect of the application of compensating controls. This is captured and reported consistently, enabling the risk information to be consolidated and ranked. The key risks are then summarised in the Group's risk profile and submitted to the Board for review and approval.

As part of the bi-annual risk management process, Directors and senior managers are required to certify that they have established effective controls to manage risk and to comply with legislation, as well as with the Group's policies and procedures.

Ricardo's internal control and monitoring procedures include:

- Clear and understood responsibilities by both line and financial management for the maintenance of good financial controls and the production of accurate and timely management information;
- Requirement for divisional Finance Directors to confirm on a monthly basis that appropriate controls are in place and to identify any exceptions, with the outcome being reviewed by the Group Financial Controller and Group Risk Manager & Head of Internal Audit;
- Divisional Finance Directors have line management responsibility to their Managing Directors, but with an independent reporting line to the Chief Financial Officer;
- Control of key financial risks through clearly set authorisation levels and appropriate segregation of accounting duties;
- Control of key project risks through project delivery and review systems;
- Control of other key business risks through a number of processes and activities recorded in the Group's risk register;
- Detailed monthly forecasting and reporting of trading results, financial position and cash flow, with regular review by management of variances from budget and forecast;
- Review and reporting by the internal audit function on divisional compliance with internal procedures and financial controls; and
- Review and implementation of recommendations in reports on internal control by external auditors.

To ensure our risk process drives continuous improvement across the business, we monitor the ongoing status and progress of key action plans against each risk on a half-yearly basis. Risk is a key consideration in all strategic decisions made at Board level. In the June 2019 risk review cycle, we considered risks associated with our customers, suppliers, employees, finances and the potential impact of Brexit, which we now report as a separate principal risk. Our principal risks and the approach to their mitigation are disclosed on pages 45 and 46.

The Group has risk management processes in place for projects and other business risks. Contract risks are managed through a project management process which is closely linked to measurement of financial performance. The majority of active Technical Consulting projects are reviewed on a monthly basis within divisions. In addition, the highest risk category projects are independently reviewed by the Group either on a quarterly basis or once significant milestones are deemed to have been achieved. Non-contract risks are owned by the Group functions and divisional Managing Directors. These non-contract risks are analysed, regularly reviewed and recorded in the Group's risk register in liaison with the Group Risk Manager & Head of Internal Audit, who has an independent reporting line to the Chairman of the Audit Committee. The Group's approach to risk management is to identify key risks early and to remove, control or minimise the impact of them before they occur.

Risk transfer is managed through insurances by the Group Risk Manager under the direction of the Chief Financial Officer. The insurance programme is reviewed annually by the Board to ensure that it continues to meet business needs as the risk profile changes.

Risk appetite is managed through a number of internal controls, authority limits and insurance excesses. The Group's risk appetite was reviewed during the year as part of the Board's review of risks and is stated as an internal policy document.

The Group's internal audit function provides assurances on divisional systems of internal control, risk management and compliance with applicable legislation and regulations. This is complemented by internal audits required as part of maintaining certifications to international standards for management systems. The effectiveness of these risk management and internal audit processes is reviewed annually by the Audit Committee and is set out on pages 86 and 87.

Financial risks faced by the Group comprise capital risk, liquidity risk, credit risk and market risk (comprising interest rate risk and foreign exchange risk). The Group's objectives, policies and strategies in respect of these risks are set out in Note 23 to the financial statements on pages 154 to 158.

The Company complies with the 2016 UK Corporate Governance Code by ensuring that:

- Risks are either classified as strategic or operational and as either internally or externally driven;
- Risks are evaluated on a gross and net risk basis; and
- The Chief Executive Officer reviews the higher-rated risks on the Group's risk register with the Audit Committee twice each year, in the presence of the other Executive Directors and the Chairman.

We also ensure that emergent risks are considered as part of the Board's existing half-yearly reviews of risk and annual review of strategy. This is compliant with the requirements of the 2018 UK Corporate Governance Code, which becomes effective to the Group from 1 July 2019.

Principal risks and uncertainties

In common with all businesses, the Group faces risks and uncertainties on a daily basis. It is the effective management of these risks that places us in a better position to be able to achieve our strategic objectives and to embrace opportunities as they arise.

Set out below and on the following page are the details of the Group's principal risks, the mitigating activities in place to address them, and the additional actions implemented to further reduce the net risk to the Group. The mitigation of the principal risks is within the Group's risk appetite, which is reviewed annually by the Audit Committee. It is also recognised that the Group is exposed to a number of emergent risks that are currently deemed to be less material, together with additional risks and uncertainties beyond those listed that are presently not known to management which may also have an adverse effect on the business.

Movement in risk Reduced risk No change Increased risk

Principal risk	Impact	Mitigation
Customers and markets The Group is largely dependent on a dynamic, diverse and politically volatile marketplace, particularly in Automotive, which is exposed to many external political and economic pressures. These include pressures to improve urban air quality, reduce greenhouse gas emissions, provide independent emissions testing and to navigate the impact of Brexit and trade tariffs.	This could cause changes or uncertainty in the product plans of major customers or government policy, leading to delays in the placement of new orders or insourcing of activity, the redirection, deferral or curtailment of existing contracts, slippage in payments or variations in demand for resources, and availability of R&D funding. The precise timing of the receipt of orders and the utilisation of our resources to generate revenue and profit may give some volatility in our ability to forecast future performance.	These risks are mitigated by the strategy of diversifying the Group to reduce exposure to any one specific customer, territory or market sector. Challenges currently being faced by our Automotive businesses across the globe can be mitigated by other Technical Consulting businesses and Performance Products. The success of this strategy is measured by the key performance indicators for customer dependency and sector diversity shown on page 18 and by the geographic spread of revenue, as disclosed in Note 3(b) to the financial statements. In the event of a sudden downturn in a market sector or the wider economy, contingency plans are quickly deployed to minimise the impact on short-term performance and to preserve cash whilst protecting the long-term needs of the Group's stakeholders. The impact of insolvency risk is mitigated by robust working capital management and the use of credit insurance where this is economically available.
Brexit Brexit is a source of additional political, regulatory and economic instability, which could potentially have a significant impact on the Group for an uncertain period of time. The Group has assessed the risk, taken appropriate action as necessary, and continues to monitor the situation in readiness to change and implement further plans as more information becomes available.	The main areas of potential impact are these: trade tariffs, exchange rates and supply chain disruption within Performance Products, the need for additional certifications in the EU for Rail, the ability to recruit and the mobility of people to work within the EU and the UK, and the ability to contract with customers between the EU and the UK.	In Performance Products we have ensured all documentation is in place to continue to export to key clients in the EU. We have considered the potential impact of tariffs, exchange rate movements and logistics disruption on our EU supply chains. Arrangements are in place to increase inventory levels. Our Rail Notified Body ('NoBo') accreditation in the UK will no longer be valid in the EU after Brexit, so we have obtained NoBo status from the Danish and Dutch certification authorities so that we can maintain access to the EU market. To reduce the risk of loss of contracts with the European Commission, we have added capability in the Netherlands to successfully contract with the European Commission and provide them with ongoing support. We are monitoring the potential impact of Brexit on employee mobility and our ability to recruit EU nationals for UK roles and vice versa. We believe that our range of geographic locations across Europe will continue to make us an employer of choice.
Contracts The majority of the Group's revenue arises from fixed price contracts for engineering, technical, environmental and strategic consultancy services, together with accreditation and independent assurance services, with an increasingly broad range of projects, customers and geographies. There is a risk that the obligation to complete the agreed scope of these contracts may be carried out in a longer timescale or less cost-efficient manner than initially estimated, reducing profit margins. In product supply contracts, there is a risk of product liability, recall or warranty claims and dependency on specialist suppliers. Contracts denominated in foreign currencies can be subject to exchange rate risk.	Failure to perform on contracts within estimated cost and delivery timescales could impact profitability. Faulty products, or the infringement of the rights of others, could potentially subject the business to increased costs, a claim from a customer, reputational damage or reduced opportunity for repeat business. Failure of production processes or product validation could lead to warranty or recall claims. Failure or poor performance of a supplier could disrupt delivery to customers and increase operating costs. Unhedged adverse foreign exchange rate movements on contracts could also affect profitability.	Project leadership and management are the Group's core competencies. Led by the Chief Operating Officer, the Group remains focused on the continuous improvement of these functions. Risks are proactively managed by clearly defined lead qualification, bidding, contracting and project management processes, whereby projects are initially categorised according to their risk level and their performance is continually assessed throughout the life of the project, which in turn dictates the level of approval or review required. Internal procedures are in place to ensure that the technical content of our output is of high quality and meets customer requirements without infringing the rights of others, and within time and cost estimates. Procurement processes are in place to assess critical suppliers and selections are often made with the involvement of the customer. In product supply contracts, there are rigorous quality assurance processes in place to reduce the risk of product liability, warranty and recall claims. Significant contracts in foreign currencies are hedged to protect against volatility in exchange rates.

Principal risks and uncertainties

Principal risk	Impact	Mitigation
People Ricardo is a diverse business that is knowledge-driven and people-led, with a focus on attracting and retaining the best talent. Recruiting, developing and retaining knowledge and talent in the right locations is essential.	The failure to recruit, develop or retain the very best talent would restrict growth and the execution of our strategy, and would have an impact on delivery and customer relationships.	The Group is focused on a model of 'bringing in and bringing on' the best talent. We aim to ensure that we actively develop and manage staff to encourage their optimum contribution; we foster mobility and professional development, and we provide appropriate remuneration and working conditions. Our IT infrastructure enables us to share work and mitigates mobility issues. Our people as stakeholders are discussed further on pages 36 and 37.
Technology The business is enabled through the development of new technology to meet the needs of market sectors, customers, and regulators on varying time scales.	If the Group invests in the wrong technologies, it could lose marketplace advantage and levels of business activity could reduce. If there are movements in the implementation of new regulations, which in turn accelerate or delay customer programmes dependent on new technology, the time taken to deliver returns from our R&D programmes may also increase.	Our R&D programmes are developed through a mixture of customer consultation, long-range forecasting, thought leadership and deep technology roadmap development. Many of our programmes are collaboratively developed and delivered with customers, partners, governments and suppliers, which creates strong links to the market and ensures the output is relevant and credible. The programmes are approved and delivered by Ricardo Innovations, a division which operates as a global R&D organisation, singularly focused on the delivery and exploitation of approved R&D programmes. This enables staff and facilities across multiple geographies to be dedicated to relevant programmes, which accelerates the delivery of our innovative products and services to the market and promotes the exploitation of developed intellectual property and know-how. Further details of a selection of our current R&D programmes are given on pages 28 and 29.
Laws and regulations The Group's operations are subject to an increasingly wide range of evolving domestic and international laws and regulations, including restrictions, standards and tax legislation.	Non-compliance with, or changes to, laws and regulations including restrictions, standards and tax legislation could expose the Group to fines, penalties or reputational damage, or result in trading restrictions which could have a materially adverse impact on the business or impede the Group's ability to recover certain available tax-related credits.	To mitigate these risks, the Group has a number of defined policies and operating procedures in place, and takes professional advice where considered necessary, to ensure that the Group acts upon current and expected changes in legislation. Our Code of Conduct, which is published on www.ricardo.com, ensures that employees and others act with the highest ethical standards and within local legal and regulatory requirements. The Group's internal audit programme includes within its remit the review of compliance with applicable legislation and regulations, and awareness of key Group policies and procedures. These are updated as regulations change and as a result of our continuous drive to adopt best practice. We aim to anticipate the impact of working in new countries and new sectors, particularly within our Rail business, which operates in a growing list of territories and cultures, each with its own regulations, standards and laws with which we need to comply. Unsettled tax credits claimed within a financial year are recognised to an appropriate level at which management is highly confident of full recovery, and in a manner that is consistent with both current legislation and professional advice.
Defined benefit pension scheme The Group has a UK defined benefit pension scheme which currently has a funding deficit. The uncertainty of Brexit continues to impact the volatility in the assets and liabilities of the scheme.	Any decline in the value of the pension fund assets, improvement in mortality assumptions, long periods of high inflation or decreases in interest rates could increase the funding deficit and require additional funding contributions in excess of those currently expected.	The Group closed the pension fund to future accrual in 2010. The current funding plan was agreed on the basis of a valuation undertaken as at 5 April 2017 and anticipates deficit recovery contributions being made until July 2022. In addition, the Group regularly monitors the performance of the pension fund. Further details of the Group's defined benefit pension scheme can be found in Note 24 to the financial statements.
Financing The Group is in a net debt position, having drawn on available facilities primarily to fund acquisitions	There is a risk of the Group being unable to secure sufficient financing at reasonable cost in order to carry out its strategic objectives.	This risk is mitigated by robust cash and working capital management, regular process improvement initiatives, monitoring actual cash flows to budgets and forecasts, maintaining good relationships with the Group's bankers and ensuring that sufficient borrowing facilities are in place at all times to support the Group's funding requirements to deliver on its growth strategy, with additional headroom available to meet possible downside scenarios. The Group has sufficient headroom in its facilities and covenants and renewed its borrowing facilities in July 2018, increasing the committed facility to further support the Group's growth strategy for an extended term to 2023. Further details of the Group's borrowing facilities and other financial risks can be found in Notes 21 and 23 to the financial statements, respectively.
Information security Ricardo has valuable intellectual assets comprised of propriety, customer, and supplier data.	The theft or loss of intellectual assets could result in reputational damage, loss of competitive advantage, business disruption and financial penalties.	Ricardo has implemented a global Information Security Management System ('ISMS') and achieved certification to ISO 27001 information security at our main facilities. The Group IT Director is accountable for managing information security resilience, which includes cyber risk. Dedicated information security resources monitor and manage our threat profile. External penetration tests are conducted to augment our control regime. Information security risks are reviewed by the Group IT Director each quarter and integrated with the Group's enterprise risk management process. Bi-annual briefings on information security are made to the Audit Committee.

Viability statement

The Directors have assessed the prospects of the Group in accordance with provision C.2.2 of the 2016 UK Corporate Governance Code for this year ended 30 June 2019. The 2018 Code was published in July 2018 and places greater emphasis on the Board's role in this assessment, with which we are compliant before the 2018 Code takes effect from 1 July 2019.

The context supporting the assessment

The Group's prospects are underpinned by its business model and strategy, which can be found on pages 12 to 27. The Group continues to follow a balanced approach to its strategy, which is subject to ongoing monitoring and development as described herein. The underlying operating profit of the Group has grown on average by 7% each year over the last five years and the Group has a year-end order book of £314m, of which 32% is expected to be workable beyond 12 months from the year-end. The year-end order book comprises the value of all unworked purchase orders and contracts received from customers.

The strategy of the Group is to grow its diversified engineering, technical, environmental and strategic consultancy business, as well as its manufacturing and assembly operation for high-performance products. These businesses focus on the development of longer-term, multi-year contracts and relationships, underpinned by global macro trends. The Board has considered the risk appetite and profile of the Group in this context, and has determined that this remains appropriate for the Group as a whole.

Assessing the prospects of the Group

The Group's prospects are assessed primarily through its annual strategy review and business planning processes, which cover a five-year period and a three-year period, respectively, and are both led by the Chief Executive Officer.

The strategy review is a forward-looking process and is undertaken by the Group's constituent divisions, with full participation by members of the Board, which results in a five-year strategic plan. Part of the Board's role is to review the performance of the Group in the last financial year and to consider whether the strategic plan remains appropriate. This includes an assessment of changes in the market and competitive environment, together with macroeconomic, political, societal and technological changes. Actions are implemented as necessary to continue to support the strategic plan.

Detailed business plans are also prepared during the last quarter of each financial year by all the Group's constituent divisions, with the involvement of relevant functions including Finance and Treasury; these plans are then reviewed and approved by the Board. The first year of the business plan forms the Group's annual operating budget. This is subject to a re-forecast on a monthly basis. The second and third years are based on the overall content of the year one business plan together with the strategic plan, having been flexed for known or anticipated events.

Assessment of viability

The three-year business plan reflects the best estimate of the prospects of the Group and has been stress-tested for the following scenarios:

- 20% reduction in revenue, offset by associated cost savings;
- 5% increase in LIBOR interest rates; and
- A further scenario combining both of the above.

The impact of each of these scenarios on the Group's business plan has been quantified and presented to the Board as part of the approval process. These scenarios, which are based on aspects of the Group's principal risks and uncertainties, including customers and markets, Brexit, contracts, and financing, as set out on pages 45 and 46, represent severe but plausible circumstances that the Group could experience.

The results of our stress testing showed that the Group would be able to withstand the impact of these scenarios occurring over the period of the plan, by making adjustments to its operating activities within the normal course of business.

The Group also performed reverse stress testing on its financial plan using these scenarios to identify the point at which its banking covenants would be breached, as this would represent a serious threat to the Group's liquidity. None of the scenarios required were considered to be plausible, and more severe actions would be taken to preserve the liquidity of the Group.

Viability statement

The Directors have assessed the prospects of the Group over the three-year period to 30 June 2022 and confirm that their assessment of the principal risks and uncertainties facing the Group was robust. A three-year period was selected for the following reasons:

- This period reflects the detailed business planning cycle;
- Lead times on customer contracts and typical engineering programmes are no longer than three years; and
- Although the strategic plan covers a five-year period, the Group's order book and pipeline of opportunities does not extend significantly beyond three years.

Whilst the Directors have no reason to believe the Group will not be viable beyond the three-year period of this assessment, a three-year period is deemed most appropriate given the inherent uncertainty involved, the stress-testing scenarios considered as part of the three-year business plan, together with the reasons outlined herein.

Based on their assessment of prospects and viability, the Directors confirm that 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 three-year period ending 30 June 2022.

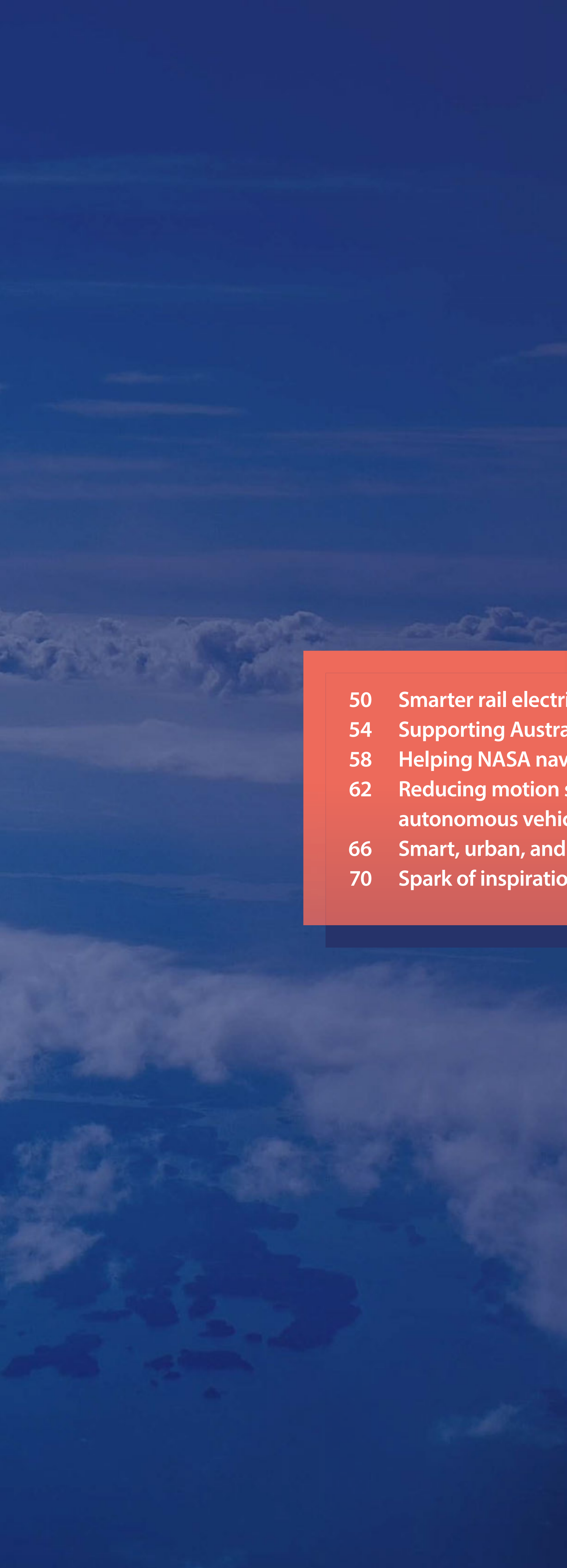
Going concern

Given the viability statement provided above, the Directors therefore considered it appropriate to prepare the financial statements on a going concern basis, as explained in Note 1(a) to the financial statements on page 128.

Our 2018/19 Strategic Report, from pages 8 to 47, has been reviewed and approved by the Board of Directors on 11 September 2019

Dave Shemmans, Chief Executive Officer

Case studies



Smarter rail electrification

The international rail industry is an important focus for governments and regulators in their drive to reduce carbon emissions and improve sustainability. Ricardo is at the forefront of this mission, helping authorities to achieve this with smarter approaches to electrification and tackling the parallel issue of air quality.

Rail electrification has long been seen as a means of improving the energy efficiency of passenger train propulsion in relation to the alternative of diesel traction; more recently, it has also been seen as a means of avoiding air pollution at the point of use. On a like-for-like basis, electric trains are lighter in weight, accelerate more quickly, have lower maintenance costs and consume less energy than diesels.

But while electrification may have distinct benefits once in place, it is far from a low-cost option in terms of upfront capital investment. Despite the significant efforts being made to reduce costs, it is almost inevitable that most mixed networks of urban, intercity and rural routes will include regions for which the business case for conventional overhead electrification cannot be made.

A key challenge for the rail industry internationally is to look at how gaps in electrification can be accommodated, whilst still maximising the proportion of electric traction. Gaps in electrification can arise for a variety of reasons – perhaps for aesthetic considerations around installing a catenary system for a light rail or tram system in a historic city centre, or because there is insufficient commercial justification for the investment required for a rural route with lower traffic volumes and load factors.

Partial catenary systems

The Ricardo Rail team in Utrecht was asked by the northern Netherlands provinces of Fryslân and Groningen to investigate new approaches to electrification. The provinces have taken the political decision to aim for zero-emissions public transport by 2025, both in terms of point of use and the generation of the energy used: this means that an alternative to diesel-based operation of the regions' rail lines is needed.

The seven rail routes running through the area form part of the 5% of the network in the Netherlands that remains unelectrified. Ricardo Rail had previously conducted a study

Ricardo is investigating the use of its IGNITE systems modelling software to optimise traffic flows in power-restricted pinch points on DC third-rail systems

that demonstrated that full conventional electrification of these lines was not cost effective due to the comparatively light load factors and train frequencies. For this reason, Ricardo Rail was contracted, in collaboration with infrastructure consultancy Arcadis, to evaluate options for range-extender solutions based on hydrogen fuel cells used in the form of a hybrid propulsion system, or for partial catenaries in combination with higher capacity on-board battery energy storage. With recent improvements and declining costs in battery systems, the latter was clearly identified as the more attractive solution.

The team modelled a range of scenarios combining station-based recharging with partial electrification. In the partial electrification zones, trains use the overhead line for both their immediate tractive power needs as well as for battery recharging. This was augmented in the non-electrified sections with station-based recharging points similar to those used for battery bus networks.

The initial scenario was based solely on station-based recharging without any electrification beyond the existing network. Analysis of this mode of operation showed that the trains' on-board batteries would be fully depleted on all but three of the seven routes modelled, so some level of additional power supply for recharging would be required. Two further scenarios were simulated with small but crucially important sections of partial catenary – representing just 4 km (1.5%) and 10.5 km (4%), respectively, of the network covered by the routes. The 10.5 km partial catenary scenario demonstrated sufficient capacity to operate the entire timetable on battery-equipped trains and, through the inclusion of this additional length of overhead line, this simulation indicated that the need to install the two station-based recharging facilities could be bypassed, thus mitigating part of the infrastructure investment required.

Ricardo is working with rolling stock leasing company, Porterbrook, to use on-board batteries to eliminate diesel engine operation in built-up areas where there is no electrification of the rail network – a first in the UK

Armed with the information generated from the study, the provinces of Fryslân and Groningen and the regional rail operator, Arriva, can now make an informed choice about the possible roll-out of a battery-powered fleet, with greater insight into the costs and the modifications required to trains and infrastructure.

Incorporating renewable energy

Elsewhere, on the UK rail network, Ricardo is assisting in the Green Valley Lines project to incorporate community renewable energy schemes into the proposed smart electrification of the commuter lines running to and from the Welsh capital, Cardiff. Aside from its benefits in reducing the carbon intensity of rail traction, this approach can be particularly attractive in areas where the power grid is restricted and would otherwise require significant upgrades to supply such electrification schemes.

Working with infrastructure owner, Network Rail, and the Energy Saving Trust, the Ricardo team is identifying potential sites to install community-owned solar, wind or hydroelectric generators that could directly supply the new overhead lines with low-cost, low-carbon electricity. The study is also scoping technical solutions for directly connecting renewable sources of energy to overhead electrified lines and analysing how best to integrate new energy storage technologies to help keep electrification costs down.

Station air quality and last mile emissions-free running

Poor air quality is a particular concern for major rail termini and interchanges served principally by diesel fleets. However, it can also affect hubs served by mixed traffic, particularly where station topology is challenging due to deep cuttings and covered concourses. Ricardo Rail and Ricardo Energy & Environment's air quality teams are researching the issue of such pollution hotspots, and are examining potential abatement options for immediate, medium and longer term solutions. The hybridisation of the existing diesel-powered fleet in the UK is an innovation on which Ricardo is working with UK rolling stock leasing company, Porterbrook. The resulting *HybridFLEX* project aims to eliminate diesel operation in built-up areas where there is no electrification of the rail network. It plans to achieve this through the use of battery operation during the last mile of running in the vicinity of urban areas, as well as during station stops. In addition to reducing diesel emissions in urban areas, a further benefit will be to significantly reduce noise.

As these examples demonstrate, the work of Ricardo Rail in exploring the potential for innovative and smart electrification of rail networks offers valuable synergies for customers by drawing together the skills and expertise of Ricardo's Rail, Energy & Environment and Automotive businesses. With further opportunities already being explored in areas such as the use of advanced systems modelling software to optimise traffic flows in power-restricted pinch points on DC third-rail systems, and using the railway electrification system to augment grid-scale energy transmission and connection of distributed renewable resources, this is just the start of things to come.

Supporting Australia's circular economy

With its newly launched office in Brisbane and the recent acquisition of PLC Consulting in July 2019, Ricardo Energy & Environment is making important inroads into the Australian market. The business is helping both the public and private sectors grasp the opportunities presented by world-class innovations in waste and resource management, and is engaging in a range of strategic projects that are helping the country to move towards a circular economy.

Ricardo Energy & Environment has supported waste, energy and water projects across the Asia-Pacific region for many years, but its development of a local presence in the Australian waste and resources sector since entering the market in 2018 has been even more decisive. The timing is also prescient: Ricardo is engaging with the Australian market at a stage where demand for services aimed at facilitating sustainability and circular economy initiatives has never been greater.

The Australian economy has experienced one of the longest periods of sustained GDP growth in the developed world, not least due to the nation's population expansion and its extensive mineral resources. This growth, coupled with the increasing need to improve sustainability and climate resilience, means that any developments in the infrastructure and utilities sector must consider waste, water and energy together to capture a truly holistic view of the environmental impacts of projects. From its new office in Brisbane, Queensland, Ricardo is supporting projects in these areas for state and local government agencies, as well as a range of private-sector clients.

Creating Australia's first circular economy community

Located 40 km south-east of Brisbane, the regional community of Yarrabilba is situated within the Logan local government area. At present, Logan comprises over 3,000 homes, but it is planned that by the completion of a 30-year development, this will have grown to 17,000, housing a population of approximately 45,000 and putting the community on a similar scale to Queensland's regional cities. The Yarrabilba development will include a town centre, a business park and neighbourhood hubs, as well as community, education and employment facilities.

Yarrabilba is being developed with the aim of creating Australia's first circular economy community – one that integrates social, economic and environmental values to provide a dynamic and empowered community that fosters sharing, access, connection, diversity and control. In support of this vision, Ricardo was contracted by the developer of the Yarrabilba estate – Sydney-based international property and infrastructure group, LendLease – to support the development of a circular strategy covering resources, energy, water and transportation. The initial strategy report, delivered with the assistance of Ricardo, provides a roadmap for the development of Yarrabilba up to the mid-2020s and outlines the key steps of data collection, feasibility assessments and identification of quick-win initiatives that will enable the community to start to realise its bold vision.

Helping the New South Wales EPA shape policy

Working in partnership with the Institute of Sustainable Futures at the University of Technology Sydney, Ricardo was contracted to support the New South Wales Environmental Protection Agency ('EPA') in the development of the state's circular economy strategy.

The project aimed to assess international best practice that might be drawn upon, reviewing over 50 case studies across Europe, Asia and the Americas, and examining the economic, social and environmental costs and benefits in countries where a circular economy is active. From this work, an assessment could be made of the potential enablers and synergies for implementation within the state of New South Wales.

In particular, the project reviewed the waste processing of priority materials such as glass, paper, plastics and metals within the state, as well as considering organics, electronic waste, textiles and other problem wastes. The initiative engaged with industry, local government and civil society stakeholders through workshops on best-practice cases with applicability

to the context of New South Wales. Based on this work and through further consultation with policy experts and advisers, Ricardo was able to develop short and longer term policy recommendations, together with a suggested implementation pathway.

Addressing new challenges and opportunities in waste management

Based in Bayswater, Victoria, Steinert Australia is a company that provides sorting and separation equipment to the waste and recycling industries. Following bans on imported wastes and recyclables introduced by China and other countries, there has been recognition across industry sectors within Australia of the need for increased local processing capability and improved recycling rates.

Steinert Australia engaged Ricardo to review the potential of adopting a leasing model for a selection of its products. Specifically, Ricardo was tasked with qualifying the potential of leasing for Steinert and defining a unique leasing model suited to both the company and its clients. Work for this project included extensive research into the existing leasing market, the engagement of Steinert's potential clients, and an analysis of the financial implications of implementation.

Ricardo's independent engagement of Steinert's clients was crucial for the assessment and development of a tailored leasing approach for the company. Additionally, this aspect of the project provided Steinert with further valuable insights into its clients' requirements and plans for the future.

A positive future

As this small selection of projects demonstrates, Ricardo Energy & Environment's first year in its new office in Brisbane is providing an effective base through which it can deliver its skills, expertise and insights across Australia. This local presence has also been expanded with the acquisition in July 2019 of Melbourne-based PLC Consulting, which will now operate as part of Ricardo Energy & Environment. This is in addition to the acquisition of Sydney-based Transport Engineering in May 2019, which operates as part of Ricardo Rail.

The timing of Ricardo's new focus on the Australian market is entirely appropriate in meeting the needs of a growing economy in which all stakeholders – from the federal and state governments and local authorities to private-sector companies and investors – are increasingly aligned in our mission **to create a world fit for the future**.

Helping NASA navigate ‘big data’

Ricardo Defense is providing the United States' National Aeronautics and Space Administration ('NASA') with advanced software for the analysis and optimisation of large and complex data sets – so-called 'big data' – which will be used in the planning of future deep-space missions

NASA has an enviable and well-deserved reputation for the planning and execution of the most challenging, safety-critical and complex space missions. Fifty years since placing the first humans on the surface of the Moon and returning them safely to Earth, the agency continues to strive for new frontiers: now it is actively pursuing plans that envisage a return of astronauts to the lunar surface in 2024, with ambitions to extend human exploration to Mars and beyond in the years that follow.

In parallel, NASA's unmanned missions are following in the footsteps of the pioneering Voyager series of spacecraft, the first human-made objects to enter interstellar space. The new missions include numerous probes exploring the planets of the solar system, and the investigation of the Martian surface by a series of rovers, most recently the Curiosity vehicle of the Mars Science Laboratory mission that remains active since touching down on the red planet in 2012.

The planning of these long-duration, deep-space missions is an extremely complex and data-intensive process, requiring the close and effective collaboration of numerous specialist scientists and engineers, ranging from risk managers and experts in human factors and systems analysis to user interface developers. Standard modern tools and techniques such as spreadsheets and project scheduling systems would have been beyond the wildest dreams of the engineers who planned the Apollo programme in the 1960s, but even today they are inadequate for addressing large, diverse, and dynamic data sets for the modern, high-criticality missions now envisaged by NASA. The planning of such operations that risk lives and property on this scale can have only very limited tolerance and scope for ignorance, deficiency, or accident.

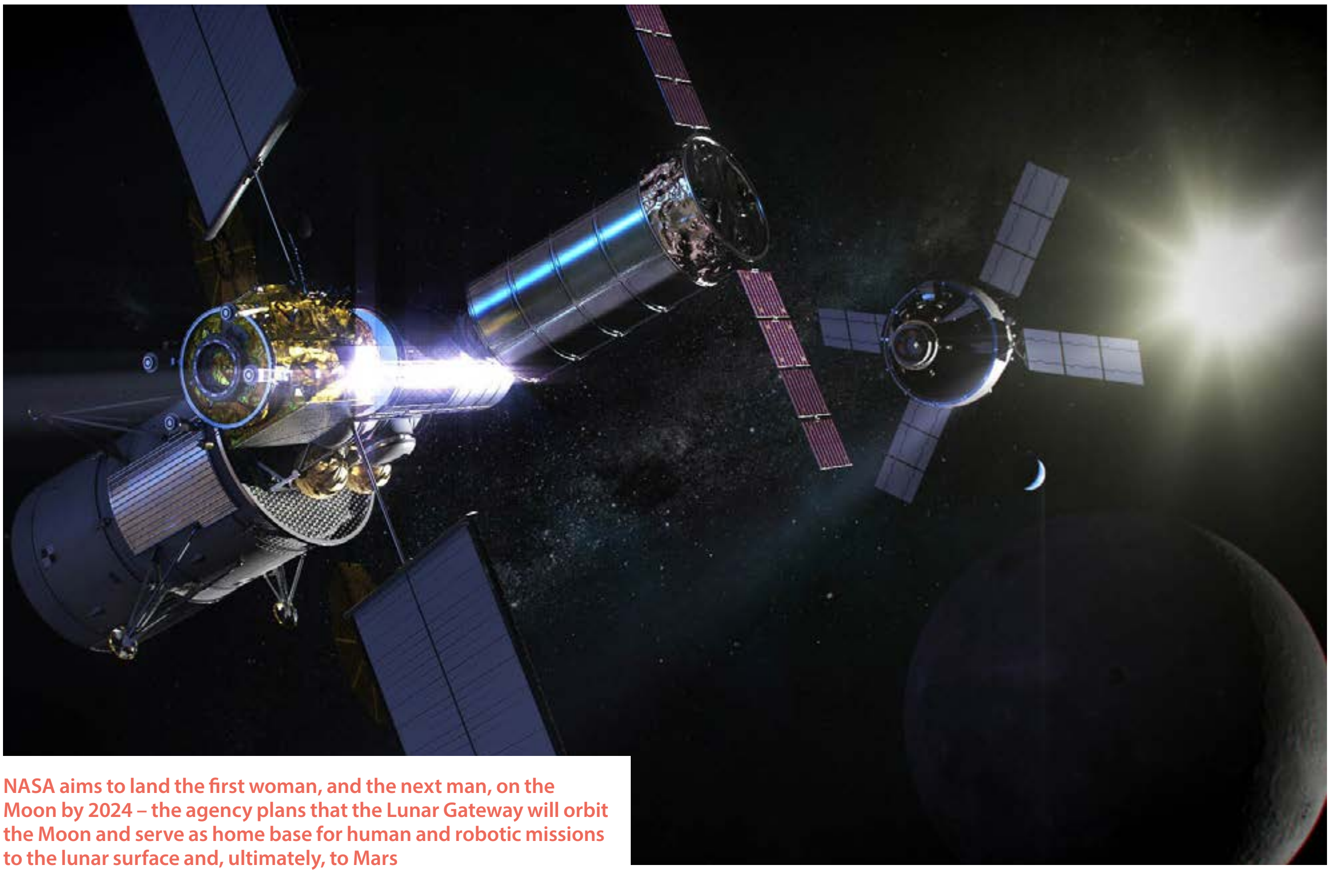
Software for 'big data' analysis

The visualisation, analysis and manipulation of large and complex data sets used in operational planning is an expertise that Ricardo Defense has developed for use with its military customers. This is now being delivered to NASA in the form of advanced visual data analysis software that allows teams to quickly analyse extremely large data sets in order to isolate potential conflicts, risks, human or system errors, or excessive workload. This enables operating plans to be optimised, including the provision for resilient contingencies. The software also enables the investigation of opportunities to eliminate non value adding activities, thereby minimising cost, complexity, and susceptibility.

The process on which it is based is known as Hierarchical Task Analysis ('HTA'), which enables groups – ranging from a few individuals, up to large multi-organisational engineering teams – to systematically assess essential functions, interdependencies and capabilities to an appropriate level of clarity. This hierarchal analysis approach enables the development of a highly granular incremental understanding of each aspect of the wider business processes, providing a capability for continuous analysis of the probability of success or inherent resilience.

The method enables collaboration between teams and the partners involved, while at the same time protecting sensitive information and intellectual property. A piece-wise analysis of interrelated functions of a complex plan is followed, with each successive level of decomposition providing a budget of constraints for all lower levels to ensure that more detailed activities are compliant with requirements of the higher-level plans. The software automatically identifies conflicts and opportunities for improvement where they arise, so that task expectations and the overarching plan can be developed and optimised with the highest probability of success.

Ricardo Defense's visual data analysis software – supplied to NASA – allows teams to quickly analyse extremely large data sets in order to isolate potential conflicts, risks, human or system errors, or excessive workload



NASA aims to land the first woman, and the next man, on the Moon by 2024 – the agency plans that the Lunar Gateway will orbit the Moon and serve as home base for human and robotic missions to the lunar surface and, ultimately, to Mars

Visualisation is key

Pioneered by Ricardo, important aspects of the software provided to NASA are its extensive data visualisation capabilities and drag-and-drop graphical tools that follow standard Business Process Modelling Notation. These address the challenges of the large, dynamic data sets associated with collaborative planning of sequential and concurrent activities that may each contain many potentially conflicting attributes.

A creative workflow technique enables analysts to follow their own preferred approach. Some, for example, may be detail-oriented and choose to flush out the full set of characteristics for each task in turn. Others may be methodical in dissecting functions in a rigorous decomposition, while still others follow a train-of-thought workflow through the business activities. This creative workflow approach permits multiple users to follow any order through the planning data, exposing crucial insights in a truly collaborative manner.

Graphical tools include a TreeMap, enabling a comparative interrogation of activity complexity, including risks, resources, and errors. Complexity analysis provides insight into the relative weighting of contributing factors that will reduce the probability of success, so that they may be eliminated, reduced, or mitigated. A spider or radar diagram quickly accentuates inconsistencies between the budgeted constraints for an activity and the aggregated constraints from all elaborated subtasks. A quick selection changes the analysis focus to human-machine screen mock-ups for usability and user experience evaluation of the proposed final system. Dependencies, conditions, and time constraints are also readily visible for the activity under analysis.

The software also includes a chromoscopic indicator palate – a unique, Ricardo-developed feature – that facilitates 2D and 3D diagnostic analysis and correction of potential obstacles to mission success. User-specific and team-defined criteria are presented as a unique background or font colour, using a slider to switch between a range of assessment filters. This might be used, for example, to quickly identify all activities that are allocated to a certain team, subcontractor or partner organisation, or to highlight all activities with a risk exceeding a pre-set threshold.

Multi-industry potential

The powerful and highly sophisticated software provided to NASA was originally conceived and developed for the requirements of Ricardo Defense's military customers. Going beyond this initial focus, the software has clear potential to support the planning of a wide range of mission-critical operations across many industrial sectors, from energy systems management, autonomous vehicle development, hazardous materials handling, disaster response planning, and transportation systems optimisation.

In this application, this innovative Ricardo 'big data' analysis technology has been delivered and is in pilot use by the NASA Human Factors engineering teams. It is thus helping the organisation that went to the Moon fifty years ago to plan effectively for a successful return to the lunar surface – and a bold onward programme of human deep-space exploration.

Reducing motion sickness in autonomous vehicles

Ricardo engineers have been working to identify the causes of motion sickness and are creating a software package that aims to minimise the effects of this condition on the passengers of both autonomous and conventional vehicles

Motion sickness – otherwise known as kinetosis – is not a new phenomenon, but in order to provide high levels of customer comfort in new connected and autonomous vehicles ('CAVs'), the issue has now become a clear and pressing problem. Thus far, the key priority in the development of CAVs has been safety, which remains paramount and is a subject of ongoing research and investment by Ricardo. However, motion sickness is a vital issue if consumer acceptance of driverless vehicles is to be achieved: after all, customers will be expecting levels of comfort close to those of a living room environment. Users will want to be able to work, to watch or read from a screen, or hold a conversation during their journey, perhaps while sitting in a swivelled, side- or rear-facing position. These are all known triggers for motion sickness.

As a first step to understanding the problem, the Ricardo team constructed a biomechanical model including parameters known or thought to contribute to kinetosis, a phenomenon which is generally believed to be caused by a disconnect between the motion as experienced by the vestibular system (sense of balance) and what the eyes perceive. Children and teenagers tend to suffer from this more often than adults.

The parameters of the model included vehicle suspension set-up, driver inputs, human physical factors – including weight, height, sex, age, and health – as well as individual considerations such as sensitivity to car sickness and average alcohol consumption. Seating position, seat type and cabin air quality were also considered. A simplified 'crash test dummy' style simulation showed the relative impacts of the vehicle's motion on its occupants, as measured by accelerometers under the tested scenarios, and taking all of the different parameters into account.

This biomechanical model was then correlated and refined against real-life data collected in a small-scale on-road trial, based at Ricardo's Midlands Technical Centre near Leamington Spa in the UK. For this, the participants – who looked intermittently at their mobile phone screens, just as occupants of autonomous vehicles would – were wired up with accelerometers, driven around three different routes, and

Reducing motion sickness in autonomous vehicles

Cars have traditionally been engineered for the requirements of 40 to 60 year-old front seat occupants – Ricardo's research aims to help automakers focus on the well-being of every occupant, including children in the age group most susceptible to kinetosis

observed on in-car video cameras. Importantly, there were male and female participants of different sizes and body shapes, and each showed very different reactions to higher acceleration, especially over speed bumps. In the past, car designers had tended to assume that a 40 to 60 year-old male would be driving, with the comfort of passengers in second and third row seats afforded relatively less attention. Today, engineers take the well-being of every occupant into account.

The resulting Ricardo motion sickness prediction software can be applied from the very early stages of a vehicle's design to provide a more comfortable ride. The model can be set to represent, for example, an eight-year-old passenger – male or female, with or without a known propensity to motion sickness – to see how they will respond to such factors as passive spring damper settings, ride height and roll stiffness, and to uneven road surfaces such as cobblestones. It can also be used to calibrate seating position, seating design, and the overall layout and ergonomics of the cabin.

In a CAV, in-built software can record data as manoeuvres are executed, such as cornering, overtaking and negotiating roundabouts in order to help optimise the vehicle's path to reduce motion sickness. In addition, the ride on that path can then be modified by adjusting parameters such as chassis stiffness and automated driver tuning to further improve occupant well-being. Furthermore, passengers who show signs of motion sickness could be identified by sensors – according to biometric indications such as eye and bodily movements, breathing, sweating, and even facial expression. Sickness could

In an autonomous vehicle, data can be accumulated over a series of manoeuvres or corners to optimise its path – helping to avoid motion sickness for passengers

Ricardo's model and its predictive software are already attracting attention from a wide spectrum of existing vehicle manufacturers

then be avoided not just by adjusting the vehicle's trajectory, but also by providing the right amount of cool air, adjusting the seating position, or lowering window blinds. In conventional vehicles, the software could prompt drivers to take measures to avoid their passengers becoming unwell, in much the same way that gearshift indicators are currently used to prompt a more economical driving style.

In addition, engineers in Ricardo Innovations are developing a specific biodynamic model for those reading while travelling, since this is a particular cause of motion sickness. The position of a book, tablet or phone relative to a passenger's head, and the tilt or angle of the head, are all believed to be significant in this, as well as in the fatigue that comes with continually needing to refocus. A metric covering the 'peripheral flicker' of passing lights and objects – another known trigger of motion sickness – is incorporated, using virtual reality technology as a means of modelling all of the variables.

Ricardo's model and its predictive software are already attracting attention from a wide spectrum of existing vehicle manufacturers, new market entrants in the electric and CAV sectors, and mobility-as-a-service innovators. There is potential too for the technology to be made available to consumers as an app, on subscription. Further opportunities lie in the integration of nausea prediction with 'e-nose' electronics to detect and control scents and odours in vehicle cabins, as the olfactory system (sense of smell) is another aspect highly associated with motion sickness. More immediately, engineers at Ricardo Innovations are focused on increasing and improving the data set on which the algorithms are based, setting up a larger scale research programme involving the participation of local schoolchildren and linking it to their science curriculum. This work is expected to be completed later this year.

This highly innovative Ricardo project means that for both the premium vehicles of today as well as the autonomous CAVs of tomorrow, this new software technology could bring closer the day when motion sickness becomes no more than an unpleasant collective memory.

Smart, urban, and every inch a BMW

Building on more than a decade of co-operation with BMW Motorrad, Ricardo Motorcycle has partnered with the German premium bike manufacturer to develop a new generation of mid-sized scooters that distil the qualities of the highly successful C 650 maxi-scooters into the smaller and more accessible C 400 series.

BMW's C 650 range of luxury maxi-scooters, co-developed with Ricardo, has been a major critical and commercial success, prompting an initiative to extend the premium concept into the heart of the sector. However, the global market for smaller scooters in the 400 cc category is already well served by a number of established manufacturers, and to enter it and succeed is a daunting task – even for a company of BMW's stature and standing. Yet, with the help of Ricardo, that is precisely what BMW Motorrad is aiming to do with its new C 400 scooters.

The challenge, put simply, was to design and manufacture a scooter that could not only achieve a competitive price point in this tightly fought market segment, but also gain best-in-class status for refinement, performance, handling and premium design values. For Ricardo, it was to be the most daunting engineering task yet, in a relationship with the German motorcycle manufacturer that has spanned more than a decade.

Successful partnership

Ricardo first began work on BMW Motorrad products back in 2006 when it took on the upgrade programme for the four-cylinder K 1200 superbike engine to produce a new range of K 1300 motorcycles to be launched in 2009. The programme drew on Ricardo's extensive resources in the UK, in the Czech Republic and in Germany, making for a truly multinational project.

The result was a resounding success and since then the relationship has gone from strength to strength. Ricardo's engineering of the six-cylinder engine for the K 1600 touring bike led to it earning rave reviews in the motorcycle press. The first luxury maxi-scooters, again developed with substantial Ricardo input, arrived in 2012 and continue to be available as the C 650 Sport and C 650 GT – and since 2017 there has also been an electric version, the C Evolution.

The concept for the new C 400 was very similar to that of the larger scooter. Starting from the same base, the team aimed to produce Sport and Touring variants of the scooter; these became the C 400 X and C 400 GT, respectively. Even though the C 400 parallels the thinking of the C 650, the two platforms are completely different and there is no similarity or carry-over between the maxi-scooter and the mid-sized one. Interestingly, the idea of producing a Sport and Touring version from a single platform originally came from Ricardo at the beginning of the maxi-scooter project.

Design cues from the legendary BMW GS

On both the C 400 X and C 400 GT the BMW styling department team introduced some of the design language from the BMW GS off-road touring motorcycle. One of Ricardo's concepts introduced on the bigger scooter was the patented Flexcase system, which first appeared on the C 650. This storage system can drop down to allow a full-face helmet to be securely locked away while the scooter is stationary, and can be used for general storage when being ridden. While the Flexcase system is not new to the market as a whole, the BMW machines are the only scooters available with anything like it.

The main target for the chassis design was to create an extremely rigid engine mounting and to achieve the highest standards of handling feel. The chassis and fairings were designed in collaboration with the team at Ricardo's technical centre in Rimini, Italy. Formerly the nucleus of Italian scooter specialist Exnovo, this business was acquired by Ricardo in 2016 to form the vehicle design and styling house of Ricardo's motorcycle operation.

Engine and transmission design

On the C 400 series a water-cooled, port-injected 350 cc single-cylinder four-valve engine with a single overhead camshaft and roller finger followers provides the power. Output is 34 hp at 7,500 rev/min and torque is 35 Nm at 6,000 rev/min; both the C 400 X and C 400 GT conform to the latest EU4 motorcycle emissions standards.

A scooter differs from a motorcycle in that the engine assembly also doubles as the rear swinging arm and is continually moving when the scooter is being ridden. Ricardo developed a coupling system that provides a very high pivot point for the engine, giving superior riding characteristics similar to that of a motorcycle and widely acknowledged as being best-in-class

Smart, urban, and every inch a BMW

Engine design work started in 2013 with some initial information from BMW, and Ricardo was also involved in the early benchmarking and defining of the specification. This involved reviewing existing competitor products to establish the optimum engine capacity, and BMW's desire for similarity with other BMW Motorrad engines.

Some scooter engines have a balancer shaft for smoothness, yet some that do not still score well on vibration and refinement. BMW looked at two main competitors; one which had the most rapid performance but was not equipped with a balancer shaft, and the other, rated highest for refinement, which did. The objective was to achieve the best of both and become the new benchmark for others to follow, so the decision was taken to include the shaft.

The best position for the shaft was selected to quell vibration and also take into account the desired swingarm pivot point. Intake gas flow was also the subject of considerable simulation work as the cylinder lies almost horizontally, so the air intake has to turn through 180 degrees to exit through the swingarm.

Production transfer to China

Compared with previous projects, Ricardo was given much more responsibility for the design and development, as well as helping the new supplier base to deliver components that met BMW's stringent quality requirements. This alone represented an entire area of work, but of course it went without saying that the manufacture of the final vehicle also had to meet BMW's exacting requirements for quality and refinement.

One of the ways this was managed was to perfect the various assembly techniques in Europe, and then transfer and demonstrate them in China. At that point the processes were adjusted to suit the Chinese workforce.

Excellent outcome

The resulting C 400s are exactly as required by BMW: scooters that are well designed, well specified and with great handling. Like their larger predecessors, the new BMW scooters have proved as popular with the world's motorcycle press as BMW had hoped. All in all, the new C 400s are fresh, compelling products of which both BMW and Ricardo are rightly proud, marking another step in what has proven to be a hugely successful relationship between the two organisations.

Spark of inspiration for natural gas engines

Ricardo Software is collaborating with European research partners, including Volkswagen, to create tools enabling the development of a new form of compact, lean-burn automotive natural gas engine. For use in future hybrid electric powertrains, the new engine offers diesel-like power and performance, significantly reduced CO_2 and extremely low NO_x emissions.

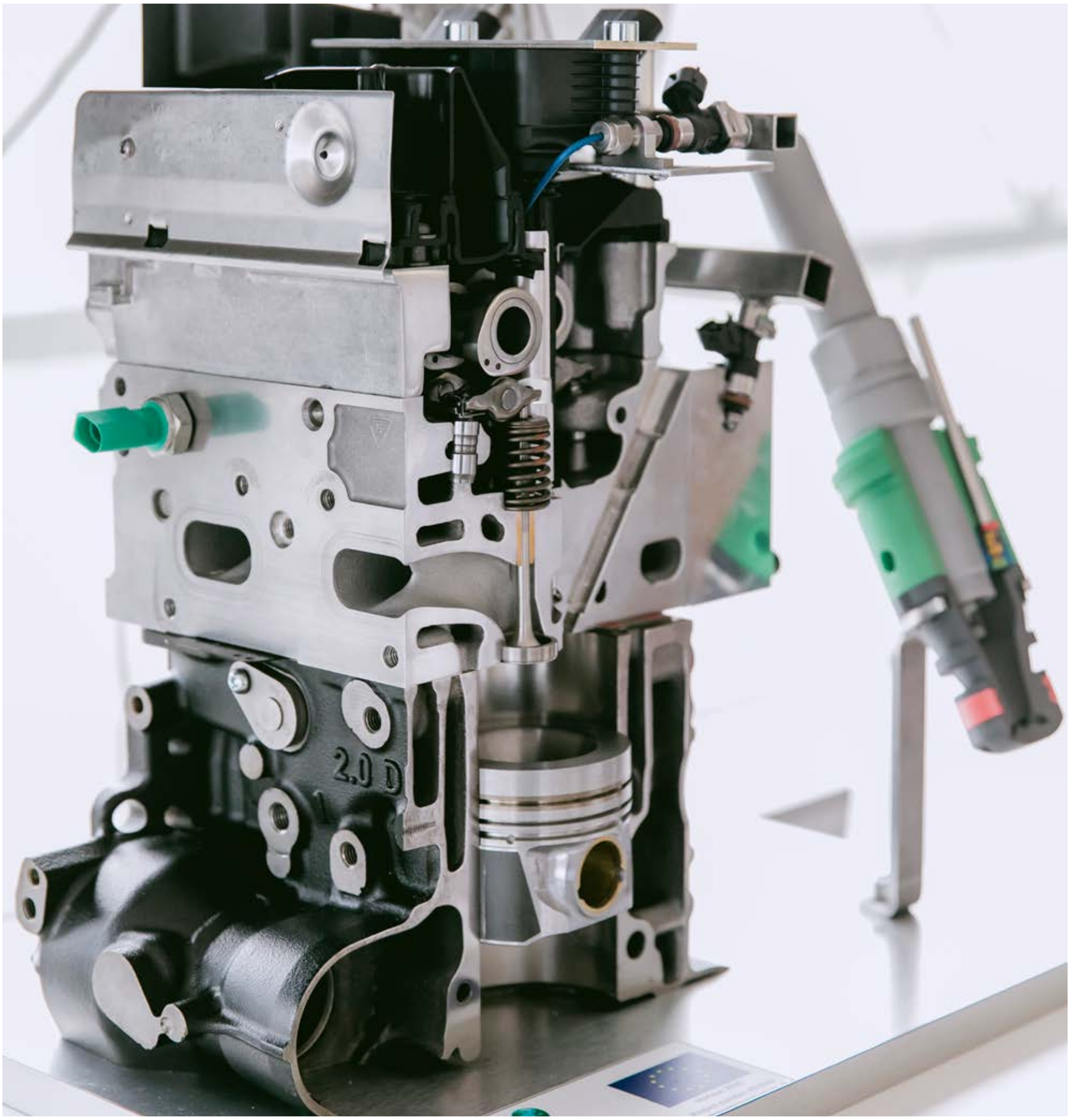
Compressed natural gas ('CNG') has long been recognised as an attractive alternative to gasoline or diesel as a transportation fuel. It is typically less expensive, exists in more abundant reserves, and provides lower overall greenhouse gas ('GHG') emissions when burned. Better still, there are also significant supply chains being developed for biomethane, the renewable equivalent of CNG that can be derived from agricultural operations, domestic refuse disposal, and water treatment works, as well as from power-to-gas energy conversion plants. Coupled with a mature distribution infrastructure for this fuel – including widespread existing filling station availability – it is understandable that CNG continues to attract significant worldwide interest.

CNG engines are at their most efficient in highway-based applications when lean operation is employed through the use of a pre-chamber for combustion initiation, allowing heat losses to be reduced. While this is a popular solution for heavy-duty truck and power generation applications, the need to miniaturise an effective pre-chamber design within the package constraints of an automobile engine – particularly one that has already been downsized for extra efficiency – is a significant challenge. For this reason, most passenger-car CNG applications have been based on conversions of spark-ignited gasoline platforms, relying on port injection and the use of a broadly homogeneous charge. This approach places an effective restriction on the extent of lean operation, thus restricting the fuel-saving and emissions-reducing potential of light-duty automotive CNG operation.

The *GasOn* project

In order to help realise the full potential environmental and emissions benefits of CNG combustion in the passenger car sector, Ricardo Software has been participating in the

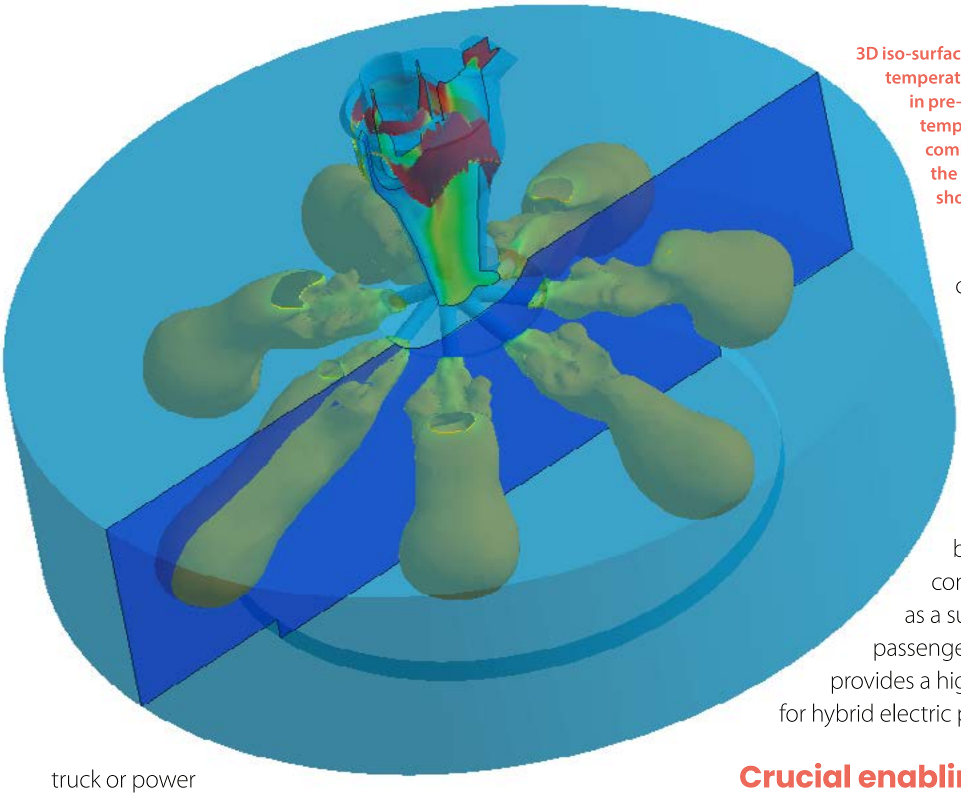
Spark of inspiration for natural gas engines



European Union's multi-partner Horizon 2020 project, *GasOn*. Within this project, Ricardo is partnering with Volkswagen, Empa, ETH Zurich and Poznan University of Technology on the development of a new form of pre-chamber ignition ('PCI') system that is capable of extending the lean limit of automotive CNG operation, while also enabling the adoption of diesel-like compression ratios.

In order to enable PCI systems to be designed effectively within the time and resource constraints that are typical of automotive product development, accurate and fast computational fluid dynamics ('CFD') modelling of the mixture formation and early flame kernel development in the pre-chamber is essential. A review by the project team of the physical models available in commercial CFD codes highlighted a gap in the technology currently available. A particular issue in this respect is that the initial stages of ignition in spark-ignited engines typically occur at timescales, temperatures and geometries which fall outside of the scope of conventional CFD technology.

The main focus of Ricardo's contribution to the research was therefore the development of a new spark model for incorporation into Ricardo's existing VECTIS CFD software package. The model needed to be sufficiently accurate to capture the relevant physics of the highly turbulent and space-constrained environment of a very compact PCI pre-chamber. This engine concept operates in a very different realm to



3D iso-surface shows the flame temperature – stoichiometric in pre-chamber with high temperature and lean cool combustion in the cylinder; the slice through the plot shows equivalence ratio

truck or power generation engines; the physics may be similar, but the pre-chamber and spark plug need to be packaged within the same tiny volume as the injector would be in a diesel engine.

Accurate modelling of the initial stages of spark ignition is thus essential, and to achieve this the Ricardo team developed a Dynamic Discrete Particle Ignition Kernel ('DDPIK') model for incorporation into VECTIS. This advanced model captures the physics of all stages of the spark process – from the point that power is received from the ignition coil, to the transition of the flame kernel supported by the spark discharge, to a fully developed turbulent flame. The final stage is the transfer to the VECTIS turbulent combustion model, which is a well-established tool for the simulation of the combustion of natural gas and other fuels. In addition to the sophisticated spark model, a new and more highly resolved wall quenching model was also created by the VECTIS development team. The avoidance of excessive wall quenching is a crucial consideration in the design of an automotive PCI CNG engine as it is essential for combustion stability that the flame is able to propagate through the pre-chamber nozzles and out into the combustion chamber without being extinguished.

As with any new predictive modelling capability, it was necessary to validate the approach in order to have confidence in its use as a computer-aided engineering ('CAE') tool. This was achieved through a range of approaches from experimental rig testing through to a full prototype engine.

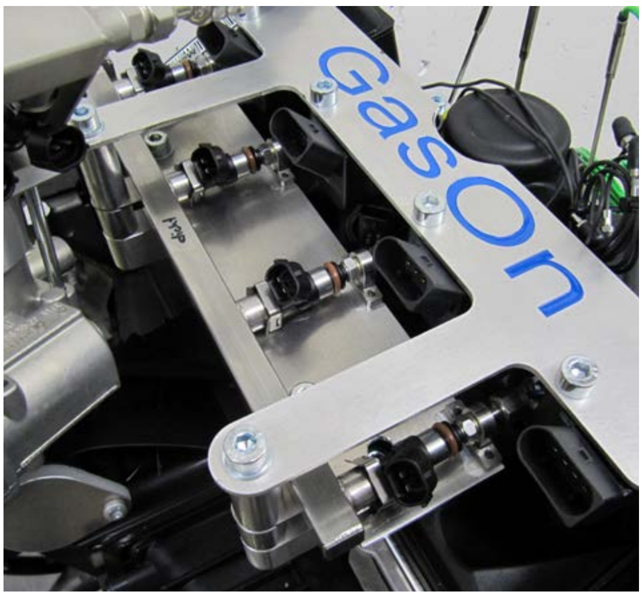
A positive automotive future for pre-chamber gas engines

As a result of the collaboration between Ricardo, Volkswagen and their partners in the *GasOn* project, a new design of engine featuring PCI CNG combustion has been demonstrated as capable of delivering extremely low emissions, diesel-like performance, and impressive fuel efficiency in an automotive-scale package.

CNG is already a very practical and environmentally attractive alternative to conventional liquid fossil fuels in truck and other heavy-duty applications, but the new miniaturised pre-chamber concept is a significant enabler for this fuel as a substitute for diesel and gasoline powered passenger-car engines. In particular, the innovation provides a highly fuel-efficient and flexible powerplant for hybrid electric powertrains.

Crucial enabling CAE software

Importantly from a Ricardo Software perspective, the new DDPIK spark and wall quenching models developed under the *GasOn* project are now amongst the many advanced technical features and capabilities incorporated into the commercial VECTIS package. These physical models are not limited just to PCI CNG applications but can also be used to facilitate the development of other low-emission and high-efficiency engine concepts. VECTIS and the entire suite of Ricardo Software products incorporate these state-of-the-art physical models and simulation capabilities – and for Ricardo's engineering teams as well as external software licensees this makes them a crucial enabling technology for the creation of the next generation of a wide range of ultra-low emissions, low carbon and high fuel efficiency engines.



Corporate governance

Board of Directors
as at 30 June 2019

Patricia Ryan
LLB (Hons)
Group General Counsel and Company Secretary

Patricia Ryan is a qualified solicitor. She joined Ricardo's legal department in 2002 and was appointed Group General Counsel in 2005 and Company Secretary in November 2008. Patricia holds an honours degree in law from the University of Westminster. Patricia achieved the Certificate of Investor Relations from the Investor Relations Society in February 2017.

Ian Gibson
BSc, ACA
Chief Financial Officer

Ian Gibson was appointed Chief Financial Officer on 1 July 2013. A member of the Institute of Chartered Accountants in England and Wales, Ian is a finance professional with more than 30 years of commercial experience. He was previously chief financial officer of Cable & Wireless Worldwide plc, where he spent a total of 17 years in a number of senior financial management positions. Prior to this, Ian spent 12 years at Deloitte where he worked in both the London and Toronto offices.

Bill Spencer
BSc, FCMA, MCT
Non-Executive Director and Chairman of the Audit Committee

Bill was appointed Non-Executive Director on 24 April 2017 and Chairman of the Audit Committee on 8 November 2017. For 15 years until 2010, he was the CFO of Intertek Group plc and has since held audit committee chair roles at UK Mail plc and Exova Group plc. Currently Bill is the interim chairman, senior independent director and audit and risk committee chairman of Northgate plc. He is a Chartered Management Accountant and Corporate Treasurer and has a BSc in Management Sciences from the University of Manchester.

Laurie Bowen
BSc, MBA
Non-Executive Director

Laurie Bowen was appointed Non-Executive Director on 1 July 2015. Laurie has over 30 years of international leadership experience at IBM, British Telecom, Tata Group, Telecom Italia Sparkle and Cable & Wireless Communications. Laurie was appointed non-executive director of Chemring Group plc on 1 August 2019. Laurie has an MBA, a BSc in Electrical Engineering and a BSc in Computer Science from Washington University in St. Louis, Missouri.

Mark Garrett
CEng, FIMechE, FREng
Chief Operating Officer

Mark Garrett joined Ricardo in 1998 and was appointed Chief Operating Officer in 2010. Prior to joining Ricardo, Mark spent 14 years in various powertrain-related roles in the Rover Group, including at the BMW Engineering Centre in Munich. He is a Chartered Engineer and a Fellow of both the Institution of Mechanical Engineers and the Royal Academy of Engineering. Mark was also appointed as non-executive chairman of Secured By Design Limited on 25 November 2016.

Board of Directors

Sir Terry Morgan

CBE, FREng

Non-Executive Director and Chairman

Sir Terry Morgan was appointed Non-Executive Director on 2 January 2014 and Chairman on 29 October 2014. He was previously non-executive chairman of Crossrail Limited, High Speed Two (HS2) Limited, The Manufacturing Technology Centre Limited, and NSARE Limited (the National Skills Academy for Railway Engineering). Sir Terry was also previously a non-executive director of Boxwood Limited and the Department of Energy & Climate Change.

Dave Shemmans

BEng

Chief Executive Officer

Dave Shemmans joined Ricardo in 1999. He was appointed to the Board as Chief Executive Officer Designate in February 2005 and became the Chief Executive Officer on 4 November 2005. Prior to joining Ricardo, he was managing director of a subsidiary of Powergen plc. He has also gained consulting experience in both listed and private companies. He is a graduate of the Harvard Business School. Dave was appointed non-executive director of Sutton and East Surrey Water plc on 1 September 2014.

Peter Gilchrist

CB

Non-Executive Director, Senior Independent Director and Chairman of the Remuneration Committee

Peter Gilchrist was appointed Non-Executive Director on 1 December 2010, Chairman of the Remuneration Committee on 14 November 2013 and Senior Independent Director on 1 July 2015. Peter's military career in the British Army spanned almost four decades and he has previously been Master-General of the Ordnance and an executive director in the Defence Procurement Agency. Peter is currently non-executive chairman of Enterprise Control Systems Limited and is a non-executive director of Orcogen Limited.

Malin Persson

MSc

Non-Executive Director

Malin Persson was appointed Non-Executive Director on 4 January 2016. Malin held a number of senior executive roles during her employment by the Volvo Group between 1995 and 2012. She is an elected member of the Royal Swedish Academy of Engineering Sciences and has an MSc in Industrial Engineering and Management from the Chalmers University of Technology in Gothenburg.

Sir Terry Morgan CBE – Chairman

Corporate governance statement

CHAIRMAN'S OVERVIEW

I am pleased to introduce the Corporate Governance Statement for the year ended 30 June 2019. Governance is an important contributor to the success of Ricardo and the Board is committed to ensuring that appropriate standards of governance are maintained throughout the Group.

This report sets out the ways in which we comply with good corporate governance principles. It describes how the Board and its Committees' work, and also our approach to risk management and internal control.

The Board recognises the importance of considering the Company's responsibilities and duties to both its shareholders and broader stakeholder group, and this has been at the heart of our culture and decision-making process for many years. The Directors' duties under section 172 of the Companies Act 2006, to promote the success of the Company, help to underpin the good governance which is at the centre of what we do, and the Board receives regular briefings and updates on corporate governance at its Board and Committee meetings.

As part of the Board's succession planning, during the year our Nomination Committee conducted searches for two additional Non-Executive Directors following the announcement of Peter Gilchrist's forthcoming retirement. I am delighted to welcome both Russell King and Jack Boyer OBE, who joined the Board on 5 September 2019.

After careful consideration of the responsibilities of the Non-Executive Directors, the Nomination Committee recommended that Russell King be appointed Chairman of the Remuneration Committee, Malin Persson will be appointed Senior Independent Director and following my decision to stand down as Chairman of the Nomination Committee, Laurie Bowen will be appointed to this role. All of these changes will take effect at the close of the AGM in November 2019.

Sir Terry Morgan CBE
Chairman

UK CORPORATE GOVERNANCE CODE

The Board confirms that the Company has complied with the provisions of the UK Corporate Governance Code 2016 ('the Code') throughout the year ended 30 June 2019. The Board has reviewed the requirements of the UK Corporate Governance Code 2018 and will fully report on compliance with that Code in the year ending 30 June 2020.

This report describes how the Company has applied the principles and standards set out in the Code during the year and sets out our activities relating to the main sections of the Code:

A. Leadership;
B. Effectiveness;
C. Accountability;
D. Remuneration; and
E. Relations with shareholders.

The Code and associated guidance are publicly available on the Corporate Governance and Stewardship page of the Financial Reporting Council's website, www.frc.org.uk/directors/corporate-governance-and-stewardship.

SECTION A: LEADERSHIP
A1: The role of Ricardo's Board

Our role is to provide entrepreneurial leadership and we recognise that we are collectively responsible for the long-term success of the Group.

We set strategy and oversee its implementation by the executive team. We assess business opportunities and seek to ensure that appropriate controls are in place to assess and manage risk. We are responsible for reviewing the executive team's performance and we oversee senior-level succession planning within the Group.

We agree the Company's values and standards and ensure that the Company's obligations to its shareholders are met.

We have a formal schedule of matters reserved for our approval which are not delegated to the executive team. These include:

- Strategy;
- Acquisitions and disposals of businesses (above a certain size);
- Annual budgets;
- Capital expenditure (above a certain amount);
- Financial results;
- Overseeing systems of internal control, governance and risk management;
- Dividends; and
- Appointment and removal of Directors and the Company Secretary.

Our Board has Nomination, Audit and Remuneration Committees and we delegate certain responsibilities to them. These Committees comprise our independent Non-Executive Directors (save for the Nomination Committee, which includes the Chief Executive Officer) and all play a key role in supporting the Board. The full schedule of matters reserved for the Board, together with the written terms of reference for each Committee which are reviewed annually, are available on our website, www.ricardo.com or on request from the Company Secretary.

The Board in financial year 2018/19

There are seven scheduled Board meetings per year, and otherwise as required. Details of attendance by Board and Committee members at scheduled meetings are shown in the table below.

If any Director is unable to attend a meeting, they discuss their views and comments with the relevant Chairman in advance, so that their position can be represented at the meeting.

Board meetings focus on driving Ricardo's strategy, developing strong leadership, succession planning, reviewing financial business performance, monitoring risks and protecting the strength of our relationships with clients, employees and other stakeholders. Our agendas allow time for debate and long-term strategic discussion. Our forward planner gives Board members visibility of what is on future agendas for their consideration.

A number of the key matters considered by the Board during the year under review are set out in the table below:

Meeting in FY 2018/19	Significant matters under review
July 2018	• FY 2018/19 budget approval; • Risk management and internal control; and • Matters reserved for the Board and Committees' terms of reference
September 2018	• Preliminary results and Annual Report; • Final dividend; and • Annual General Meeting ('AGM')
November 2018	• Strategy; and • Board objectives
February 2019	• Interim results and Interim Report; • Interim dividend; • Key performance indicators; • Human resources; and • Insurances and health, safety and environment ('HSE')
April 2019	• Treasury
June 2019	• FY 2019/20 divisional budget presentations

In each meeting the Board receives reports from the Chief Executive Officer and the Chief Financial Officer together with reports and updates on health and safety as well as potential acquisition and disposal activities.

During the year under review, Mark Garrett and the Non-Executive Directors visited our operations in China and Hong Kong and had the opportunity to meet with some of our key clients. The visit was very informative and gave the Non-Executive Directors greater insight into our operations in those territories and the expectations of our customers.

Board objectives

The Company is confident that the Board and the wider leadership team have the experience and track record to meet the Company's aims of delivering long-term growth and successfully managing the challenges of an expanding international group.

	Board meetings	Committee meetings		
		Audit	Remuneration	Nomination
Number of scheduled meetings in the year	7	3	4	1
Number attended by each member:				
Dave Shemmans	7	-	-	1
Ian Gibson	7	-	-	-
Mark Garrett	7	-	-	-
Sir Terry Morgan CBE	7	-	4	1
Peter Gilchrist CB	7	3	4	1
Bill Spencer	7	3	4	1
Laurie Bowen	7	3	4	1
Malin Persson	7	3	4	1

The Board sets its specific future objectives at the end of each financial year and these reflect the particular focus of the Company in the year ahead. Progress against each objective is tracked by the Company Secretary and reviewed with the Chairman and the Board at the mid-year point.

Induction

There is a written framework for the full, formal and tailored induction of new directors, which includes site visits, meetings with senior management and advisors, and the provision of corporate documentation to facilitate their understanding of our business, its operations, key markets and risks.

A2: Division of responsibilities

There is a clear division of responsibilities between the Chairman and the Chief Executive Officer, which is documented, clearly understood and approved by the Board.

Sir Terry is primarily responsible for leading the Board and ensuring its effectiveness. Dave Shemmans has direct responsibility for the Group on a day-to-day basis and is accountable to the Board for the financial and operational performance of the Group.

Dave Shemmans chairs the Executive Committee, which meets formally at least three times a year. The Executive Committee is primarily responsible for developing and implementing our corporate strategy and policies.

The responsibilities of the Senior Independent Director are also documented and include the provision of an additional channel of communication between our Chairman and the Non-Executive Directors. The Senior Independent Director also provides an additional point of contact for our shareholders should they have concerns that communication through normal channels has failed to resolve or where these contacts are inappropriate.

A3: The Chairman

Sir Terry sets the Board agenda in consultation with the Chief Executive, other Board members and the Company Secretary. On appointment as Chairman in October 2014, the Board considered Sir Terry to be independent in accordance with the Code provisions.

A4: Non-Executive Directors

Peter Gilchrist has been the Senior Independent Director and Chairman of the Remuneration Committee throughout the year under review. Bill Spencer has been the Chairman of the Audit Committee throughout the year under review. All current Non-Executive Directors held office throughout the year under review, except for Russell King and Jack Boyer OBE who were appointed on 5 September 2019 (see Section B1).

On a number of occasions during the year, the Chairman met the other Non-Executive Directors without the attendance of the Executive Directors. There were several other occasions during the year when discussions between various Directors took place on an informal basis. In addition to formal Board meetings, the Chairman maintains regular contact with the other Directors to discuss specific issues.

SECTION B: EFFECTIVENESS

B1: Board composition and independence

As at 30 June 2019, our Board comprised five Non-Executive Directors and three Executive Directors as follows:

Dave Shemmans	Chief Executive Officer
Ian Gibson	Chief Financial Officer
Mark Garrett	Chief Operating Officer
Sir Terry Morgan CBE	Non-Executive Chairman (independent at time of appointment)
Peter Gilchrist CB	Independent Non-Executive Director, Senior Independent Director and Chairman of the Remuneration Committee
Bill Spencer	Independent Non-Executive Director and Chairman of the Audit Committee
Laurie Bowen	Independent Non-Executive Director
Malin Persson	Independent Non-Executive Director

Biographies of Directors, giving brief details of their experience and other commitments, are set out on pages 76 and 77. The wide-ranging experience and backgrounds of the Non-Executive Directors enable them to debate and constructively challenge management in relation to the strategy and performance of the Group.

On 6 September 2019, the Company announced that Peter Gilchrist intended to step down as Non-Executive Director, Senior Independent Director and Chairman of the Remuneration Committee at the close of the AGM on 14 November 2019. On the same date, the Company announced that Russell King and Jack Boyer OBE had been appointed as Non-Executive Directors to the Board. It is intended that Russell King will be appointed as Chairman of the Remuneration Committee and Malin Persson as Senior Independent Director, at the close of the AGM on 14 November 2019.


Russell King

Russell King is chairman of Hummingbird Resources plc, and senior independent non-executive director and remuneration committee chair of Spectris plc. Russell is due to retire from Spectris plc at the close of its AGM in May 2020. Russell is also a non-executive director of BDO LLP and Interserve plc, which is in administration. Russell will resign from his role at Interserve plc when the administration process has been completed.

Russell was senior independent non-executive director of Aggreko plc for ten years to 2017. Between 2010 and 2013, Russell was a senior advisor to RBC Capital Markets on metals and mining. Prior to this, Russell served as chief strategy officer at Anglo American plc.


Jack Boyer OBE

Jack Boyer is a non-executive director of TT Electronics plc where he is a member of the audit, remuneration and nomination committees. He chairs the board of trustees of the University of Bristol and is a non-executive director of the Henry Royce Institute for Advanced Materials.

Jack holds degrees from Stanford University (BA (Hons)), the London School of Economics (MSc) and INSEAD (MBA). Jack was awarded an OBE in 2015 for services to Science and Engineering.

The Board has concluded that Sir Terry Morgan, Laurie Bowen, Malin Persson, Bill Spencer, Russell King and Jack Boyer OBE are independent in character and judgement.

The Company has procedures in place to ensure that the Board's power to authorise conflicts of interest is operated effectively and that such procedures have been followed during the year under review.

B2: Appointments to the Board

Our Board has continued to discuss matters relating to succession planning and talent management for leadership succession.

Following the year under review, there were two additional appointments to the Board in accordance with our rigorous and transparent procedures, together with a re-assignment of responsibilities amongst the Non-Executive Directors.

Non-Executive Directors are appointed for specified terms of three years, which can be extended by agreement provided that the individual's performance continues to be effective.

More details are described in the Nomination Committee report on page 84.

Diversity

Our Board and its Committees are committed to promoting equality of opportunity for all employees and job applicants, free from all forms of discrimination. Ricardo is an inclusive employer and values diversity of skills, knowledge, background, industry, international experience and gender in its employees and aims to recruit the best person for the role in all its positions across the Group.

Our Nomination Committee appreciates that a diverse range of backgrounds is an important part of succession planning at all levels in the Group. Our Nomination Committee continually monitors tenure profile and is very conscious of the need to continue to promote diversity at Board level and throughout the Group. Upon engagement of external search consultants, our Board requires that full account of all aspects of diversity are considered in preparing candidate lists.

The Board recognises that the appointment of our two additional Non-Executive Directors has diluted female gender diversity. Careful consideration of this impact was undertaken by the Nomination Committee and the Board before appointment and it was determined that in accordance with our aim to recruit the best person for the role, it was appropriate to appoint Russell King and Jack Boyer OBE as Non-Executive Directors. As part of its determination, the Nomination Committee considered that these appointments should be viewed in relation to its overall responsibility for succession planning of the Board.

In addition, the Committee recommended to the Board that Laurie Bowen and Malin Persson should be appointed to the roles of Chair of the Nomination Committee and Senior Independent Director, respectively, to reflect their contributions and status on the Board.

The Board remains committed to promotion of diversity at all levels within the Group and will report on this further in future years.

Details of female representation elsewhere within the Group are set out on page 36.

B3: Commitment

The Chairman and the Non-Executive Directors have provided assurances to the Board that they remain fully committed to their respective roles and can dedicate the necessary amount of time to attend to the Company's affairs.

During the year, Malin Persson reduced her non-executive roles and now holds five other non-executive appointments.

The Board is satisfied that each of the Non-Executive Directors is able to devote sufficient time to the Company and its affairs, to effectively discharge their duties.

Letters of appointment for the Non-Executive Directors are available for inspection by shareholders at each AGM and during normal business hours at the Company's registered office.

Executive Directors must obtain the prior consent of the Board before accepting a non-executive directorship in any other company. Executive Directors may retain the fees from any such directorship. Two Executive Directors, Dave Shemmans and Mark Garrett, held non-executive directorships during the year under review.

B4: Professional development

The Board and its Committees are kept informed through the Company Secretary of corporate governance and relevant regulatory developments as they arise.

In addition, we keep ourselves informed about the Group's activities through a structured programme of presentations from each of the businesses within the Group and from a number of Group functional leaders. During the year under review we received presentations from the Group HR Director and the Group Risk Manager & Head of Internal Audit, together with specific presentations on key projects for the business.

There are regular presentations to the Board from employees of the Group who have been identified by their peers and managers as potential high achievers.

Directors are updated continually on the Group's business with information on monthly financial performance, and by means of additional presentations on matters including insurance, treasury, health and safety, and environmental risk management.

The Audit Committee is routinely briefed on accounting and technical matters by senior management and by the external auditors.

The Remuneration Committee receives updates on remuneration trends and market practices as part of its regularly scheduled business, and during the year under review FIT Remuneration Consultants LLP provided updates on the proposals and reporting requirements for executive remuneration.

Training for Directors is available as required and is provided mainly by way of external courses. A register of the training that individual Directors have undertaken is maintained by the Company Secretary and is reviewed by the Chairman individually with each Director as part of the Board evaluation process.

The Board considers that it is the primary responsibility of each Director to identify the individual training and development needs that he or she requires.

B5: Information and support

The Chairman is responsible for ensuring the Directors receive accurate, timely and clear information, with Board and Committee papers being circulated sufficiently in advance of meetings.

All Directors have access to the advice and services of the Company Secretary and each Director has been informed that, in the furtherance of his or her duties, they are entitled to seek independent professional advice at the expense of the Company. The Company arranges appropriate insurance cover in respect of legal actions against its Directors. In addition, the Company has entered into indemnities with its Directors as described on page 110.

B6: Board evaluation

The Board undertakes a formal review of its performance and that of its Committees each year. The externally facilitated review conducted in the 2016/17 financial year concluded that the Board was strong and effective, with each Director actively contributing to the effectiveness of the Board and the Committees of which he or she was a member during that year.

Following the external review, the Board set itself improvement actions and objectives. In 2017, the Board reviewed the evaluation findings, agreed improvement actions and noted that progress had been made in all areas. The Board also recognised that succession planning is an area that continues to require focus.

Additionally, Ricardo's external auditors and remuneration consultants provide an evaluation of the performance of our Audit and Remuneration Committees, respectively.

The Nomination Committee has recommended, and the Board has decided, to conduct a further external evaluation during the next financial year and this will be reported on in the Annual Report for the year ending 30 June 2020.

B7: Election and re-election

In accordance with the Company's Articles of Association and the Code, all Directors will retire at the AGM in November 2019 and, being eligible, will offer themselves for election or re-election, except for Peter Gilchrist.

The Board recommends that each of the Directors should be elected or re-elected, as appropriate, by the shareholders because each continues to be effective and demonstrates commitment to the role that each of them performs.

SECTION C: ACCOUNTABILITY

This Report provides shareholders with a clear assessment of the Group's position and prospects, supplemented, as required, by other periodic financial and trading statements.

C1: Financial and business reporting

The Statement of Directors' Responsibilities for preparing the Annual Report, the Directors' Remuneration Report and the financial statements in accordance with applicable law and regulations are set out on page 113.

The Group's business model is set out within the Strategic Report on pages 21 and 26.

The Directors' statement relating to going concern and the Viability Statement are set out on pages 128 and 47, respectively.

C2: Risk management and internal control

Each year, the Board undertakes a comprehensive review of the principal risks and uncertainties facing the Group and how those risks may impact the Group's prospects.

Overall responsibility for systems of internal control rests with the Board. The Board's arrangements for the application of risk management and internal control principles are detailed on pages 44 to 46.

C3: Audit Committee and auditors

The Board has delegated oversight of the relationship with the Group's and the Company's external auditors to the Audit Committee. Their work is outlined in the Audit Committee report on pages 85 to 87.

SECTION D: REMUNERATION

Please refer to the Directors' Remuneration Report on pages 88 to 109 for further information, and in particular:

D1: Level and components of remuneration

Please refer to pages 90 to 101.

D2: Procedure

Please refer to pages 102 to 109.

The Non-Executive Directors have never been employees of the Company, nor have they participated in any of the Company's share schemes, pension schemes or bonus arrangements.

The Non-Executive Directors receive no remuneration from the Company other than the Directors' fees disclosed, and the reimbursement of travel expenses. Their fees are determined by the Board as a whole on the recommendation of the Chief Executive Officer.

No Director is involved in deciding their own fees.

SECTION E: RELATIONS WITH SHAREHOLDERS

E1: Shareholder dialogue

The Chief Executive Officer and the Chief Financial Officer regularly meet with institutional shareholders to foster a mutual understanding of objectives, answer their questions and to keep them updated on our performance and plans.

These meetings range from one-to-one discussions to group presentations and investor conference calls following our results announcements. Any presentations provided in these meetings are uploaded to our website and comments are fed back to us.

In addition, the Senior Independent Director and the Chairman of the Audit Committee are available for discussions with major shareholders, if required.

The Chairman also looks to shareholder groups' annual voting guidelines to better understand their policies on governance and voting.

For an independent view, Investec and Liberum, the capital markets advisory firms, provide us with regular reviews of major investors' views on company management and performance. Surveys of shareholder opinion are normally carried out following announcements of results and are circulated to the Board.

As required by the Code, the Board considers that its Non-Executive Directors, including the Senior Independent Director, have a good level of understanding of the issues and concerns of major shareholders.

E2: Ricardo's Annual General Meeting

The Company's Annual General Meeting is an opportunity to meet private investors. It is intended that all Directors of the Company will be available to answer questions at the 2019 AGM.

The Notice of Meeting sets out the resolutions being proposed at the AGM on 14 November 2019 at 10:00am. Shareholders can vote separately on each proposal.

Last year, all resolutions were passed with votes ranging from 83.48% to 99.96%. Shareholders unable to attend the AGM are encouraged to vote in advance of the meeting.

The AGM in November 2018 was attended by all Directors in office at the time of the meeting. The Directors encourage the participation of all shareholders, including private investors, at the AGM and as a matter of policy the level of proxy votes (for, against and vote withheld) lodged on each resolution is declared at the meeting and displayed on the Company's website.

Ricardo's website, www.ricardo.com, contains a wealth of information, including:

- Latest Ricardo news, stock exchange announcements and press releases; and
- Annual reports, interim reports and investor presentations.

The Corporate Governance Statement was approved by the Board of Directors on 11 September 2019 and signed on its behalf by:

Sir Terry Morgan CBE
Chairman

Nomination committee report

Sir Terry Morgan CBE – Chairman of the Nomination Committee

CHAIRMAN'S OVERVIEW

The primary objectives of the Committee are to support the Board in fulfilling its responsibilities to ensure that, firstly, there are formal, rigorous and transparent processes in place for the appointment of new Directors, both to the Board and to senior management positions, and, secondly, that there are effective, deliverable and well thought-through succession and contingency planning processes in place across the Group for all key positions.

A key focus during the year has been the appointment of additional Non-Executive Directors. These appointments were managed in conjunction with recruitment consultants, the Inzito Partnership. Further details of this process are included in the Responsibilities section below. In addition, we have re-assigned responsibilities amongst the Non-Executive Directors for the roles of two of our Committees and the role of Senior Independent Director.

In the forthcoming year we will continue to focus on talent management and succession planning for management below Board level.

Sir Terry Morgan CBE

Chairman of the Nomination Committee

COMPOSITION

During the year under review, the Nomination Committee, which is chaired by Sir Terry Morgan, comprised the independent Non-Executive Directors Peter Gilchrist, Laurie Bowen, Malin Persson and Bill Spencer, together with the Chief Executive Officer, Dave Shemmans. The Committee has one scheduled meeting per year, which is supplemented by ad hoc meetings as necessary, and informal meetings between the Committee members.

The Chairman of the Committee is the Chairman of the Board, Sir Terry Morgan, except when a new Chairman of the Board is being sought, in which case it is the Senior Independent Director.

RESPONSIBILITIES

The Committee:

- Evaluates the balance of skills, knowledge and experience of the Board;
- Monitors the leadership needs and succession planning of the Company;
- Considers the training needs of the executive and non-executive members;
- Regularly reviews the structure, size and composition of the Board; and
- Makes recommendations to the Board for executive and non-executive appointments.

Before such recommendations are made, descriptions of the roles and skills required in fulfilling these roles are prepared for each particular appointment. To attract suitable candidates, appropriate external advice is taken, and interviews conducted by at least two members of the Nomination Committee to ensure a balanced view.

As announced on 6 September 2019, Peter Gilchrist will be retiring from the Board at the close of the AGM in November 2019. After careful consideration, the Nomination Committee recommended the appointments of Russell King and Jack Boyer OBE as Non-Executive Directors.

As a result of Peter's forthcoming departure, the Nomination Committee took the opportunity to review the responsibilities of Non-Executive Directors to the Board and with effect from the close of the AGM, Sir Terry Morgan will step down as Chair of the Nomination Committee and Laurie Bowen will be appointed in his place. Russell King will take on the role of Chairman of the Remuneration Committee and Malin Persson will be appointed Senior Independent Director.

The search for new Non-Executive Directors during the year was managed with the assistance of recruitment consultants, the Inzito Partnership, who have signed up to the voluntary Code of Conduct for executive search firms. The Inzito Partnership provided a shortlist of candidates who were interviewed by Dave Shemmans and Sir Terry Morgan. Laurie Bowen, Bill Spencer and Malin Persson then interviewed shortlisted candidates before it was unanimously agreed to offer Russell King and Jack Boyer OBE the roles. Both new Non-Executive Directors will undertake an extensive induction programme to ensure a rounded understanding of the business and our ambitions. The Inzito Partnership have no other connection with the Company.

When an appointment of a Non-Executive Director is made, a formal letter is sent clearly setting out what is expected regarding time commitment, Committee membership and involvement outside of Board meetings. Chosen candidates are required to disclose to the Board any other significant commitments before appointments can be ratified.

Non-Executive Directors, including the Chairman, are subject to rigorous review when they continue to serve on the Board for any term beyond six years.

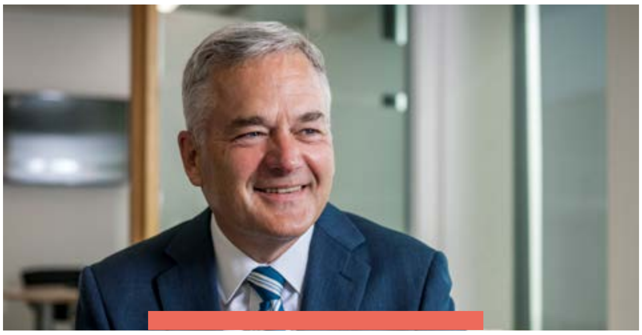
SUCCESSION PLANNING

Name	Date of appointment	Tenure (years)
Dave Shemmans	April 2005	14
Ian Gibson	July 2013	6
Mark Garrett	July 2008	11
Sir Terry Morgan CBE	January 2014	5
Peter Gilchrist CB	December 2010	8
Laurie Bowen	July 2015	4
Malin Persson	January 2016	3
Bill Spencer	April 2017	2
Jack Boyer OBE	September 2019	-
Russell King	September 2019	-

Following completion of Malin Persson's first three years of service, we reviewed her performance and confirmed her continued independence as a Non-Executive Director. Accordingly, the Committee unanimously recommended to the Board the renewal of her appointment. The Board approved this renewal at the appropriate time.

The Committee has spent time looking at succession planning for the Executive Directors as well as for the Board over the medium term. We have also discussed talent management and succession planning for the top-performing senior managers within the business.

Audit committee report



Bill Spencer – Chairman of the Audit Committee

CHAIRMAN'S OVERVIEW

I am pleased to present to you my second report as Chairman of the Audit Committee since joining the Board in 2017.

This year the Committee welcomed KPMG LLP ('KPMG') as the external auditors of the Group, following their appointment at the 2018 Annual General Meeting ('AGM'). I would like to thank Michael Harper and his team for ensuring a smooth transition in this first year of audit.

The Committee has been actively engaged in risk management to provide appropriate challenge and guidance. It has also evaluated the effectiveness of the internal control environment to ensure the integrity of the Group's financial reporting.

I hope that you will find this report useful and I would welcome any comments.

Bill Spencer

Chairman of the Audit Committee

COMPOSITION

I chair the Audit Committee, which during the year under review also comprised the independent Non-Executive Directors, Peter Gilchrist, Laurie Bowen and Malin Persson. The competence and experience of all the members of the Audit Committee is set out on pages 76 and 77.

As the Committee's Chairman and as is considered desirable by the Financial Reporting Council's *Guidance on Audit Committees*, I have recent and relevant financial experience and a professional accountancy qualification.

As set out on page 82, the performance of the Audit Committee has been evaluated and is considered to be effective.

The Committee convenes at three scheduled meetings each year and other ad hoc meetings, as required. Details of attendance at meetings held during the financial year are set out on page 79. The Chairman, Executive Directors, the Group's Head of Internal Audit and the Company's external auditors all have standing invitations to attend all Committee meetings.

RESPONSIBILITIES

The Committee is established by, and is responsible to, the Board. As authorised by the Board, the Committee has obtained all necessary documentation and information it required from officers or employees of the Company, as well as external professional advice. In order to carry out its responsibilities during the year, the Committee undertook the following activities:

- Assessed the Group's risk profile, as well as its appetite for risk on behalf of the Board, and evaluated the effectiveness of the Group's risk management and internal control systems, together with the policies and procedures in relation to ethics, whistleblowing, fraud and bribery prevention;

Group overview
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- Monitored the key risks to the Group in respect of data and cyber security and evaluated the effectiveness of its control environment;
- Considered significant matters arising from internal audits performed during the year, evaluated the effectiveness of the internal audit function, and reviewed the scope and available resource for the internal audit plan in the following year to ensure that it is appropriate;
- Reviewed the scope and planning of the external audit, and evaluated the external auditors' remuneration, effectiveness, independence and objectivity, including consideration of the provision of non-audit services;
- Considered separate reports prepared by the Chief Financial Officer and external auditors on financial reporting and internal control matters as part of the interim review and annual audit processes;
- Assessed the results, on behalf of the Board, of the application of agreed assumptions to re-confirm the continued operational and financial viability of the Group for a period of three years from the date of this report;
- Reviewed the significant financial reporting matters, judgements and estimates, and changes in accounting policies applicable in the preparation of both the Group's interim and year-end consolidated financial statements, which included the transition to IFRS 9 *Financial Instruments* and IFRS 15 *Revenue from Contracts with Customers*, prior to submission to the Board for approval; and
- Evaluated the content of the *Annual Report & Accounts* as a whole and assessed the processes in place to assure its integrity, to advise the Board on whether the information presented is fair, balanced and understandable, and whether it contains the information necessary for shareholders to assess the Group's position and performance, business model and strategy.

Risk management

The Committee has monitored the Group's risk management processes and internal control systems as part of its role to oversee the Group's approach to risk management and with due consideration to the principal risks and uncertainties facing the Group.

During the year, the Committee commissioned the implementation of an independent hotline to reinforce the Group's policies and procedures in relation to ethics, whistleblowing, and the prevention of fraud and bribery.

Significant financial reporting matters

The Committee received and considered reports from the Chief Financial Officer in relation to the critical accounting judgements and key sources of estimation uncertainty. Following discussions with senior management and the external auditors, the Committee approved the disclosure as set out in Note 1(c) to the financial statements on pages 129 and 130.

The Committee considered the following significant financial reporting matters, judgements and estimates in approving the financial statements for the year ended 30 June 2019:

Considerations of the risk and impact of Brexit

Management's perception of the risks associated with Brexit have been considered as part of the Committee's bi-annual risk profile review. The risks, their potential impacts and the mitigating actions taken are set out in the Group's Principal Risks and Uncertainties on page 45.

Although the potential impacts of the perceived risks of Brexit are inherently uncertain and the full range of identifiable risks and possible outcomes cannot be known, severe but plausible downside scenarios to reflect a significant downturn in levels of trading have been factored into the assessment of the Group's continued viability. In addition, the actuarial assumptions used to value its retirement benefit obligations at the year-end reflect the level of economic uncertainty of Brexit as at the reporting date. While no business can fully prepare for, or mitigate against, the potential impacts of Brexit, the Committee is satisfied that appropriate considerations of the perceived risks associated with Brexit have been made, together with reasonable actions taken to mitigate those risks, where possible.

Revenue recognition on fixed price contracts

The Group recognises a significant proportion of its revenue within Technical Consulting from the supply of services under fixed price contracts, which may span a number of reporting periods. The identification and separate accounting of distinct performance obligations within the context of a contract is a critical judgement in recognising revenue.

The percentage of completion basis is applied to estimate the extent to which revenue is recognised and is calculated as actual costs incurred as a proportion of total forecast contract costs to complete. This method places importance on the accuracy of forecast costs to complete, including the outcome of contractual and technical risks, and the extent to which variation requests are recognised for proposed changes in agreed schedule, price or scope.

Contractual and technical risks are assessed at the proposal stage of a project and regularly reviewed throughout its life cycle. A risk rating is determined prior to project approval in accordance with the Group's authority limits, including Board approval, where appropriate.

Projects in progress are assessed on a timely basis against quantitative and qualitative criteria. High risk and high value projects with significant performance challenges are monitored by senior management and reported to the Board.

A summary of the judgements and estimates taken by management to assess the extent to which these contract assets are recoverable was reviewed by the Committee at the February and September meetings and the positions taken are considered to be appropriate.

The Committee is satisfied that the Group's policies and procedures have been followed to reflect management's best estimate of revenue recognised at the reporting date and that no individual judgement or estimate is expected to have a materially different outcome.

Changes in these estimates may impact revenue recognition and the actual outcome may differ to the estimate made at the reporting date. Further detail is set out in Note 1(c) to the financial statements on page 130.

Defined benefit obligation
The Company operates the defined benefit Ricardo Group Pension Fund ('RGPF'). The accounting basis of the RGPF is exposed to changes in the value of its assets and liabilities. The liabilities of the RGPF are also sensitive to changes in actuarial assumptions, on which management takes professional advice. Further detail is set out in the financial statements in Note 1(c) on page 130 and Note 24 on pages 158 to 160.

The Committee is satisfied that the assumptions were reviewed by senior management and that the value of the RGPF's liability reflects the best estimate at the reporting date.

Impact of new accounting standards
Accounting standards IFRS 9 *Financial Instruments* and IFRS 15 *Revenue from Contracts with Customers* became effective for the first time from 1 July 2018. The transitional impact of these standards and the changes required to accounting policies have been reviewed by the Committee and are considered to be appropriate. Further detail is given in Note 38 to the financial statements on pages 170 to 172.

IFRS 16 *Leases* became effective for the Group from 1 July 2019 and will be reported in next year's financial statements. During the year management completed its initial impact assessment of the standard and disclosure has been provided, the expected impact of which has been reviewed by the Committee and is considered to be appropriate. Further detail is set out in Note 1(x) to the financial statements on pages 135 and 136.

Internal audit
The internal audit function is accountable to the Committee, and as set out in the Strategic Report on page 44, is considered to be a key function for effective risk management.

Internal audit is led and resourced by suitably skilled and experienced staff from head office or parts of the Group independent from the business or function being audited. Where relevant, external consultants are used to supplement internal resources when specialist knowledge is required. This approach ensures independence in the process, the identification of relevant findings and recommendations, and the sharing of best practice around the Group.

All internal audit reports submitted during the year were reviewed by the Committee and the status of each remedial action is tracked to completion to ensure appropriate resolution. Meetings are held with the Group's Head of Internal Audit without the presence of management.

The Committee also monitored the effectiveness of the Group's internal audit function including the approval of the scope and resources required to carry out work to be performed.

External audit
As outlined in last year's report, the Committee led an audit tender process that culminated in the appointment of KPMG as the Group's external auditors for the year ended 30 June 2019.

Non-audit services
The Board's policy is that the provision of permissible non-audit services may only be undertaken by KPMG in limited circumstances and is subject to a cumulative cap. In order to remove the possibility of a perceived conflict of auditor objectivity and independence, KPMG has agreed with the Committee that no permissible non-audit services will be provided to Ricardo other than those closely related to the audit of the Group, such as the interim review.

Fees for non-audit services paid to the external auditors during the year were 9% of KPMG's audit fee (FY 2017/18: 29% of PwC's audit fee). The ratio of audit and non-audit fees and the nature of non-audit fees are disclosed in Note 6 to the financial statements on page 140. Given the nature and scale of the services provided by KPMG, the Committee concluded that these services did not cause any concerns regarding KPMG's objectivity or independence.

There are limited instances where Ricardo enters into business relationships or joint arrangements with KPMG to pursue commercial opportunities, either as a prime contractor, sub-contractor or as part of a consortium, with either party or a third party being the project manager. These business relationships are considered acceptable to the extent that they remain immaterial to both organisations and do not compromise the auditors' independence.

Independence and effectiveness
Both the Board and KPMG have safeguards in place to avoid the possibility that the auditors' objectivity and independence could be compromised. The Committee supports KPMG in having the necessary professional scepticism in its role. KPMG also provides the Committee with information about policies and processes for maintaining its independence.

The Committee confirms that during the year it has maintained formal and transparent arrangements for considering corporate reporting, risk management and internal control and for maintaining an appropriate relationship with KPMG.

The quality and effectiveness of KPMG is assessed after the completion of each audit and is based upon their audit findings and responses to questions from the Committee, together with input from senior management and finance personnel. The Committee also met with the audit partner without management being present.

The Committee has concluded that KPMG are operating effectively and recommended to the Board that their re-appointment be proposed to shareholders at the 2019 AGM.

Peter Gilchrist CB – Chairman of the Remuneration Committee

Directors' remuneration report

PART 1 – CHAIRMAN'S OVERVIEW

Dear Shareholder,

Ricardo, led by Dave Shemmans and his leadership team, has remained steadfast to its long-term business strategy in an environment which continues to be uncertain and unpredictable.

Despite the challenges, the international expansion of the Group has continued with the acquisitions of Transport Engineering, which now forms part of Ricardo Rail, and PLC Consulting, which completed after the end of the 2018/19 financial year and now forms part of Ricardo Energy & Environment. Both these businesses establish Ricardo in Australia, which is a key market for us. The order book has increased and the pipeline of business is increasingly diverse. This helps us to manage the difficult operating conditions affecting the European and US Automotive businesses in Technical Consulting. Conversely, performance for the year was particularly good in Energy & Environment and in Performance Products.

Pay outcomes and performance for FY 2018/19

Despite our successes, the Group's adjusted underlying Profit Before Tax ('PBT') for the year, on which 60% of the Executive Directors' total bonus opportunity is based, was £36.7m and below the threshold we set for bonus purposes. Performance against the net debt measure was between threshold and target. The performance assessment for each of the Executive Directors against their personal targets, which are all designed to support Ricardo's long-term sustainable success, ranged from 70% to 90%. The consequence was that the bonuses for the Executive Directors range from 21.5% to 31.4% of salary. Half the value of the bonuses earned must be deferred into shares for three years, with a corresponding award of performance shares, which we call the bonus-linked shares, to be made in October 2019 – see page 89.

The Directors' Remuneration Report explains this in more detail and I hope that our shareholders will find the additional disclosure this year in respect of the personal objectives helpful and that it will be easier to see each individual's performance assessment.

In October 2018, awards under the Long-Term Incentive Plan ('LTIP') made during 2015 and the bonus-linked shares that were granted at the same time, vested at a level of approximately 40% of maximum – see page 95.

Basic salaries for the Executive Directors were increased from 1 January 2019 by between 2.5% and 4% against a Group-wide budget of 3%.

Increasing the focus on profit

We expect to make an award under the LTIP in October 2019. As the Directors' Remuneration Report explains, the Remuneration Committee (the 'Committee') for now is of the view that relative total shareholder return ('TSR') and underlying earnings per share ('EPS') are the right measures. However, we have decided to tilt the balance away from an equal weighting and more towards underlying EPS, which will account for two-thirds of the award and relative TSR for one-third. This is intended to signal the importance of increasing Ricardo's profitability as measured by underlying EPS and to give the management team a stronger incentive to drive profitable performance which should in turn lead to increased shareholder value. The underlying EPS target range for the 2019 awards is described in some detail and equates to a compound annual growth rate of 3.9% to 8.8% over the next three years.

The 2019 share awards will be as per the table on the following page:

Long-term incentive awards to be granted in October 2019

	% of salary		
Role	LTIP shares	Bonus-linked shares	Total award
Chief Executive Officer ('CEO')	100	15.70	115.70
Chief Finance Officer ('CFO')	55	12.75	67.75
Chief Operating Officer ('COO')	55	10.75	65.75

Looking ahead to FY 2019/20

The Committee has been assessing and acting on our responsibilities and duties under the 2018 Corporate Governance Code which applies to Ricardo with effect from 1 July 2019. We have also already started to review Ricardo's Directors' Remuneration Policy. We operate in an international labour market and we need to be able to recruit and retain very talented people with deep technical skills and expertise in an uncertain world: this is essential to Ricardo's ability to create value. We shall be seeking the views of our largest shareholders – and also those who voted against the Directors' Remuneration Report last year – during the course of the next few months. I shall be leaving the Board at the Annual General Meeting in November after nine years and handing over to my successor, Russell King, whose appointment was announced on 6 September 2019. If you have any questions or comments on the Directors' Remuneration Report please do contact me through Patricia Ryan, Ricardo's Group Legal Counsel and Company Secretary, at patricia.ryan@ricardo.com.

Peter Gilchrist CB
Chairman of the Remuneration Committee

SUMMARY OF THE KEY ELEMENTS OF EXECUTIVE DIRECTORS' PAY IN FY 2018/19

	Dave Shemmans (CEO)	Ian Gibson (CFO)	Mark Garrett (COO)
Base salary (effective 01/01/2019)	£515,033	£334,772	£287,950
Other benefits	• Company car allowance: £17,500; • Private fuel; • Private medical insurance; and • Life assurance.	• Company car allowance: £12,000; • Private fuel; • Private medical insurance; and • Life assurance.	• Company car allowance: £12,000; • Private fuel; • Private medical insurance; and • Life assurance.
Pension	21.2%(1) of salary (over Lower Earnings Limit)	20%(1) of salary (over Lower Earnings Limit)	20%(1) of salary (over Lower Earnings Limit)
Annual bonus with deferral of half of any bonus earned	• Maximum opportunity of 125% of salary; • Based on underlying PBT (60%), net debt (15%) and personal targets (25%); and • 50% of any bonus to be deferred into shares for three years.	• Maximum opportunity of 100% of salary; • Based on underlying PBT (60%), net debt (20%) and personal targets (20%); and • 50% of any bonus to be deferred into shares for three years.	• Maximum opportunity of 100% of salary; • Based on underlying PBT (60%), net debt (20%) and personal targets (20%); and • 50% of any bonus to be deferred into shares for three years.
Long-term incentive shares			
(A) Bonus-linked shares(2)	62.5% of salary	50% of salary	50% of salary
(B) Long-term incentive plan(3)	100% of salary	55% of salary	55% of salary
Total maximum annual award of shares (A + B)	162.5% of salary	105% of salary	105% of salary
Share ownership and retention policy	• A minimum of 100% of base salary; • Net value of all vested shares to be retained until holding met; and • Year-end holding is 149% of base salary.	• A minimum of 100% of base salary; • Net value of all vested shares to be retained until holding met; and • Year-end holding is 96% of base salary.	• A minimum of 100% of base salary; • Net value of all vested shares to be retained until holding met; and • Year-end holding is 158% of base salary.

(1) This reflects legacy pension arrangements. Arrangements for any new executive directors will be determined as part of the review of our policy in FY 2019/20.
(2) Maximum award on grant of bonus-linked shares:
a. An award of shares with a value on grant of half the gross equivalent of any annual bonus declared;
b. Vests approximately four years from the start of the bonus performance period if executive still in service and additional performance criteria are met over a three-year period: based on a mix of underlying EPS growth and TSR vs. FTSE Small Cap Index (excluding financial services companies and investment trusts); and
c. Net value of all vested shares to be retained until share ownership requirement met; and
d. The value of the bonus-linked shares granted in 2018 was 27%, 23% and 16% of salary for the CEO, CFO and COO respectively.
(3) Face value of award of long-term incentive plan shares in October 2018:
a. Subject to three-year performance conditions: 50% underlying EPS growth, 50% TSR vs. FTSE Small Cap Index (excluding financial services companies and investment trusts); and
b. Net value of all vested shares to be retained until share ownership requirement met.

PART 2 – ANNUAL REPORT ON REMUNERATION

This section of the report explains how Ricardo's Directors' Remuneration Policy, which was last approved in 2017, has been implemented during the financial year ended 30 June 2019. The paragraphs in this Annual Report on Remuneration that have been audited are indicated.

The Remuneration Committee

During the year under review, the Committee was chaired by Peter Gilchrist. The Committee also comprised Sir Terry Morgan, Laurie Bowen, Malin Persson and Bill Spencer.

The Non-Executive Directors serving on the Committee have no personal financial interest (other than as shareholders) in matters to be decided, no potential conflicts of interest arising from cross-directorships and no day-to-day involvement in running the business. Biographical details of the members of the Committee are shown on pages 76 and 77; details of attendance at the meetings of the Committee during the year ended 30 June 2019 are shown on page 79.

Advisors to the Remuneration Committee

The Committee is supported by the Group HR Director (Timothy Hargreaves), the Group Head of Remuneration and Pensions (Mark Jarvis) and the Company Secretary (Patricia Ryan). The Chief Executive Officer (Dave Shemmans) attends the Committee's meetings by invitation and is consulted in respect of certain proposals. The Chief Financial Officer (Ian Gibson) may be invited to attend meetings to address specific matters. Neither the Chief Executive Officer nor the Chief Financial Officer is consulted or involved in any discussions in respect of their own remuneration.

During the year, FIT Remuneration Consultants and Shepherd and Wedderburn (who have been jointly appointed by the Committee following a competitive tender process) provided independent advice on matters under consideration by the Committee and updates on legislative requirements and market practice.

FIT Remuneration Consultants' fees for this work amounted to £33,239 (calculated based on a mixture of fixed fees and time spent). Shepherd and Wedderburn's fees for advising the Committee amounted to £33,000 (also calculated based on a mixture of fixed fees and time spent). Shepherd and Wedderburn also advises Ricardo on the design, implementation and operation of its various share incentive plans.

FIT Remuneration Consultants are members of the Remuneration Consultants Group and their work is governed by its Code of Conduct. Shepherd and Wedderburn is a law firm and is regulated accordingly. Having carefully considered all relevant factors and using its judgement, the Committee is satisfied that the advice provided on executive remuneration is objective and independent and that no conflict of interest arises.

Voting outcome at AGM

The AGM for the financial year ended 30 June 2018 was held on 15 November 2018. The result of the vote on the remuneration report is set out below. The remuneration policy in operation during the year was approved by shareholders at the 2017 AGM; details of this approval are also set out in the table below.

	Annual Report on Remuneration approved at 2018 AGM		Directors' Remuneration Policy approved at 2017 AGM	
Votes[1]	%	Number	%	Number
For, including discretion	88.0	29,318,064	94.0	35,127,967
Against	12.0	3,995,612	6.0	2,224,774
Total votes cast	100.0	33,313,676	100.0	37,352,741
Withheld[1]		3,693,512		1,851,358

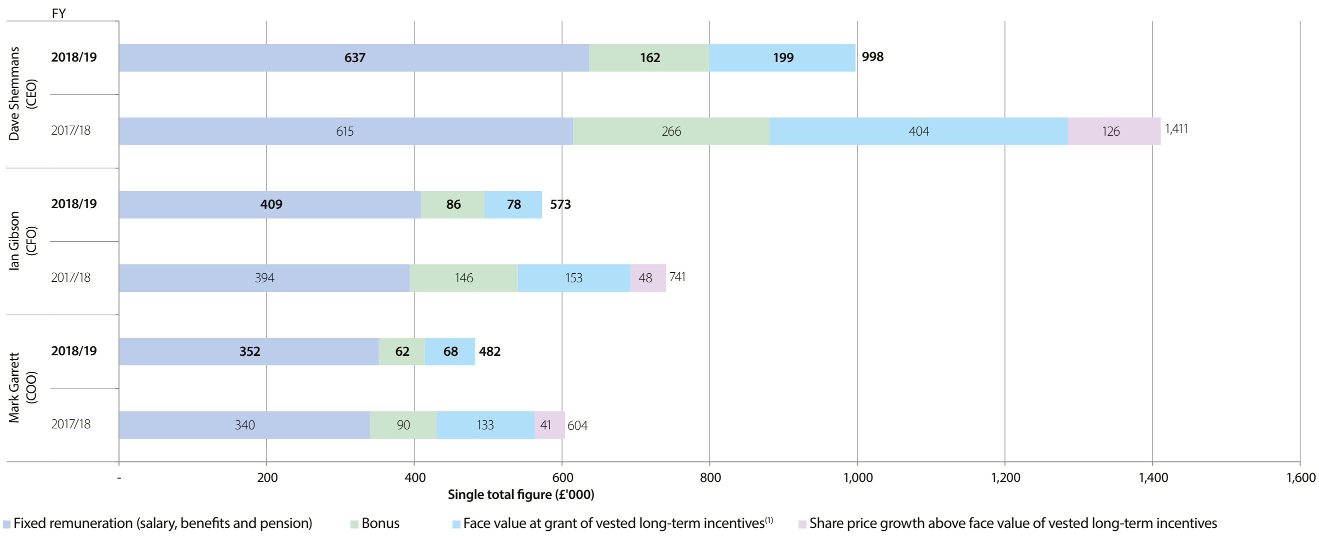
(1) Excludes withheld votes. A vote withheld is not a vote in law and so is not counted for the purposes of the calculation of the proportion of votes 'for' and 'against' a resolution.

Performance at a glance in FY 2018/19 compared with FY 2017/18

Bonus performance outcomes		Long-term incentive performance outcomes in respect of awards vested in 2018	
Underlying PBT (adjusted)	Net debt (adjusted)	3-year underlying EPS growth	3-year TSR growth
£36.7m	**£(26.2)m**	**RPI +8.3% p.a.**	**(2.8)%**
(FY 2018/19)	**(FY 2018/19)**	**(overall 26.9% to 30 June 2018)**	**(below median to October 2018)**
£38.8m	*£(19.1)m*	*RPI +11.0% p.a.*	*31.4%*
(FY 2017/18)	*(FY 2017/18)*	*(overall 42.9% to 30 June 2017)*	*(between median and upper quartile to October 2017)*

The closing mid-market price of the Company's shares on 30 June 2019 was 760.0p per share (2018: 960.0p). The highest closing price during the year was 980.0p per share and the lowest closing price during the year was 572.0p per share.

Pay at a glance in FY 2018/19



(1) As the share price decreased over the life of the long-term incentive awards that vested in FY 2018/19, the face value at grant of these awards has been adjusted accordingly and no share price appreciation is shown.

Single total figure table (audited)

The table below sets out the remuneration received by the Executive Directors and Non-Executive Directors during the year. This should be considered in conjunction with the TSR performance graph on page 92.

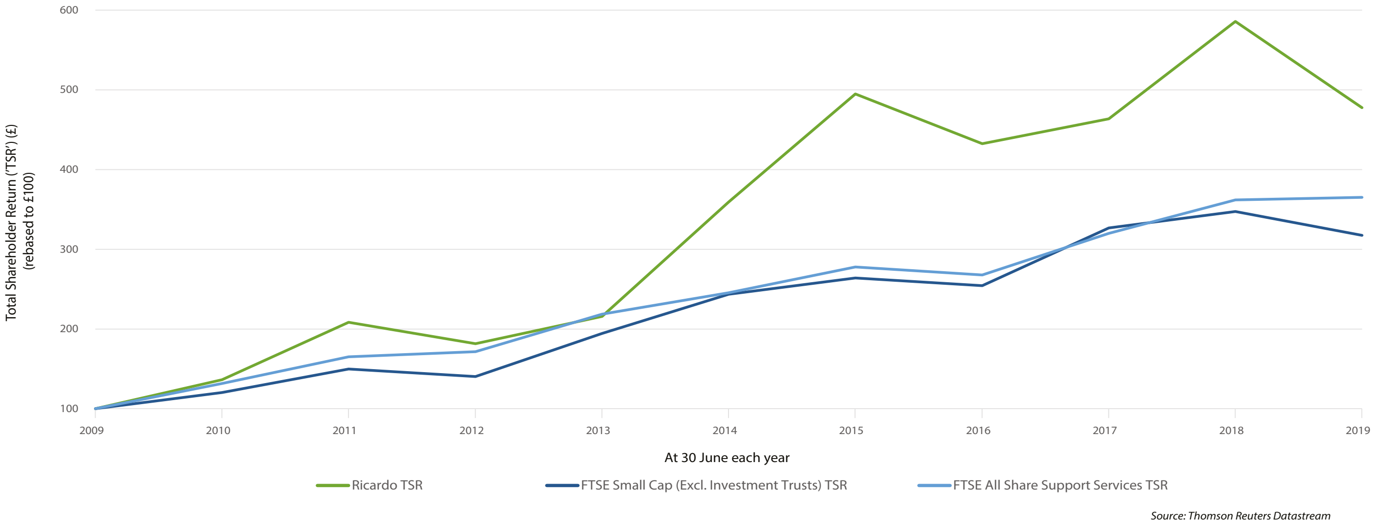
		Fixed remuneration			Short-term variable remuneration			Long-term variable remuneration – 3-year performance periods			
	Financial year	Base salary and fees £’000	Benefits(1) £’000	Pension £’000	Bonus (cash element)(2) £’000	Bonus (deferred element) £’000	Total £’000	Bonus-linked shares(3) £’000	LTIPs(4) £’000	Total £’000	Total £’000
EXECUTIVE DIRECTORS											
Dave Shemmans (CEO)	2018/19	508	23	106	81	81	162	54	145	199	998
	2017/18	490	22	103	133	133	266	103	427	530	1,411
Ian Gibson (CFO)	2018/19	328	17	64	43	43	86	27	51	78	573
	2017/18	316	16	62	73	73	146	50	151	201	741
Mark Garrett (COO)	2018/19	284	12	56	31	31	62	23	45	68	482
	2017/18	276	10	54	45	45	90	42	132	174	604
NON-EXECUTIVE DIRECTORS											
Sir Terry Morgan CBE	2018/19	152	1	-	-	-	-	-	-	-	153
	2017/18	147	-	-	-	-	-	-	-	-	147
Peter Gilchrist CB	2018/19	65	1	-	-	-	-	-	-	-	66
	2017/18	62	2	-	-	-	-	-	-	-	64
Laurie Bowen(5)	2018/19	49	57	-	-	-	-	-	-	-	106
	2017/18	47	47	-	-	-	-	-	-	-	94
Malin Persson	2018/19	49	8	-	-	-	-	-	-	-	57
	2017/18	47	6	-	-	-	-	-	-	-	53
Bill Spencer	2018/19	57	1	-	-	-	-	-	-	-	58
	2017/18	51	1	-	-	-	-	-	-	-	52
Ian Lee(6)	2018/19	-	-	-	-	-	-	-	-	-	-
	2017/18	19	3	-	-	-	-	-	-	-	22
Total	2018/19	1,492	120	226	155	155	310	104	241	345	2,493
	2017/18	1,455	107	219	251	251	502	195	710	905	3,188

(1) Further information on benefits for the Executive Directors can be found on page 93. The benefits for Non-Executive Directors represent reimbursement of expenses incurred (including any associated personal tax charges) while travelling for business and Committee meetings.
(2) Further details of the annual bonus can be found from page 93.
(3) Further details of the bonus-linked share award vestings in the year can be found on page 99.
(4) Further details of the LTIP award vestings in the year can be found on page 98.
(5) Laurie Bowen’s benefits largely consist of travel expenditure to and from the United States.
(6) Ian Lee retired as a Non-Executive Director on 8 November 2017.

Following the year-end, the Committee considered whether there were any circumstances that could or should result in the recovery or withholding of any sums pursuant to the Company’s clawback arrangements. The conclusion reached by the Committee was that it was not aware of any such circumstances.

Pay for performance – TSR performance graph and CEO pay history

TSR from the year ended 30 June 2009 to 30 June 2019



The chart above shows Ricardo's TSR performance for the past ten years against the FTSE Small Cap index (excluding investment trusts). In the Committee's opinion, the FTSE Small Cap index (excluding investment trusts) represents an appropriate index against which the Company should be compared when considering the Company's size. The FTSE All Share Support Services index is also shown for information. The remuneration of the CEO, Dave Shemmans, for the same period is shown in the table below.

Financial year	Single figure of CEO's total remuneration £'000	Annual variable element award rates against maximum opportunity %	Long-term incentive vesting rates against maximum opportunity %
2018/19	998	25	40
2017/18	1,411	43	74
2016/17	1,612	-	100
2015/16	2,291	63	100
2014/15	1,367	59	67
2013/14	760	38	N/A[(1)]
2012/13	1,546	75	77
2011/12	979	58	35
2010/11	1,116	97	46
2009/10	708	19	36

(1) The performance period for awards made in November 2011 ended in October 2014 and so its vesting rate is included in FY 2014/15. The vesting rate is not applicable for FY 2013/14 because the performance period for awards made in October 2010 ended in June 2013 and so the applicable vesting rate is included in FY 2012/13.

CEO remuneration compared to employees

The table below compares the percentage change in the CEO's remuneration and the percentage change in employees' remuneration between FY 2017/18 and FY 2018/19. The percentage change in the CEO's taxable benefits between FY 2017/18 and FY 2018/19 represents a £385 increase as a result of changes in private fuel provision and the taxable value of private medical insurance. The average bonus paid to all employees across the Group decreased year-on-year as did the CEO's bonus. The change in the employees' annual bonus represents the average percentage change in bonuses for employees across the Group as a whole, with individual performance against target varying between divisions.

	CEO %	All employees %
Base salary	3	3
Benefits	2[(1)]	-[(1)]
Annual bonus	(39)	(31)

(1) The year-on-year change for the CEO is explained above and is not the result of any enhancement of the CEO's benefits.

Relative importance of pay spend

The following table sets out the total amounts spent on remuneration for all employees, the dividends declared and other significant distributions to shareholders in FY 2017/18 and FY 2018/19.

	FY 2018/19	FY 2017/18	% change
Total remuneration spend (£m)	**179.9**	175.0	*2.8*
Key management remuneration as a proportion of total remuneration spend(1) (%)	**2.7**	3.1	*(0.4)*
R&D expenditure(2) (£m)	**13.4**	9.5	*41.1*
Distributions to shareholders(3) (£m)	**11.4**	10.9	*4.6*

(1) The key management personnel are the Board of Directors, together with the Managing Directors who have the authority and responsibility for planning, directing and controlling the Group's activities and resources within the market sectors in which the Group operates. Further details on key management remuneration can be found on page 140. This measure was chosen in order to give greater context for the scale of key management remuneration within Ricardo.

(2) Further details on R&D expenditure can be found on pages 19 and 33. This measure was chosen because of the importance to Ricardo's business of developing its R&D portfolio.

(3) The only distributions made by the Company over these years were in the form of dividends.

Detailed breakdown of pay in FY 2018/19

Base salary

Base salaries were reviewed with effect from January 2019. As described in the policy section on page 103, a number of factors are taken into account when salaries are reviewed, principally: market levels of total pay for comparable roles in companies of a similar size, complexity and sector; the individual's experience, scope of responsibilities and performance; and the salary increases for employees across the Group, which on average was 3%. The current salary levels from 1 January 2019 and the increase for each Executive Director are shown in the table below:

Executive Director	Salary from 1 January 2019 (£)	Salary increase (%)
Dave Shemmans (CEO)	515,033	3.0
Ian Gibson (CFO)	334,772	4.0(1)
Mark Garrett (COO)	287,950	2.5

(1) Ian Gibson's salary increase reflected his personal contribution and performance.

Other benefits (audited)

The Company provides other cash benefits and benefits in kind to its Executive Directors. These include a company car or cash alternative, private fuel, private medical insurance, life assurance and permanent health or disability insurance. The car allowance levels remain unchanged and set at £17,500 p.a. for Dave Shemmans and at £12,000 p.a. for Ian Gibson and Mark Garrett.

Non-Executive Directors can recover travel and accommodation expenses for carrying out their duties and do not receive any other benefits. If tax is payable by a Non-Executive Director on expenses received, these may be paid gross of tax.

Pension (audited)

(a) The defined benefit scheme is closed and there are no active members. During the year ended 30 June 2019, the transfer value in respect of the Chief Executive Officer has increased. The transfer value at 30 June 2019 was £640,593, an increase of £15,249 from the prior year. The CEO's Normal Retirement Date ('NRD') is 16 June 2031, at which point he will receive his pension at the date of leaving the fund, increased for the period in deferment until his NRD. If he decides to retire early, he will receive an immediate pension calculated as for retirement at NRD but reduced for early payment.

(b) With respect to defined contribution pension schemes:

	Employer contributions payable in the year £'000	Cash in lieu £'000
Dave Shemmans (CEO)	5	101
Ian Gibson (CFO)	-	64
Mark Garrett (COO)	3	53

Annual performance-related bonus (audited)

For the year ended 30 June 2019, the maximum annual performance-related bonus opportunity was 125% of salary for the Chief Executive Officer and 100% of the salary for the other Executive Directors. To determine the amount of bonus payable for the year, the Committee assessed the level of achievement against the financial measures and targets set in respect of:

- Group underlying profit before tax (60% for each of the Executive Directors);
- Group net debt at year-end (15% for the CEO and 20% for the other Executive Directors); and
- The achievement of specified individual objectives (25% for the CEO and 20% for the other Executive Directors).

The choice of these measures, and their respective weightings for each individual, reflected the Committee's belief that any incentive compensation should be tied both to the overall performance of the Group and to those areas of the business that the relevant individual can directly influence.

The targets set by the Committee take into account several factors such as the business plan, management's expectations and brokers' forecasts.

A sliding scale of targets for each financial measure of the Group was set at the start of the 2018/19 financial year:

Performance achieved	Element payable (%)
Threshold	-
On-target	50
Maximum	100
Between any two points	Straight-line basis

Detailed breakdown of pay in FY 2018/19 (continued)

Annual performance-related bonus (audited) (continued)

The personal objectives of the Executive Directors were different for each individual and were ascribed different weightings. The Committee, supported by the Chairman of the Board in the case of Dave Shemmans, and supported by Dave Shemmans in the case of the other Executive Directors and members of the leadership team, sets the personal objectives at the start of the year. The Committee usually identifies 'strategic areas' which each Executive Director is asked to focus on and seeks to ensure that all personal objectives are specific, measurable and are indirect drivers of financial performance and value creation. They usually set five objectives and weight them in accordance with their relative importance. At the end of the year, based on a formal and qualitative assessment of performance against each objective (at half year and full year), the Committee decides how well each individual has performed overall.

The targets set by the Committee take into account a number of issues shown in the table below but also include an assessment against other strategic and business critical issues which are planned, or occur during the year, but are not declared as they are business sensitive.

	Personal objectives FY 2018/19	Examples of performance outcomes against personal objectives	Overall achievement (%)
Dave Shemmans (CEO)	• The implementation of the sustainable growth strategy through acquisition and to reach a target of 30% recurring revenue; • Development of and focus on Ricardo's strategic relationships; • Maintain turnaround delivery of the US business and meeting targets for profit and order book levels; • Ensure the financial, cultural and technical development of the global Automotive Technical Consulting business; • Development and implementation of management succession planning and increasing diversity; and • Identify and manage opportunities and risks of Brexit.	• Completion of the acquisition of Transport Engineering Pty Ltd and the acquisition of PLC Consulting Pty Ltd; • Increased the recurring revenue base; • Increased emphasis on strategic client engagement; • Growth of Ricardo Defense business; integration of Control Point Corporation and commencement of the ABS programme; • Good progress on the digital agenda and new technology transition in the global Automotive Technical Consulting business; • Internal talent management and succession planning programme; • Improvement in diversity statistics; and • Effective management of the uncertainty and disruption with focus on new Brexit deadline.	78
Ian Gibson (CFO)	• Lead work with divisional finance management to ensure profit and cash delivery and drive process improvements to support forecasting; • Deliver robust audit design so as to be target-driven and compliant; • Continue to improve the simplicity and professionalism of management and corporate reporting; • In support of strong divisional business models, lead regular reviews of pricing, fees and utilisation; and • Progress the finance team development and create career progression and ensure retention and diversity.	• Successful transition of audit partners; • Successful and robust audit completed swiftly; • Comprehensive and simplified reporting to the Board on all finance issues; • Successful management of the acquisitions, managing the due diligence process and integrating finance functions; • Managing progress reviews with divisions robustly; and • Improved management and development of the finance team.	90
Mark Garrett (COO)	• Improve operational efficiency; • Lead technology commercialisation through R&D activity and by raising the profile of technology solutions; • Manage the R&D portfolio in Ricardo Innovations and maximise leverage; and • Support skills development.	• Excellent progress in reducing overspends and poor performing projects; • Improved processes at commencement of projects; • Skilled maximisation of the R&D portfolio and driving pull through. Improved external awareness of the strong technology portfolio; • Strong lead in the digitalisation programme and development of close working with Roke on cyber issues; and • Further work required on driving inter-divisional synergies.	70

Detailed breakdown of pay in FY 2018/19 (continued)

Annual performance-related bonus (audited) (continued)

The following table sets out the financial targets and the performance outcomes in respect of the Executive Directors' bonus scheme for the 2018/19 financial year.

	Weighting (% of maximum opportunity)			Performance required (£m)			Actual performance (£m) (adjusted)[1]			Pay-out (% of maximum opportunity)		
Measure	**CEO**	**CFO**	**COO**	**Threshold**	**On-target**	**Maximum**	**CEO**	**CFO**	**COO**	**CEO**	**CFO**	**COO**
Underlying profit before tax	60	60	60	38.5	40.5	42.5	36.7	36.7	36.7	-	-	-
Year-end net debt	15	20	20	(29.2)	(25.2)	(23.2)	(26.2)	(26.2)	(26.2)	5.6	7.5	7.5
Personal objectives	25	20	20	Achievement of specific targets			78%	90%	70%	19.5	18.0	14.0
							Total pay-out (% of maximum opportunity) = (a)			**25.1**	**25.5**	**21.5**
							Maximum opportunity (% of base salary) = (b)			**125**	**100**	**100**
							Total pay-out (% of base salary) = (a) x (b)			**31.4**	**25.5**	**21.5**

The performance of the Group over the year included a 1% decrease in underlying profit before tax to £37.0m (2018: £37.5m) and a year-end net debt of £(47.4)m (2018: £(26.1)m).

The Group underlying profit before tax of £37.0m was adjusted by £0.3m for acquisition-related expenditure. The adjusted profit performance at £36.7m is below the lower threshold of £38.5m and therefore no bonus is payable in respect of Group underlying profit before tax. The Group net debt of £(47.4)m was adjusted by £21.2m for unbudgeted Transport Engineering net consideration, acquisition-related expenditure, and other exceptional items which were reviewed by the Audit Committee and our external auditors to give an adjusted net debt balance of £(26.2)m. The Group net debt was achieved at a level of 37.5% of maximum. The Committee reviewed the adjustments to both underlying profit before tax and net debt in light of its bonus principles, which take account of materiality and the need for consistency. Finally, the Committee also considered whether the result of the assessment of the specific bonus targets reflected the overall performance of the Group during the year and was satisfied that this was the case.

One half of any bonus paid to an Executive Director is subject to a policy of compulsory deferral into ordinary shares, via the deferred share bonus plan ('DBP'), the release of which is dependent on continued employment for a three-year period from the award date.

Long-term incentive awards vesting during the financial year (audited)

Awards under the LTIP made in October 2015 vested in October 2018 on the basis of underlying EPS and TSR performance over performance periods, the last of which ended in October 2018. The performance conditions applicable to these awards are summarised below:

Relative TSR portion (50%) **Relative TSR performance against the FTSE Small Cap (excl. financial services companies and investment trusts)**	**Vesting level (%)**
Below median	-
Median	25
Upper quartile (or above)	100
Between median and upper quartile	Straight-line basis

Underlying EPS growth portion (50%) **Underlying EPS growth performance**	**Vesting level (%)**
Less than RPI +3% p.a.	-
RPI +3% p.a.	25
RPI +10% p.a.	100
Between RPI +3% and RPI +10% p.a.	Straight-line basis

Over the three-year performance period, Ricardo was ranked below the median of the TSR comparator group, giving a vesting level for this portion of zero. Ricardo's TSR over the period was (2.8)% against a median of 14.0%. The underlying EPS figure for the year resulted from growth of 26.9% in real terms, which represented compound growth of RPI +8.3% p.a. compared to the base year, with the result that the underlying EPS target was achieved to a level of 80.49% of the shares under award and subject to the underlying EPS performance condition. The overall vesting level for this award was 40.25%. The number and value of shares which vested in October 2018 in respect of awards granted to each of the Executive Directors in October 2015 are set out on page 98 of this report.

The Committee was satisfied that there had been a sustained improvement in the overall performance of the Group over the three years in question.

Detailed breakdown of pay in FY 2018/19 (continued)

The Chairman's and the Non-Executive Directors' fees

The Chairman's and the Non-Executive Directors' fees as of 1 January 2019 are as follows:

	£'000
Chairman's fee	155
Non-Executive Directors' fees:	
Basic fee	49
Additional fee for Audit and Remuneration Committee Chairs	9
Additional fee for the Senior Independent Director	8

The above table reflects a 3% increase in the Chairman's fee and a 3% increase in the basic fee for Non-Executive Directors, Committee Chair fee and Senior Independent Director fee, relative to the prior year.

Payments to past directors and in respect of loss of office (audited)

No payments have been made to past directors of the Company or in respect of loss of office in the financial year.

Long-term incentive awards granted during the financial year (audited)

Awards were made to the Executive Directors under the DBP (bonus-linked shares) and LTIP in October 2018. The awards granted to each Executive were as follows:

Deferred Bonus Plan ('DBP')

	Chief Executive Officer David Shemmans	Chief Financial Officer Ian Gibson	Chief Operating Officer Mark Garrett
Type awarded		Performance shares (bonus-linked shares)(1)	
Basis for award		1:1 match for corresponding Deferred Award	
Date of award		25 October 2018	
Number of shares	17,568	9,686	5,922
Share price(2) (£)	7.56	7.56	7.56
Face value of award (£)	132,814	73,226	44,770
Vesting level for achievement of threshold performance (%)	25	25	25
End of performance period		35 days after release of preliminary results announcement for FY 2020/21 (expected to be October 2021)	

(1) As the bonus-linked shares are granted in the form of performance share awards, no 'exercise price' is payable in order to receive any vested shares.
(2) Average of the share prices over the five days up to and including 24 October 2018.

Long-Term Incentive Plan ('LTIP')

	Chief Executive Officer David Shemmans	Chief Financial Officer Ian Gibson	Chief Operating Officer Mark Garrett
Type awarded		Performance shares(1)	
Basis for award (% of base salary)	100	55	55
Date of award		25 October 2018	
Number of shares	66,141	23,418	20,437
Share price(2) (£)	7.56	7.56	7.56
Face value of award (£)	500,026	177,040	154,504
Vesting level for achievement of threshold performance (%)	25	25	25
End of performance period		35 days after release of preliminary results announcement for FY 2020/21 (expected to be October 2021)	

(1) As the LTIP awards are granted in the form of performance share awards, no 'exercise price' is payable in order to receive any vested shares.
(2) Average of the share prices over the five days up to and including 24 October 2018.

Detailed breakdown of pay in FY 2018/19 (continued)

Long-term incentive awards granted during the financial year (audited) (continued)

The vesting of these awards will be based on Ricardo's three-year relative TSR (50%) and underlying EPS growth (50%) performance summarised in the table below. The relative TSR measure was chosen by the Committee to link the remuneration of Executive Directors to the performance experienced by shareholders and further align their interests. The underlying EPS measure was chosen to reward sustained profit growth and align with one of our key performance indicators. In addition, no part of an award will vest unless the Committee is satisfied that the achievement against the TSR and underlying EPS performance conditions is a genuine reflection of the underlying performance of the Group over the performance period.

Relative TSR portion (50%) **Relative TSR performance against the FTSE Small Cap (excl. financial services companies and investment trusts)**	**Vesting level (%)**
Below median	-
Median	25
Upper quartile (or above)	100
Between median and upper quartile	Straight-line basis

Underlying EPS growth portion (50%) **Adjusted underlying EPS for the final year in the performance period (FY 2020/21)**	**Vesting level (%)**
Less than 60p	-
60p	25
Equal to or greater than 69p	100
Between 60p and 69p	Straight-line basis

Performance target setting and those applying to awards outstanding during FY 2018/19

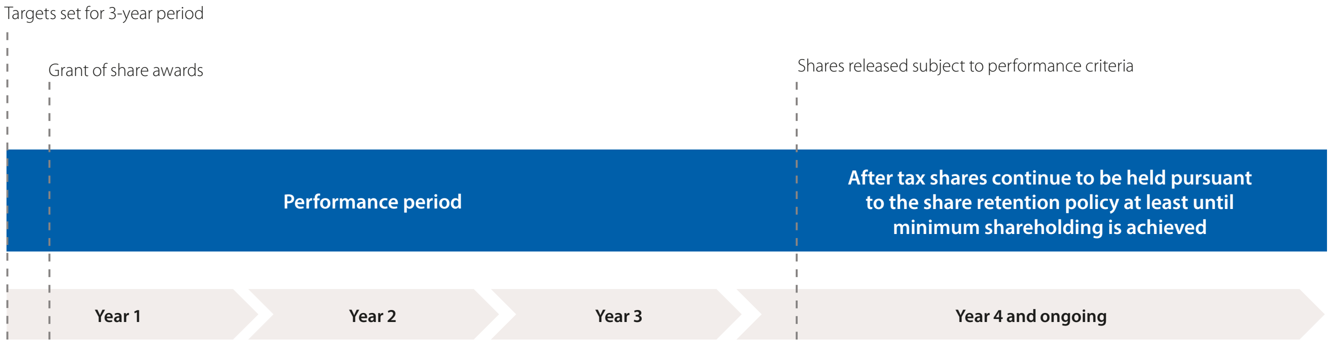
As shown in previous Directors' Remuneration Reports, the Committee has a track record of setting stretching underlying EPS targets which are carefully calibrated to deliver maximum pay-outs only where Ricardo has outperformed the business plan and market expectations. Full vesting of the shares linked to relative TSR performance only occurs where Ricardo's performance is in the upper quartile of the FTSE Small Cap Index (excluding financial services companies and investment trusts).

The performance targets applicable to outstanding LTIP and bonus-linked share awards are as follows: For awards in years ended 30 June 2016 and 2017, maximum vesting of the underlying EPS portion required growth of RPI +10% per annum. The underlying EPS target to achieve threshold vesting for awards granted in the years ended 30 June 2016 and 2017 required performance in excess of RPI +3% per annum. As explained in the Directors' Remuneration Report in the *Annual Report & Accounts 2017*, for awards in the year ended 30 June 2018 the Committee decided to move away from expressing our targets as growth percentages in excess of RPI. The reason for this change was to simplify and enhance the 'line of sight' for participants and also to recognise the international scope of Ricardo. The underlying EPS target to achieve threshold vesting for awards granted in the year ended 30 June 2018 requires underlying EPS of at least 65 pence and maximum vesting requires underlying EPS of at least 75 pence.

The performance condition applicable to the TSR portion of awards has remained constant through this period and is the same as set out above for awards granted in the year ended 30 June 2019. The number and value of shares which were awarded to each of the Executive Directors in the year ended 30 June 2019 are set out in the table on page 96.

Directors' interests in shares provisionally awarded under the LTIP (audited)

The following chart sets out in graphical form how the LTIP operates:



For details of the share retention policy, see page 100.

The Directors' interests in shares provisionally awarded under the LTIP are as follows:

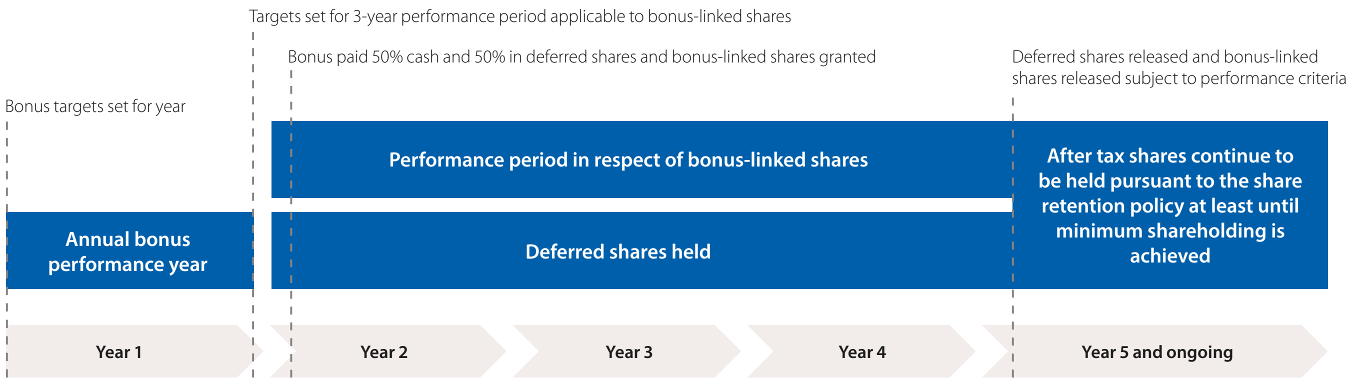
	3-year cycle ending	Award date(1)	Share price at award date in pence	Number of provisional shares					
				At 1 July 2018	Awarded(2)	Lapsed	Vested	At 30 June 2019(3)	Vesting date
Dave Shemmans (CEO)	2018	Oct 15	904.80	50,088	-	(29,931)	(20,157)	-	25/10/2018
	2019	Oct 16	954.30	48,915	-	-	-	48,915	25/10/2019
	2020	Nov 17	830.00	57,927	-	-	-	57,927	08/11/2020
	2021	Oct 18	756.00	-	66,141	-	-	66,141	25/10/2021
Ian Gibson (CFO)	2018	Oct 15	904.80	17,734	-	(10,597)	(7,137)	-	25/10/2018
	2019	Oct 16	954.30	17,318	-	-	-	17,318	25/10/2019
	2020	Nov 17	830.00	20,510	-	-	-	20,510	08/11/2020
	2021	Oct 18	756.00	-	23,418	-	-	23,418	25/10/2021
Mark Garrett (COO)	2018	Oct 15	904.80	15,477	-	(9,249)	(6,228)	-	25/10/2018
	2019	Oct 16	954.30	15,114	-	-	-	15,114	25/10/2019
	2020	Nov 17	830.00	17,899	-	-	-	17,899	08/11/2020
	2021	Oct 18	756.00	-	20,437	-	-	20,437	25/10/2021

(1) Awards made under the rules of the Ricardo plc 2014 Long Term Incentive Plan: performance conditions as outlined on page 97.
(2) The face values at the date of grant of the awards made in October 2018 were £500,026 for Dave Shemmans; £177,040 for Ian Gibson; and £154,504 for Mark Garrett.
(3) The mid-market closing price of the Company's shares on 30 June 2019 was 760.0p per share (2018: 960.0p).

The values of the October 2015 awards vesting were £145,130 for Dave Shemmans; £51,386 for Ian Gibson; and £44,842 for Mark Garrett. The market price per share of the shares that vested on 25 October 2018 was 720.0p.

Directors' interests in shares provisionally awarded under the DBP (audited)

The following chart sets out in graphical form how the DBP operates:



For details of the share retention policy, see page 100.

The Directors' interests in shares provisionally awarded under the DBP are as follows:

	Type of award	Award date	Deferral/ performance period	Share price at award date in pence	Number of provisional shares: At 1 July 2018	Awarded[1]	Dividend shares[2]	Lapsed	Vested	At 30 June 2019[3]
Dave Shemmans (CEO)	Deferred	Oct 15	3 years	904.80	19,685	-	-	-	(19,685)	-
	Bonus-linked shares[4]	Oct 15	3 years	904.80	18,509	-	-	(11,061)	(7,448)	-
	Deferred	Oct 16	3 years	954.30	20,163	-	599	-	-	20,762
	Bonus-linked shares[4]	Oct 16	3 years	954.30	19,336	-	-	-	-	19,336
	Deferred	Oct 18	3 years	756.00	-	17,568	522	-	-	18,090
	Bonus-linked shares[4]	Oct 18	3 years	756.00	-	17,568	-	-	-	17,568
Ian Gibson (CFO)	Deferred	Oct 15	3 years	904.80	10,027	-	-	-	(10,027)	-
	Bonus-linked shares[4]	Oct 15	3 years	904.80	9,431	-	-	(5,636)	(3,795)	-
	Deferred	Oct 16	3 years	954.30	10,014	-	297	-	-	10,311
	Bonus-linked shares[4]	Oct 16	3 years	954.30	9,604	-	-	-	-	9,604
	Deferred	Oct 18	3 years	756.00	-	9,686	288	-	-	9,974
	Bonus-linked shares[4]	Oct 18	3 years	756.00	-	9,686	-	-	-	9,686
Mark Garrett (COO)	Deferred	Oct 15	3 years	904.80	8,452	-	-	-	(8,452)	-
	Bonus-linked shares[4]	Oct 15	3 years	904.80	7,949	-	-	(4,750)	(3,199)	-
	Deferred	Oct 16	3 years	954.30	8,595	-	255	-	-	8,850
	Bonus-linked shares[4]	Oct 16	3 years	954.30	8,244	-	-	-	-	8,244
	Deferred	Oct 18	3 years	756.00	-	5,922	175	-	-	6,097
	Bonus-linked shares[4]	Oct 18	3 years	756.00	-	5,922	-	-	-	5,922

(1) The face values at the date of grant of the awards made in October 2018 were £132,814 for Dave Shemmans; £73,226 for Ian Gibson; and £44,770 for Mark Garrett.
(2) Amounts allocated include shares equivalent to dividends on provisional deferred award shares and vested bonus-linked shares.
(3) The mid-market closing price of the Company's shares on 30 June 2019 was 760.0p (2018: 960.0p).
(4) Bonus-linked shares awarded under the rules of the Ricardo plc 2011 Deferred Bonus Plan: performance conditions as outlined on page 97.

The values of the October 2015 Deferred awards vesting were £151,968 for Dave Shemmans; £77,408 for Ian Gibson; and £65,249 for Mark Garrett. The market price per share of the shares that vested on 19 October 2018 was 772.0p.

The values of the October 2015 Bonus-linked shares vesting were £53,626 for Dave Shemmans; £27,324 for Ian Gibson; and £23,033 for Mark Garrett. The market price per share of the shares that vested on 25 October 2018 was 720.0p.

Directors' shareholdings (audited)

The interests of Directors and their connected persons in ordinary shares as at 30 June 2019, including any shares provisionally awarded under the LTIP and DBP are presented in the table below.

At 11 September 2019, the interests in shares of the Directors who were still in office were unchanged from those at 30 June 2019.

	Shareholding as at 30 June 2019		Not subject to performance conditions	Subject to performance conditions
	No. of shares	% of base salary[1]	Deferred awards[2]	Long-term incentives (Bonus-linked shares and LTIP awards)[2]
EXECUTIVE DIRECTORS				
Dave Shemmans (CEO)	101,085	149	38,852	209,887
Ian Gibson (CFO)	42,363	96	20,285	80,536
Mark Garrett (COO)	59,723	158	14,947	67,616
NON-EXECUTIVE DIRECTORS				
Sir Terry Morgan CBE	15,000	N/A	-	-
Peter Gilchrist CB	4,970	N/A	-	-
Laurie Bowen	6,000	N/A	-	-
Malin Persson	1,500	N/A	-	-
Bill Spencer	8,000	N/A	-	-

(1) For Executive Directors only (i.e. those who are subject to the share retention policy). Percentages calculated by reference to the mid-market closing price of the Company's shares on 30 June 2019 which was 760.0p per shares (2018: 960.0p).
(2) Deferred awards and bonus-linked shares were granted pursuant to the rules of the Ricardo plc 2011 Deferred Bonus Plan and LTIP awards were granted pursuant to the rules of the Ricardo plc 2014 Long-Term Incentive Plan.

Share retention policy

In order to foster greater alignment between our Executive Directors and our shareholders, the Board operates a share retention policy for the Executive Directors with the intention that each Executive Director will own shares in the Company with a value at least equal to one times annual base salary. Unvested awards granted under the Company's employee share schemes do not count towards this target. As at 30 June 2019, Dave Shemmans and Mark Garrett met this shareholding requirement. Ian Gibson has increased his shareholding since last year to 96% of his salary, but this remains below the required minimum. Ian must retain the net value of all vested shares from the LTIP and DBP until the minimum shareholding has been achieved.

Dilution limits

The number of shares that may be issued under all Ricardo employee share plans in any ten-year rolling period will be restricted to 10% of the issued ordinary share capital of the Company and 5% of the issued ordinary share capital of the Company for discretionary employee share plans.

At the end of the year under review, the Company's overall dilution was 4.53%, of which 4.09% related to discretionary employee share plans. The Company operates an employee benefit trust ('EBT') which has principally been used to facilitate the operation of the LTIP and DBP arrangements. Any new shares issued to the trust are, however, included in the dilution limits noted above.

Executive Directors and their Board positions with other companies during FY 2018/19

Executive Directors may, with the prior consent of the Board, hold a non-executive directorship with another company.

On 1 September 2014, the Company's Chief Executive Officer was appointed as a non-executive director of Sutton and East Surrey Water plc. He is permitted to retain the associated fees which, for the year from 1 July 2018 to 30 June 2019 (inclusive), amounted to £35,250.

On 25 November 2016, the Company's Chief Operating Officer was appointed as the non-executive chairman of Secured By Design Limited. He is permitted to retain the associated fees which, for the year from 1 July 2018 to 30 June 2019 (inclusive), amounted to £20,000.

Implementation of Directors' Remuneration Policy in FY 2019/20

The Committee anticipates the implementation of the 2017 Directors' Remuneration Policy in FY 2019/20 to be similar to that of FY 2018/19, although we propose a small change to the weighting of measures in respect of the LTIP and the bonus-linked shares (see page 101).

The Committee will:

- Review base salary levels for the Executive Directors with effect from 1 January 2020;
- Set and review the performance targets for the FY 2019/20 annual bonus and the LTIP awards to be made in 2019 to ensure continued alignment to strategy;
- Make awards under the LTIP; and
- Make awards under the DBP, where necessary.

Implementation of Directors' Remuneration Policy in FY 2019/20 (continued)

The Committee has so far considered the weighting of the performance measures to apply to the awards to be made under the Company's long-term incentive arrangements in FY 2019/20. To provide additional focus on Ricardo's profitable performance, the Committee has determined that instead of an equal weighting:

- one-third of the relevant shares will be subject to the relative TSR measure; and
- the remaining two-thirds of the relevant shares will be subject to the underlying EPS measure.

The Committee has also considered the target range to apply to the underlying EPS portion of these awards. In order to ensure that the target range remains challenging in light of market expectations of the Company's underlying EPS performance to the year ending 30 June 2022, the Committee has determined that:

- No part of the underlying EPS portion of these awards will vest if the Company's underlying EPS for the final year in the performance period is lower than 60.1p;
- 25% of this portion will vest where the final year underlying EPS is 60.1p;
- 100% of this portion will vest where the final year underlying EPS is greater than or equal to 69.1p; and
- Vesting will take place on a straight-line basis between 60.1p and 69.1p.

The target range has been set on the basis of Ricardo's business plan, the long-term strategy and consensus forecasts. Note that the adjusted underlying EPS result for the financial year ended 30 June 2019 was 53.6p and the implied growth rate is a compound annual growth rate of 3.9% at threshold and 8.8% at maximum.

Where the underlying EPS performance period ends before 30 June 2022 (the final year of the performance period), the Committee retains the discretion to amend these targets and the corresponding vesting levels accordingly.

The Committee considered, and will continue to consider, the impact of the introduction of IFRS 15 *Revenue from Contracts with Customers* on 1 July 2018 and IFRS 16 *Leases* on 1 July 2019. It will make any adjustments when assessing the performance outcomes to outstanding long-term incentive awards to ensure that performance measurements are carried out on a like-for-like basis and are fair to both shareholders and plan participants. Note that because of these accounting charges, the underlying EPS target range for the 2019 LTIP awards is not comparable to the underlying EPS range for the 2018 LTIP awards.

The targets applicable to the TSR portion of these awards will be the same as those which applied to awards granted last year.

Threshold performance (for which 25% of this portion will vest) is generally intended to align to the anticipated performance of the relevant market and our competitors. If the maximum performance is achieved, we would expect to have significantly outperformed the relevant market and our competitors.

The Committee believes that TSR and underlying EPS are appropriate measures for the LTIP as they are strongly aligned to shareholder value creation. In particular, the normalised underlying EPS performance targets are considered by the Committee to be suitably stretching and will reward the leadership team only if they perform very well. When calibrating performance targets, the Committee takes into account the economic and market outlook, the business plan and investor expectations at the time of each award.

Finally, during the year the Committee will also review the operation of the 2017 Directors' Remuneration Policy and consider any changes that should be made when shareholder approval is sought for the replacement policy at the 2020 AGM. The Directors' Remuneration Report, comprising the Chairman's Overview in Part 1, the Annual Report on Remuneration in Part 2 and the Directors' Remuneration Policy in Part 3 was approved by the Board on 11 September 2019 and signed on its behalf by:

Peter Gilchrist CB
Chairman of the Remuneration Committee

PART 3 – DIRECTORS' REMUNERATION POLICY
Introduction

This Directors' Remuneration Policy provides an overview of the Company's policy on Directors' pay that is designed to align with and support Ricardo's strategic plan and operates over the three years from the AGM held on 8 November 2017 (the '2017 AGM') until the AGM to be held in 2020. This policy permits the execution of remuneration arrangements that were agreed when the previous policy was in effect. There have been no changes of substance to the text of the policy that was approved at the 2017 AGM. A copy of the originally approved text is in the *Annual Report & Accounts 2017*, which is available on our website at: www.ricardo.com. We have, however, updated the 'remuneration outcomes' chart on page 107 and the page references, for ease of use.

In accordance with the requirements of the Companies Act 2006, the policy contained in this part was subject to a binding vote at the 2017 AGM and took effect immediately upon receipt of such approval from shareholders.

The Remuneration Committee – what we do

The Committee's primary purpose is to make recommendations to the Board on the Group's framework or broad policy for executive remuneration. The Board has also delegated responsibility to the Committee for determining the remuneration, benefits and contractual arrangements of the Chairman and the Executive Directors. No individual is involved in deciding his or her remuneration.

The Committee has written terms of reference, which are available at www.ricardo.com, and its responsibilities include:

- Determining and agreeing with the Board the policy for executive remuneration and monitoring and considering the policy for, and structure of, senior management remuneration taking into account that the ultimate decision-making responsibility for the remuneration of the senior management team (other than the Executive Directors) lies with the Chief Executive Officer;
- Agreeing the terms and conditions of employment for Executive Directors, including their individual annual remuneration and pension arrangements, and reviewing such provisions for senior management;
- Agreeing the measures and targets for any performance-related bonus and share schemes;
- Agreeing the remuneration of the Chairman of the Board;
- Ensuring that, on termination, contractual terms and payments made are fair, both to the Company and the individual, so that failure is not rewarded and the duty to mitigate loss is recognised wherever possible; and
- Agreeing the terms of reference of any remuneration advisors it appoints.

Taking shareholders' views into account

When considering Ricardo's remuneration policy and its implementation, the Committee is always keen to ensure that it takes into account the views and opinions of all the relevant stakeholders in the business. In particular, when preparing its policy for approval at the 2017 AGM, the Committee undertook a programme of engagement with the Company's largest institutional investors and their representative bodies in order to better understand their perspective on our previous pay practices and the proposed policy for 2017-2020. Shareholders were given an early opportunity to raise any questions and in finalising the proposals a number of questions were raised and answered: for example, on the use of the same performance measures in respect of the deferred bonus matching shares and the change in nomenclature to the bonus-linked shares. Both are designed to simplify Ricardo's long-term incentive arrangements.

In the spirit of continuous improvement and in order to ensure that our remuneration policy continues fully to support achievement of business objectives and delivery of value to shareholders, the Committee will continue to review our policy periodically in the context of the changing business environment. Any material future changes to policy will be discussed with shareholders in advance.

Consideration of employment conditions elsewhere in the Company

While Ricardo does not consult directly with employees on the subject of Directors' remuneration, the remuneration packages for each Executive Director and their fixed and variable elements are reviewed annually. This process takes into account a number of factors, including the following:

- Individual and business performance;
- Pay arrangements for similar roles in other companies and consultancy organisations of Ricardo's size, complexity and international reach;
- Risk management; and
- Pay and employment conditions of employees of the Group.

The Committee also looks at the differential between the CEO's pay and Ricardo's average employee earnings over time.

Overview of Ricardo's remuneration policy for 2017-2020

The objective of Ricardo's executive remuneration policy is to support the business strategy and timescales of an international consultancy business by not only rewarding the standard of performance and the outcomes that our shareholders require, but also encouraging share ownership and fostering alignment of interest between the Executive Directors and shareholders. We do this by setting base levels of salary that are competitive, compared with companies of similar size and complexity to Ricardo, and providing other remuneration package elements, namely the short-term annual bonus plan and long-term incentive arrangement, that only pay for performance. Taken together, our two variable pay platforms focus on growing the profitability of the business, its resilience, the achievement of discrete non-financial targets and linking executive outcomes with the shareholder experience both by delivering rewards in the form of Ricardo shares and also by using a relative total shareholder return performance measure over the longer term.

The remuneration policy that was approved by shareholders at the 2017 AGM is:

- Simple and straightforward;
- Well-understood, both internally and externally;
- Competitive but fair; and
- Aligned to performance.

THE STRUCTURE OF OUR DIRECTORS' REMUNERATION PACKAGE – THE POLICY TABLE

Pay element and link to strategy	Maximum	Operation	Framework for assessing performance
Base salary *To provide a core level of remuneration to enable the Company to attract and retain skilled, high-calibre executives to deliver its strategy.*	Base salary increases will not ordinarily be more than 10% p.a. with exceptional increases over the normal maximum limit capped at 25% p.a. However, generally speaking, increases will be in line with salary increases for employees across the Group.	Salary levels are reviewed annually in January each year. Pay is set by considering market levels of total pay for comparable roles in companies of similar size, complexity and sector, as well as each individual Director's experience, scope of responsibilities and performance and the salary increases for employees across the Group. Ricardo places a strong emphasis on internal succession planning. This emphasis may mean that talented individuals are promoted rapidly. In such circumstances, the Committee's policy is to set a relatively low base salary initially and then increase this to a market competitive level for the role over time. This may mean relatively high annual salary increases as the individual gains experience in the new role. We will notify shareholders where this is the case.	None
Other benefits *To provide market-competitive benefits.*	The total value of benefits will not exceed 10% of base salary p.a., save in the case of relocation.	The Company provides other cash benefits and benefits in kind to Executive Directors in line with market practice. These include a company car or cash alternative, private fuel, private medical insurance, life assurance and permanent health and disability insurance. The benefits arrangements are reviewed on an annual basis. The Committee reserves the right to provide further benefits where this is appropriate in the individual's particular circumstances (for example, costs associated with relocation as a result of the Director's role with the Company). Certain other employees are eligible for the same or similar benefits described above depending on their role, seniority and geographical location.	None
Pension *To offer market-competitive retirement benefits.*	For the Chief Executive Officer, the pension contribution is 21.2% of salary over the Lower Earnings Limit due to legacy pension arrangements. For all other Executive Directors, the pension contribution is 20% of salary over the Lower Earnings Limit.	The Company operates a defined contribution scheme, the Ricardo International Pension Scheme ('RIPS'). The policy for Executive Directors (save for the CEO's legacy pension arrangements described opposite) continues to be a pension contribution of 20% of base salary only over the Lower Earnings Limit. Contributions are made up to the adjusted annual allowance limit and the rest is paid as cash in lieu of pension. Executive Directors may only choose to opt out of the RIPS where they are close to or have exceeded the pension lifetime allowance and have applied for fixed protection from HMRC. Under such circumstances, Executive Directors will receive a cash payment in lieu of pension. On death in service, all Executive Directors, subject to the medical requirements of the insurance company, are entitled to a lump sum of four times annual salary at date of death. Early retirement is available with the consent of the Company and the pension scheme trustees if the individual is over 55 or retiring due to ill health. The same policy approach applies to all employees although contribution levels vary by seniority.	None

THE STRUCTURE OF OUR DIRECTORS' REMUNERATION PACKAGE – THE POLICY TABLE (CONTINUED)

Pay element and link to strategy	Maximum	Operation	Framework for assessing performance
Pay for performance: **Annual bonus** *To reward the annual delivery of financial and operational targets.*	Maximum opportunity of 125% of base salary for the CEO and 100% of salary for other Executive Directors.	**Bonuses are awarded by reference to performance against specific targets measured over a single financial year:** One half of any bonus paid to an Executive Director will be paid out shortly after the assessment of the performance targets has been completed. The remainder of the bonus will be compulsorily deferred into ordinary shares, the vesting of which is normally subject to continued employment for a three-year period from the award date. The cash element of the bonus is not payable unless the individual remains in employment at the payment date. The principal purpose of this bonus deferral mechanism is to: • Provide for further alignment of executives' and shareholders' interests; • Provide an additional retention element; and • Encourage Executive Directors to build up a shareholding in accordance with our share retention policy. Dividends and dividend equivalents for each deferral period may also be paid in respect of shares under award to the extent that shares have vested in participants. Bonus arrangements exist for certain other employees throughout the Group on terms that are applicable to their role, seniority and geographical location, although typically at lower levels of maximum opportunity to reflect that a greater proportion of Executive Directors' remuneration is performance-based. **Malus and clawback:** Annual bonuses (including any element deferred into shares) may be subject to malus and clawback provisions if certain events occur in the period of three years from the end of the financial year to which they relate. These events include the Committee becoming aware of: • A material misstatement of the Company's financial results; • An error in the calculation of performance conditions; or • An act committed by the relevant participant that could have resulted in summary dismissal by reason of gross misconduct or which has caused significant reputational damage to the Group. The mechanism through which malus and clawback can be implemented enables the Committee to take various actions including: • Reducing outstanding incentive awards; and • Requiring a cash payment to be made by participants.	The measures and targets applicable to the annual bonus scheme (and the different weightings ascribed to them) are set annually by the Committee in order to ensure they are relevant to participants and take account of the most up-to-date business plan and strategy. A significant majority (at least 50%) of the bonus opportunity will normally be determined by reference to performance against Group KPIs such as: • Underlying profit before tax; and • Year-end net debt. Any remaining part of a Director's bonus will normally be based on the achievement of personal objectives which relate to delivery of the business strategy. Examples include the development and efficient execution of the strategic plan, developing the business in emerging markets, identifying opportunities for inorganic growth and succession planning. A payment scale for different levels of achievement against each performance target is specified by the Committee at the outset of each year – this ranges from zero for below-threshold performance up to 100% for full satisfaction of the relevant target.

THE STRUCTURE OF OUR DIRECTORS' REMUNERATION PACKAGE – THE POLICY TABLE (CONTINUED)

Pay element and link to strategy	Maximum	Operation	Framework for assessing performance
Pay for performance: **Long-term incentives** Bonus-linked shares *To link short-term and long-term performance.* Performance shares under the Long-Term Incentive Plan ('LTIP') and Bonus-linked shares *To focus motivation on the long-term performance of the Group and reward shareholder value creation.* *To encourage share ownership and alignment with shareholders.*	Maximum opportunity in aggregate of 162.5% of salary for the CEO and 105% of salary for other Executive Directors.	**Bonus-linked shares – performance measured over an aggregate four-year period:** Assuming that a satisfactory level of performance is achieved over the financial year in which the annual bonus is assessed (the first year in the four-year aggregate performance period) which results in a bonus being paid, Executive Directors will be granted a bonus-linked share award over further shares (up to a maximum of 1 for 1) in relation to the deferred element of the bonus. Consequently, in a year when there is no annual bonus, no bonus-linked share award will be made thus providing a well-understood and automatic mechanism for reducing the overall quantum of awards in the year where performance targets have not been met in full. Bonus-linked share awards will be granted pursuant to the rules of the Ricardo plc 2011 Deferred Bonus Plan (the 'DBP'), for which shareholder approval was given at the 2011 Annual General Meeting. **LTIP – performance measured over a three-year period:** Performance share awards under the LTIP are made on an annual basis to the Executive Directors and a small group of other senior executives. **Dividends and equivalents:** Dividends and dividend equivalents for each performance period may also be paid in respect of shares under award to the extent that shares have vested in participants. **Malus and clawback:** Long-term incentive awards may be subject to malus and clawback provisions if certain events occur after their grant but before the expiry of the period of two years from the end of the relevant performance period. These events include the Committee becoming aware of: • A material misstatement of the Company's financial results; • An error in the calculation of performance conditions; or • An act committed by the relevant participant that could have resulted in summary dismissal by reason of gross misconduct or which has caused significant reputational damage to the Group. The mechanism through which malus and clawback can be implemented enables the Committee to take various actions including: • Reducing outstanding incentive awards; and • Requiring a cash payment to be made by participants. Finally, where the vesting of a deferred bonus share award is reduced, the vesting of any associated bonus-linked share award will accordingly be reduced.	In addition to the initial performance period to determine whether bonus-linked share awards are made, the vesting of all long-term incentives is subject to both continued employment and the extent to which performance conditions measured over a further specified three-year period are met. The measures and targets applicable to the long-term incentive awards will consist of challenging shareholder return, financial and strategic measures. The particular measures and targets to apply (and the different weightings ascribed to them) will be set annually by the Committee in order to ensure they are relevant to participants, challenging to achieve and take account of the most up-to-date business plan and strategy. The current weightings between the two long-term incentive measures that we use are equal; however our policy is simply for financial and shareholder return targets to make up at least 50% of awards. 25% of each element of an award will vest for achieving the threshold performance target with 100% of the awards being earned for maximum performance (with straight-line vesting between these points). Further details of the performance conditions applicable to awards to be made in FY 2019/20 are set out on pages 100 and 101.

THE STRUCTURE OF OUR DIRECTORS' REMUNERATION PACKAGE – THE POLICY TABLE (CONTINUED)

Pay element and link to strategy	Maximum	Operation	Framework for assessing performance
Chairman and other Non-Executive Directors *Helps recruit and retain high-quality experienced individuals.* *Reflects time commitment and role.*	Company's Articles of Association place a limit on the aggregate annual level of Non-Executive Directors' and Chairman's fees (currently £500,000).	The fees for Non-Executive Directors are set in line with prevailing market conditions and at a level that will attract individuals with the necessary experience and ability to make a significant contribution to the Group's affairs. Non-Executive Directors receive an annual basic fee plus an additional fee for acting as the Chairman of the Audit or Remuneration Committee or the Senior Independent Director. An additional fee may be paid for membership of the Technical Exploitation Board ('TEB'). No Non-Executive Director is currently a member of the TEB. The Chairman of the Board receives an annual fee payable monthly with no additional fees for chairing Board committees. They also receive reimbursement for travel and incidental costs (including any associated personal tax charges) incurred in furtherance of Company business.	None

Notes to the policy table:

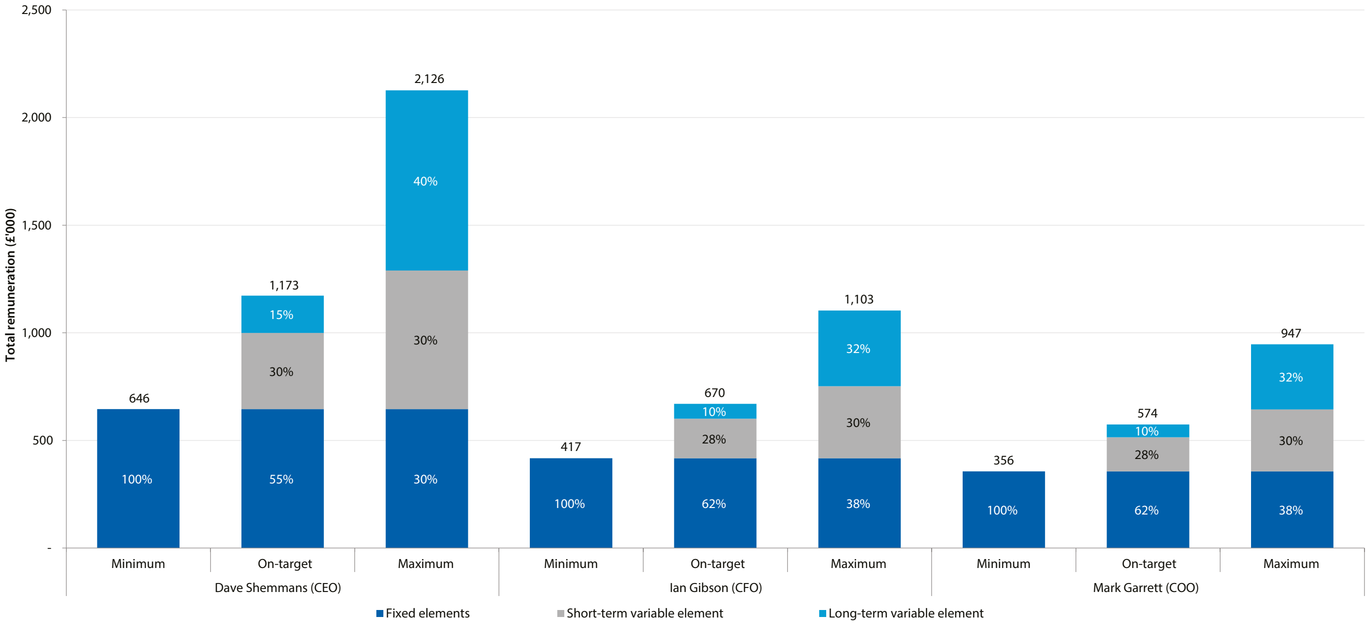
1. The changes to the 2014 Directors' Remuneration Policy consisted of:
   a. ceilings on the elements of our policy which were not capped, namely base salary and benefits;
   b. simplifying our long-term incentive arrangements so that the so-called deferred bonus matching shares became the bonus-linked shares; and
   c. aligning and extending the malus and clawback provisions which already applied to certain of our share plans across the LTIP, the annual cash bonus, deferred bonus shares and bonus-linked shares.
2. Where maximum amounts for elements of remuneration have been set within the Policy, these will operate simply as caps and are not indicative of any aspiration.
3. A description of how the Company intends to implement the Policy set out in the tables on pages 103 to 106 during the financial year to 30 June 2020 is provided on pages 100 and 101.
4. The Committee reserves the right to make any remuneration payments and payments for loss of office (including exercising any discretions available to it in connection with such payments) notwithstanding that they are not in line with the Policy (as set out on pages 103 to 106) where the terms of the payment were agreed:
   i. before 29 October 2014 (the date the Company's first shareholder-approved Directors' Remuneration Policy came into effect);
   ii. before the Policy came into effect, provided that the terms of the payment were consistent with the shareholder-approved Directors' Remuneration Policy in force at the time they were agreed; or
   iii. at a time when the relevant individual was not a Director of the Company and, in the opinion of the Committee, the payment was not in consideration for the individual becoming a Director of the Company. For these purposes payments include the Committee satisfying awards of variable remuneration and, in relation to an award over shares, the terms of the payment are 'agreed' at the time the award is granted.
5. Ricardo's variable pay may have any performance conditions applicable to the relevant element amended or substituted by the Committee if an event occurs which causes the Committee to determine that an amended or substituted performance condition would be more appropriate and not materially less difficult to satisfy. The Committee may make adjustments, where these are fair and reasonable, to measures or targets to take account of, for example, the implications of acquisitions and disposals.
6. Long-term incentive awards can be granted in a variety of forms such as performance shares, nil-cost options or forfeitable shares and the Committee reserves the right to grant long-term incentive awards with the same economic effect but in any of these different contractual forms (including in cash). Long-term incentive awards can also be adjusted in the event of any variation of the Company's share capital or any demerger, delisting, special dividend or other event that may affect the Company's share price.
7. Under the terms of long-term incentive award performance conditions, where any company becomes unsuitable as a member of the comparator group as a result of, for example, a change of control or delisting, the Committee has the discretion to treat that company in such manner as it deems appropriate (including replacing it with another organisation).
8. In the event of a change of control, long-term incentive awards will normally vest at that time, taking into account the extent to which any performance criteria have been met (over the shortened performance periods) and the time elapsed since grant.

All-employee share plans

For its UK employees the Company operates from time to time tax-advantaged share plans. These are a Share Incentive Plan ('SIP') and Save As You Earn share option ('SAYE') scheme and they are intended to encourage share ownership and wider interest in the performance of the Company's shares. Executive Directors are eligible to participate in these arrangements up to the applicable statutory limits. The SIP provides for partnership, matching, free and dividend shares. Equivalent arrangements operate from time to time for non-UK employees.

Illustrative remuneration outcomes at different performance levels

Ricardo's pay policy seeks to ensure the long-term interests of Executive Directors are aligned with those of shareholders. The remuneration packages for each Executive Director and their fixed and variable elements are reviewed annually. The scenario chart below presents remuneration outcomes for the current Policy under minimum, on-target and maximum scenarios.



The target scenario broadly illustrates the remuneration level when budgeted performance is achieved. The disclosures in the chart above reflect the 2018/19 financial year data on the basis of the assumptions set out below:

- Fixed elements comprise current base salary, pension and other benefits. For example, for the CEO, fixed elements comprise base salary of £515,033, pension (pension contribution and cash in lieu) of 21.2% of base salary above the Lower Earnings Limit and benefits equal to those received in the 2018/19 financial year;
- For minimum performance, Executive Directors receive only the fixed elements of pay;
- For target performance, an assumption of 55% of bonus pay-out and threshold vesting (25%) in respect of long-term incentives has been applied;
- For maximum performance, an assumption of maximum bonus pay-out and maximum vesting in respect of long-term incentives has been applied; and
- No share price increase has been assumed and this means that the single total figure in any year may be higher than the maximum shown above.

Recruitment remuneration policy

New Executive Directors will be appointed on remuneration packages with the same structure and elements as described in the policy table starting on page 103. Annual bonus and long-term incentive awards will be within the limits described in the policy table.

For external appointments, although we have no plans to offer additional benefits on recruitment (and indeed did not do so for our last Executive Director appointment) the Committee reserves the right to offer such benefits when it considers this to be in the best interests of the Company and shareholders and in order to protect a new Director against additional costs. The Committee may agree that the Company will meet certain relocation expenses as appropriate.

The Company may make an award to compensate a new recruit for the value of any remuneration relinquished when leaving a former employer. Any such award would reflect the nature, timescales and performance requirements attaching to that relinquished remuneration. The Listing Rules exemption 9.4.2 may be used for the purpose of such an award. Shareholders will be informed of any such payments as soon as practicable following the appointment.

For an internal appointment, any variable pay element awarded in respect of the prior role may be allowed to pay out according to its terms, adjusted as relevant to take into account the appointment. In addition, any other ongoing remuneration obligations existing prior to appointment may continue, and will be disclosed to shareholders at the earliest opportunity.

On the appointment of a new Chairman or Non-Executive Director, fees will be set taking into account the experience and calibre of the individual. Where specific cash or share arrangements are delivered to Non-Executive Directors, these will not include share options or other performance-related elements.

The Board's policy on setting notice periods for Directors is that these should not exceed one year. It recognises, however, that it may be necessary in the case of new executive appointments to offer an initial longer notice period, which would subsequently reduce to one year after the expiry of that period. All future appointments to the Board will comply with this requirement.

Termination remuneration policy

The contractual termination provision is payment in lieu of notice equal to one year's base salary or, if termination is part way through the notice period, the amount of base salary relating to any unexpired notice to the date of termination.(1) There is an obligation on Directors to mitigate any loss which they may suffer if the Company terminates their service contract. The Committee will take such mitigation obligation into account when determining the amount and timing of any compensation payable to any departing Director. No compensation is paid for summary dismissal, save for any statutory entitlements.

The cash element of the bonus is not payable unless the individual remains in employment at the payment date.

Share-based awards will lapse unless the individual concerned leaves for one of a number of specified 'good leaver' reasons which are: death; injury, illness or disability; redundancy; or retirement. The Committee retains the discretion to prevent awards from lapsing depending on the circumstances of the departure and the best interests of the Company.

Awards which do not lapse on cessation of employment may vest on their originally anticipated vesting date (although the Committee retains the discretion to allow vesting at cessation, depending on the circumstances under the applicable rules). These awards will also usually be subject to a time pro-rating reduction to reflect the unexpired portion of the performance or deferral period concerned, although the Committee will retain the discretion to disapply this pro-rating. Awards that are subject to performance conditions will usually only vest to the extent that these conditions are satisfied.

Executive Directors will also be entitled to a payment in respect of any accrued but untaken holiday and statutory entitlements on termination.

In the event that any payment is made in relation to termination for an Executive Director, this will be fully disclosed.

(1) For Ian Gibson the contractual termination provision is payment in lieu of notice equal to one year's base salary, car allowance and pension allowance, to the extent that these benefits are paid in cash.

Executive Directors' service contracts

The current Executive Directors' service contracts contain the key terms shown in the table below:

Provision	Detailed terms
Remuneration	• Salary, pension and benefits; • Company car or cash allowance; • Private health insurance for Director and dependants; • Life assurance and death in-service benefits; • Permanent health and disability insurance; • Director's liability insurance; • 30 days' paid annual leave; • Participation in annual bonus plan, subject to plan rules and at the discretion of the Committee; and • Eligible to participate in share plans, subject to plan rules and at the discretion of the Committee.
Notice period	• 6 months' notice by the Director and 12 months' notice by the Company.
Termination payment	• See separate disclosure on page 108.
Restrictive covenants	• During employment and for 6 months after leaving.(1)

(1) Except for Ian Gibson who is restricted for 12 months after leaving.

The Executive Directors' service contracts are available for inspection, on request, at the Company's registered office.

Non-Executive Directors – fees and letters of appointment

The Committee determines the Chairman's fees. The Chairman and the Executive Directors determine the fees to other Non-Executive Directors. No Director is present for any discussion or decision about his or her own remuneration. The fees are reviewed each January.

The Non-Executive Directors do not participate in any of the Company's share incentive schemes, pension schemes or bonus arrangements, nor do they have service agreements. They are appointed for a period of three years by letter of appointment and are entitled to one month's notice of early termination for which no compensation is payable. The unexpired term of the Non-Executive Directors' appointments as at 30 June 2019 were:

Non-Executive Director	Unexpired term of appointment (months)
Sir Terry Morgan CBE	6
Peter Gilchrist CB	5
Laurie Bowen	24
Malin Persson	30
Bill Spencer	10

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Patricia Ryan – Group General Counsel and Company Secretary

Directors' report

The Directors present their report and the audited consolidated financial statements of Ricardo plc for the year ended 30 June 2019.

Dividends

The Directors recommend the payment of a final ordinary share dividend of 15.28 pence per ordinary share on 21 November 2019 to shareholders who are on the register of members at the close of business on 8 November 2019, which together with the interim dividend paid on 8 April 2019 makes a total of 21.28 pence (FY 2017/18: 20.46 pence) per ordinary share for the year.

Acquisitions and disposals

The acquisition of Transport Engineering Pty Ltd completed on 31 May 2019 and was subsequently renamed Ricardo Rail Australia Pty Ltd, a wholly-owned subsidiary of Ricardo Australia Pty Ltd.

Events after the reporting date

The acquisition of PLC Consulting Pty Ltd completed on 31 July 2019 and was subsequently renamed Ricardo Energy Environment and Planning Pty Ltd, a wholly-owned subsidiary of Ricardo Australia Pty Ltd.

Ricardo Real Estate LLC purchased the freehold title to the campus occupied by its fellow subsidiary, Ricardo, Inc. in Detroit, Michigan on 21 August 2019, on which Ricardo, Inc. was previously committed as a leasehold tenant until October 2037.

Research and Development

The Group continues to devote effort and resources to the research and development of new technologies. Costs of £13.4m have been incurred, of which £7.6m has been capitalised and £5.8m has been charged to the income statement during the year.

Board of Directors

The Directors of the Company as at 30 June 2019 appear on pages 76 and 77. All Directors held office through the financial year under review. Directors appointed after 30 June 2019 but by the date of this report appear on pages 80 and 81.

Directors' interests in shares

Directors' interests in shares and share options are contained on pages 98 to 100 in the Directors' Remuneration Report.

Directors' indemnities

The Company has entered into deeds of indemnity in favour of each of its Directors under which the Company agrees to indemnify each Director against liabilities incurred by that Director in respect of acts or omissions arising in the course of their office or otherwise by virtue of their office.

Where such deeds are for the benefit of Directors, they are qualifying third party indemnity provisions as defined by section 309B of the Companies Act 1985 or section 234 of the Companies Act 2006, as applicable. At the date of this report, these indemnities are therefore in force for the benefit of all the current Directors of the Company.

On 30 June 2014, Ricardo UK Limited and Ricardo-AEA Limited, subsidiaries of the Group, entered into qualifying third-party indemnity provisions as defined by section 234 of the Companies Act 2006 in favour of their Directors, under which each Director is indemnified against liabilities incurred by that Director in respect of acts or omissions arising in the course of their office or otherwise by virtue of their office and such provisions remain in force as at the date of this report.

Employee information

The Company provides employees with various opportunities to obtain information on matters of concern to them and to improve awareness of the financial and economic factors that affect the performance of the Company. These include bi-annual presentations to all members of staff, department and team briefings and meetings with employee representatives that take place throughout the year.

All companies within the Group strive to operate fairly at all times and this includes not permitting discrimination against any employee or applicant for employment on the basis of race, religion or belief, colour, gender, disability, national origin, age, military service, veteran status, sexual orientation or marital status. This includes giving full and fair consideration to suitable applications for employment from disabled persons and making appropriate accommodations so that if existing employees become disabled they can continue to be employed, wherever practicable, in the same job or, if this is not practicable, making every effort to find suitable alternative employment and to provide relevant training.

Change of control provisions

There are a number of agreements that take effect, alter or terminate upon a change of control of the Company following a takeover bid, such as commercial contracts, bank facility agreements, property lease arrangements and employees' share plans. None of these are considered to be significant in terms of their likely impact on the business of the Group as a whole.

Management report

The management report required by the provisions of the Disclosure and Transparency Rules is included within the Strategic Report and has been prepared in consultation with management.

Share capital

As at 30 August 2019, the Company's share capital is divided solely into 53,406,250 ordinary shares of 25 pence each, all of which are fully paid. The ordinary shares are listed on the London Stock Exchange.

All ordinary shares rank equally for all dividends and distributions that may be declared on such shares. At general meetings of the Company, each member who is present (in person, by proxy or by representative) is entitled to one vote on a show of hands and, on a poll, to one vote per share.

With respect to shares held on behalf of participants in the all-employee Share Incentive Plan, the trustees are required to vote as the participants direct them to do so in respect of their plan shares. There are no restrictions on voting rights and no securities carry special voting rights with regard to the control of the Company.

Awards granted under the Company's share plans are satisfied either by shares held in the employee benefit trust or by the issue of new shares when awards vest. The Remuneration Committee monitors the number of awards made under the various share plans and their potential impact on the relevant dilution limits recommended by the Investment Association.

Based on the Company's issued share capital as at 30 June 2019, the overall dilution was 4.53% (i.e. under the 10% limit for all plans in any rolling 10-year period) and 4.09% for discretionary employee share plans (i.e. under the 5% limit for discretionary employee share plans in any rolling 10-year period).

The Company was given authority to purchase up to 15% of its existing ordinary share capital at the 2018 AGM. That authority will expire at the conclusion of the 2019 AGM unless renewed. Accordingly, a special resolution to renew the authority will be proposed at the forthcoming AGM.

The existing authority for Directors to allot ordinary shares will expire at the conclusion of the 2019 AGM unless renewed. Accordingly, an ordinary resolution to renew this authority will be proposed at the forthcoming AGM. In addition, it will be proposed to give the Directors further authority for a period of one year to allot ordinary shares in connection with a rights issue in favour of ordinary shareholders. This is in accordance with guidance issued by the Association of British Insurers. If the Directors were to use further authority in the year following the 2019 AGM, all Directors wishing to remain in office would stand for re-election at the 2020 AGM.

Details of these resolutions are included with the Notice of AGM enclosed with this report.

Resolutions at the Annual General Meeting

The Company's AGM will be held on 14 November 2019. Accompanying this report is the Notice of AGM which sets out the resolutions to be considered and approved at the meeting, together with some explanatory notes. The resolutions cover such routine matters as the renewal of authority to allot shares, to disapply pre-emption rights and to purchase own shares.

Substantial shareholdings

As at 30 August 2019, the Company has been notified of the following material interests in the voting rights of the Company under the provisions of the Disclosure and Transparency Rules.

Shareholders	Number of shares	% of issued share capital
Aberdeen Standard Investments	4,309,020	8.07
Aviva Investors	3,786,864	7.09
Canaccord Genuity Wealth Management	3,711,500	6.95
Invesco Asset Management	2,898,759	5.43
Royal London Asset Management	2,584,978	4.84
NN Investment Partners	2,136,794	4.00
Baillie Gifford	2,107,564	3.95
Impax Asset Management	2,051,194	3.84
Columbia Threadneedle Investments	1,947,162	3.65
M&G Investment Management	1,623,493	3.04

Donations

During the year the Group made various charitable donations which are summarised in the Corporate Responsibility and Sustainability Report on page 43. The Group made no political donations during the year ended 30 June 2019.

Independent auditors

Following a tender process for external audit services and shareholder approval at the 2018 AGM, KPMG LLP were appointed as independent auditors of the Group and Company for the year ended 30 June 2019.

A resolution to re-appoint KPMG LLP as independent auditors of the Group and Company will be proposed at the 2019 AGM.

Going concern

Having assessed the principal risks and the other matters discussed in connection with the Viability Statement on page 47, the Directors considered it appropriate to adopt the going concern basis of accounting in preparing the financial statements.

Branches outside the UK

The Company has no overseas branches outside the UK. A number of the Group's subsidiaries have overseas branches outside the UK, which are disclosed in their local statutory financial statements, where required.

Additional information

Certain information that is required to be included in the Directors' Report can be found elsewhere in this document as referred to below, each of which is incorporated into the Directors' Report by cross-reference:

- An indication of the likely future developments in the Group's business can found in the Strategic Report on pages 11, 15, 25 and 27;
- Information on greenhouse gas emissions can be found on pages 40 to 42;
- The Group's statement on corporate governance can be found in the Corporate Governance Statement on pages 78 to 83; and
- The Group's financial risk management objectives and policies in relation to its use of financial instruments and its exposure to capital, liquidity, credit and market risk, to the extent they are material, are set out in Note 23 to the financial statements on pages 154 to 158.

The Directors' Report was approved by order of the Board on 11 September 2019 and signed on its behalf by:

Patricia Ryan

Patricia Ryan
Group General Counsel and Company Secretary

Statement of Directors' responsibilities

in respect of the Annual Report and the financial statements

The Directors are responsible for preparing the Annual Report and the Group and Parent Company financial statements in accordance with applicable law and regulations.

Company law requires the Directors to prepare Group and Parent Company financial statements for each financial year. Under that law they are required to prepare the Group financial statements in accordance with International Financial Reporting Standards ('IFRS') as adopted by the European Union ('EU') and applicable law, and have elected to prepare the Parent Company financial statements on the same basis.

Under 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 Parent Company and of their profit or loss for that period. In preparing each of the Group and Parent Company financial statements, the Directors are required to:

- Select suitable accounting policies and then apply them consistently;
- Make judgements and estimates that are reasonable, relevant and reliable;
- State whether they have been prepared in accordance with IFRS as adopted by the EU;
- Assess the Group and Parent Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern; and
- Use the going concern basis of accounting unless they either intend to liquidate the Group or the Parent Company 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 Parent Company's transactions and disclose with reasonable accuracy at any time the financial position of the Parent Company and enable them to ensure that its financial statements comply with the Companies Act 2006. They are responsible for such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error, and have general responsibility for taking such steps as are reasonably open to them to safeguard the assets of the Group and to prevent and detect fraud and other irregularities.

Under applicable law and regulations, the Directors are also responsible for preparing a Strategic Report, Directors' Report, Directors' Remuneration Report and Corporate Governance Statement that complies with that law and those regulations.

The Directors are responsible for the maintenance and integrity of the corporate and financial information included on the Company's website. Legislation in the UK governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

Responsibility statement of the Directors in respect of the Annual Report

We confirm that to the best of our knowledge:

- The financial statements, prepared in accordance with IFRS as adopted by the EU, give a true and fair view of the assets, liabilities, financial position and profit or loss of the Parent Company and the undertakings included in the consolidation taken as a whole; and
- The Strategic Report includes a fair review of the development and performance of the business and the position of the issuer and the undertakings included in the consolidation taken as a whole, together with a description of the principal risks and uncertainties that they face.

We consider the Annual Report and financial statements, taken as a whole, is fair, balanced and understandable and provides the information necessary for shareholders to assess the Group's position and performance, business model and strategy.

The Statement of Directors' Responsibilities was approved by the Board of Directors on 11 September 2019 and signed on its behalf by:

Dave Shemmans
Chief Executive Officer

Ian Gibson
Chief Financial Officer

Financial statements

Independent auditors' report

to the members of Ricardo plc

1. Our opinion is unmodified

We have audited the financial statements of Ricardo plc ('the Company') for the year ended 30 June 2019 which comprise the Consolidated income statement, Consolidated statement of comprehensive income, Consolidated and Parent Company statements of financial position, Consolidated and Parent Company statements of changes in equity, Consolidated and Parent Company statements of cash flow, and the related notes, including the accounting policies in Note 1 to the financial statements.

In our opinion:

- the financial statements give a true and fair view of the state of the Group's and of the Parent Company's affairs as at 30 June 2019 and of the Group's profit for the year then ended;
- the Group financial statements have been properly prepared in accordance with International Financial Reporting Standards as adopted by the European Union ('IFRSs as adopted by the EU');
- the Parent Company financial statements have been properly prepared in accordance with IFRSs as adopted by the EU and as applied in accordance with the provisions of the Companies Act 2006; and
- the financial statements have been prepared in accordance with the requirements of the Companies Act 2006 and, as regards the Group financial statements, Article 4 of the IAS Regulation.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) ('ISAs (UK)') and applicable law. Our responsibilities are described below. We believe that the audit evidence we have obtained is a sufficient and appropriate basis for our opinion. Our audit opinion is consistent with our report to the Audit Committee.

We were first appointed as auditor by the shareholders on 15 November 2018. The financial period ended 30 June 2019 is the first year of our engagement. 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. No non-audit services prohibited by that standard were provided.

Overview	
Materiality: Group financial statements as a whole	£1.6m 4.8% of normalised profits and losses that make up Group profit before tax
Coverage	67% of normalised profits and losses that make up Group profit before tax
Key audit matters	
Recurring risks	The impact of uncertainties due to Britain exiting the European Union on our audit
	Revenue recognition on fixed price contracts in Technical Consulting
	Parent Company: Valuation of defined benefit pension obligation

2. Key audit matters: including our assessment of risks of material misstatement

Key audit matters are those matters that, in our professional judgment, were of most significance in the audit of the 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 summarise herein the key audit matters in arriving at our audit opinion, together with our key audit procedures to address those matters and, as required for public interest entities, our results from those procedures. These matters were addressed, and our results are based on procedures undertaken, in the context of, and solely for the purpose of, our audit of the financial statements as a whole, and in forming our opinion thereon, and consequently are incidental to that opinion, and we do not provide a separate opinion on these matters.

	The risk	Our response
The impact of uncertainties due to Britain exiting the European Union on our audit *Refer to page 86 (Audit Committee Report).*	**Unprecedented levels of uncertainty** All audits assess and challenge the reasonableness of estimates, in particular as described in the valuation of the defined benefit pension obligation on page 119, and related disclosures and the appropriateness of the going concern basis of preparation of the financial statements. All of these depend on assessments of the future economic environment and the Group's future prospects and performance. In addition, we are required to consider the other information presented in the Annual Report including the Principal Risks disclosure and the Viability Statement and to consider the Directors' statement that the Annual Report and financial statements taken as a whole is fair, balanced and understandable and provides the information necessary for shareholders to assess the Group's position and performance, business model and strategy. Brexit is one of the most significant economic events for the UK and at the date of this report its effects are subject to unprecedented levels of uncertainty of outcomes, with the full range of possible effects unknown.	We developed a standardised firm-wide approach to the consideration of the uncertainties arising from Brexit in planning and performing our audits. Our procedures included: • **Our Brexit knowledge:** We considered the Directors' assessment of Brexit-related sources of risk for the Group's business and financial resources compared with our own understanding of the risks. We considered the Directors' plans to take action to mitigate the risks. • **Sensitivity analysis:** When addressing valuation of the defined benefit pension obligation and other areas that depend on forecasts, we compared the Directors' analysis to our assessment of the full range of reasonably possible scenarios resulting from Brexit uncertainty and, where forecast cash flows are required to be discounted, considered adjustments to discount rates for the level of remaining uncertainty. • **Assessing transparency:** As well as assessing individual disclosures as part of our procedures on the valuation of the defined benefit pension obligation, we considered all of the Brexit-related disclosures together, including those in the Strategic Report, comparing the overall picture against our understanding of the risks. **Our results** As reported under the valuation of the defined benefit pension obligation on page 119, we found the resulting estimates and related disclosures, as well as the disclosures in relation to going concern, to be acceptable. However, no audit should be expected to predict the unknowable factors or all possible future implications for a company and this is particularly the case in relation to Brexit.

2. Key audit matters: including our assessment of risks of material misstatement (continued)

	The risk	Our response
Revenue recognition on fixed price contracts in the Technical Consulting business *(£207.1m; 2018: £219.2m, restated for the adoption of IFRS 15 Revenue from Contracts with Customers).* *Refer to page 86 (Audit Committee Report), page 130 (Accounting Policy) and page 138 (financial disclosures).*	**Subjective estimate:** For Technical Consulting, the Group recognises the majority of revenue on the stage of completion based on the proportion of contract costs incurred for the work performed to the balance sheet date, relative to the estimated total forecast costs of the contract at completion. The highest value, highest risk, most technically complex and financially challenging contracts to deliver are categorised as 'Red CAT 4' contracts, which are subject to more frequent and senior levels of management review. The key estimate impacting the recognition of revenue is costs to complete. This is further complicated by contract modifications which involve changes in scope, and consequently the estimate around costs to complete.	**Our procedures included:** • **Control reperformance:** We tested key controls over recording work done through timesheet approvals and invoicing through invoice approval. • **Control observation:** We attended the 'Red CAT 4' review meetings in January and July 2019 at which performance of these contracts was discussed with the Chief Financial Officer and divisional Managing and Finance Directors. • **Test of detail:** We selected a sample of costs incurred in the year and agreed to supporting documentation. • **Historical comparisons:** We assessed the reasonableness of the Group's forecasts by comparing with the comparative year forecasts and the financial performance. • **Test of detail:** We inspected a sample of correspondence with customers and instances where contractual variations had arisen to inform our assessment of the revenue and costs recorded up to the balance sheet date. We also agreed the position to relevant invoicing schedules and payment plans and the subsequent cash receipts where possible. • **Independent reperformance:** We recalculated the stage of completion on the basis of actual costs and the Group's latest forecast to inform our assessment of the appropriate amount of revenue and profit to recognise and compared this to the amounts recorded by the Group. • **Assessing transparency:** We considered the adequacy of the Group's disclosures about the degree of estimates involved in estimating the stage of completion for determining the revenue amounts for Technical Consulting contracts. **Our results** We found revenue recognition on fixed price contracts in Technical Consulting to be acceptable.

2. Key audit matters: including our assessment of risks of material misstatement (continued)

	The risk	Our response
Parent Company: Valuation of defined benefit pension obligation *(£146.0m; 2018: £135.6m).* *Refer to page 87 (Audit Committee Report), page 130 (Accounting Policy) and pages 158 to 160 (financial disclosures).*	**Subjective valuation:** The Company has a defined benefit pension obligation that is material in the context of the overall balance sheet and the results of the Company. Significant estimates, including the discount rate, inflation rate and mortality rate, are made in valuing the Company's defined benefit obligation (before deducting the schemes' assets). The scheme is closed to future accrual, but small changes in the assumptions and estimates would have a significant effect on the financial position of the Company. The Company engages external actuarial specialists to assist them in selecting appropriate assumptions and calculating the obligation. The effect of these matters is that, as part of our risk assessment, we determined that the valuation of the defined benefit obligation has a high degree of estimation uncertainty, with a potential range of reasonable outcomes greater than our materiality for the financial statements as a whole, and possibly many times that amount. The financial statements (Note 24) disclose the sensitivity estimated by the Company.	**Our procedures included:** • **Benchmarking assumptions:** We challenged key assumptions applied (discount rate, inflation rate, and mortality rate) with the support of our own actuarial specialists, including a comparison of key assumptions against market data. • **Sensitivity analysis:** We assessed the sensitivity of the defined benefit obligation to changes in certain key assumptions. • **Assessing actuary's credentials:** We assessed the competence, independence and integrity of the Company's actuarial expert through consideration of whether their work is subject to technical performance standards and other professional or industry requirements. • **Assessing transparency:** We considered the adequacy of the Company's disclosures in respect of the sensitivity of the obligation to changes in key assumptions. **Our results** We found the valuation of the defined benefit pension obligation to be acceptable.

3. Our application of materiality and an overview of the scope of our audit

Materiality for the Group financial statements as a whole was set at £1.6m, determined with reference to a benchmark of Group profit before tax, normalised to exclude this year's exceptional restructuring costs, acquisition-related expenditure and GMP equalisation, as disclosed in Note 4, of which it represents 4.8%.

Materiality for the Parent Company financial statements as a whole was set at £1.5m, determined with reference to a benchmark of Company net assets and chosen to be lower than materiality for the Group financial statements as a whole. It represents 1.5% of the stated benchmark.

We agreed to report to the Audit Committee any corrected or uncorrected identified misstatements exceeding £80,000, in addition to other identified misstatements that warranted reporting on qualitative grounds.

Of the Group's 48 reporting components, we subjected 7 to full scope audits for Group purposes and 4 to specified risk-focused audit procedures.

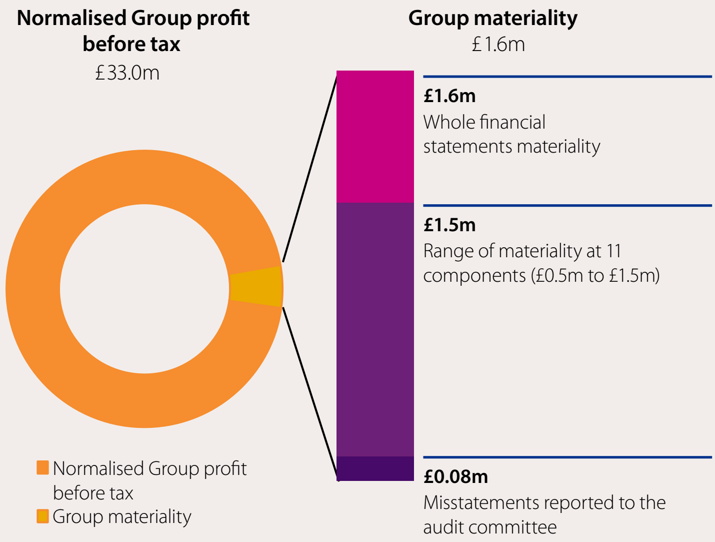
The latter were not individually financially significant enough to require a full scope audit for Group purposes, but did present specific individual risks that needed to be addressed.

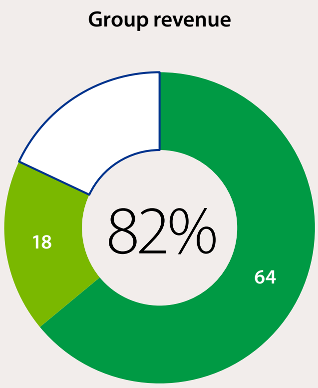
The components within the scope of our work accounted for the percentages illustrated opposite.

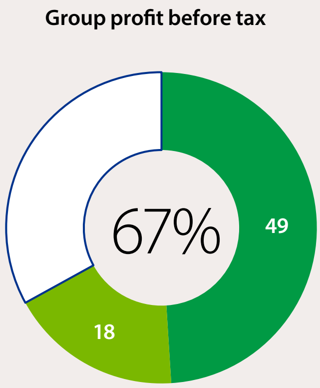
The remaining 18% of total Group revenue, 33% of Group profit before tax and 18% of total Group assets is represented by 37 reporting components, none of which individually represented more than 5.5% of any of total Group revenue, Group profit before tax or total Group assets. For these residual components, we performed analysis at an aggregated Group level to re-examine our assessment that there were no significant risks of material misstatement within these.

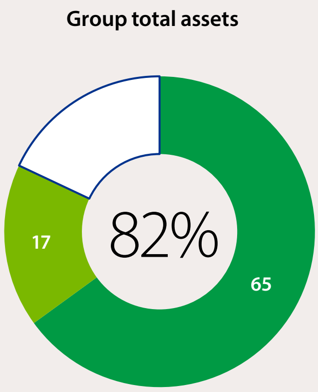
The Group team instructed component auditors as to the significant areas to be covered, including the relevant risks detailed herein and the information to be reported back. The Group team approved the component materialities, which ranged from £0.5m to £1.5m, having regard to the mix of size and risk profile of the Group across the components. The work on 3 of the 11 components was performed by component auditors and the rest, including the audit of the Parent Company, was performed by the Group team. The Group team performed procedures on the items excluded from normalised Group profit before tax.

The Group team visited all 3 component auditors (1 in the Netherlands and 2 in the US) to assess the audit risk and strategy. Telephone conference meetings were also held with these component auditors. At these visits and meetings, the findings reported to the Group team were discussed in more detail, and any further work required by the Group team was then performed by the component auditor.









Key:

- Full scope for Group audit purposes 2019
- Specified risk-focused audit procedures 2019
- Residual components

4. We have nothing to report on going concern

The Directors have prepared the financial statements on the going concern basis as they do not intend to liquidate the Company or the Group or to cease their operations, and as they have concluded that the 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').

Our responsibility is to conclude on the appropriateness of the Directors' conclusions and, had there been a material uncertainty related to going concern, to make reference to that in this audit report. However, as we cannot predict all future events or conditions and as subsequent events may result in outcomes that are inconsistent with judgements that were reasonable at the time they were made, the absence of reference to a material uncertainty in this auditor's report is not a guarantee that the Group and the Company will continue in operation.

In our evaluation of the Directors' conclusions, we considered the inherent risks to the Group's and Company's business model and analysed how those risks might affect the Group's and Company's financial resources or ability to continue operations over the going concern period. The risk that we considered most likely to adversely affect the Group's and Company's available financial resources over this period was:

- Economic pressures in the marketplace.

As this was the risk that could potentially cast significant doubt on the Group's and the Company's ability to continue as a going concern, we considered sensitivities over the level of available financial resources indicated by the Group's financial forecasts taking account of reasonably possible (but not unrealistic) adverse effects that could arise from this risk and evaluated the achievability of the actions the Directors consider they would take to improve the position should the risks materialise. We also considered less predictable but realistic second order impacts, such as the impact of Brexit and the erosion of customer or supplier confidence, which could result in a rapid reduction of available financial resources.

Based on this work, we are required to report to you if:

- we have anything 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 Company's use of that basis for a period of at least twelve months from the date of approval of the financial statements; or
- the related statement under the Listing Rules set out on page 113 is materially inconsistent with our audit knowledge.

We have nothing to report in these respects, and we did not identify going concern as a key audit matter.

5. We have nothing to report on the other information in the Annual Report

The Directors are responsible for the other information presented in the Annual Report together with the financial statements. 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, any form of assurance conclusion thereon.

Our responsibility is to read the other information and, in doing so, consider whether, based on our financial statements audit work, the information therein is materially misstated or inconsistent with the financial statements or our audit knowledge. Based solely on that work we have not identified material misstatements in the other information.

Strategic report and Directors' report

Based solely on our work on the other information:

- we have not identified material misstatements in the Strategic Report and the Directors' Report;
- in our opinion the information given in those reports for the financial year is consistent with the financial statements; and
- in our opinion those reports have been prepared in accordance with the Companies Act 2006.

Directors' remuneration report

In our opinion the part of the Directors' Remuneration Report to be audited has been properly prepared in accordance with the Companies Act 2006.

Disclosures of principal risks and longer-term viability

Based on the knowledge we acquired during our financial statements audit, we have nothing material to add or draw attention to in relation to:

- the Directors' confirmation within the Viability Statement on page 47 that they have carried out a robust assessment of the 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.

5. We have nothing to report on the other information in the Annual Report (continued)

Disclosures of principal risks and longer-term viability (continued)

Under the Listing Rules we are required to review the Viability Statement. We have nothing to report in this respect.

Our work is limited to assessing these matters in the context of only the knowledge acquired during our financial statements 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 Company's longer-term viability.

Corporate governance disclosures

We are required to report to you if:

- we have identified material inconsistencies between the knowledge we acquired during our financial statements audit 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 shareholders to assess the Group's position and performance, business model and strategy; or
- the section of the Annual Report describing the work of the Audit Committee does not appropriately address matters communicated by us to the Audit Committee.

We are required to report to you if the Corporate Governance Statement does not properly disclose a departure from the eleven provisions of the UK Corporate Governance Code specified by the Listing Rules for our review.

We have nothing to report in these respects.

6. We have nothing to report on the other matters on which we are required to report by exception

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 Parent Company, or returns adequate for our audit have not been received from branches not visited by us; or
- the 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.

We have nothing to report in these respects.

7. Respective responsibilities

Directors' responsibilities

As explained more fully in their statement set out on page 113, the Directors are responsible for: the preparation of the financial statements including being satisfied that they give a true and fair view; such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error; assessing the Group and Parent Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern; and using the going concern basis of accounting unless they either intend to liquidate the Group or the Parent Company or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities

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 (see page 123), or error, and to issue our opinion 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) 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 our responsibilities is provided on the FRC's website at www.frc.org.uk/auditorsresponsibilities.

7. Respective responsibilities (continued)

Irregularities – ability to detect

We identified areas of laws and regulations that could reasonably be expected to have a material effect on the financial statements from our general commercial and sector experience, through discussion with the Directors and other management (as required by auditing standards), and from inspection of the Group's regulatory and legal correspondence and discussed with the Directors and other management the policies and procedures regarding compliance with laws and regulations. We communicated identified laws and regulations throughout our team and remained alert to any indications of non-compliance throughout the 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, and taxation legislation and we assessed the extent of compliance with these laws and regulations as part of our procedures on the related financial statement items.

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. We identified the following areas as those most likely to have such an effect: anti-bribery, employment law, regulatory capital and liquidity and certain aspects of company 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. These limited procedures did not identify actual or suspected non-compliance.

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 (irregularities) is from the events and transactions reflected in the financial statements, the less likely the inherently limited procedures required by auditing standards would identify it. In addition, as with any audit, there remained a higher risk of non-detection of irregularities, as these may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal controls. We are not responsible for preventing non-compliance and cannot be expected to detect non-compliance with all laws and regulations.

8. The purpose of our audit work and to whom we owe our responsibilities

This report is made solely to the Company's members, as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the Company's members those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Company and the Company's members, as a body, for our audit work, for this report, or for the opinions we have formed.

Michael Harper (Senior Statutory Auditor)
for and on behalf of KPMG LLP, Statutory Auditor
Chartered Accountants
15 Canada Square, London, E14 5GL
11 September 2019

Consolidated income statement
for the year ended 30 June

	Note	2019 Underlying £m	2019 Specific adjusting items[2] £m	2019 Total £m	2018 Restated[1] Underlying £m	2018 Restated[1] Specific adjusting items[2] £m	2018 Restated[1] Total £m
Revenue	*2 & 3*	**384.4**	**-**	**384.4**	378.5	-	378.5
Cost of sales		**(249.5)**	**-**	**(249.5)**	(235.8)	-	(235.8)
Gross profit		**134.9**	**-**	**134.9**	142.7	-	142.7
Administrative expenses		**(96.3)**	**(10.5)**	**(106.8)**	(103.7)	(10.5)	(114.2)
Other income		**1.0**	**-**	**1.0**	0.7	-	0.7
Operating profit	*5*	**39.6**	**(10.5)**	**29.1**	39.7	(10.5)	29.2
Finance income	*8*	**0.5**	**-**	**0.5**	0.4	-	0.4
Finance costs	*8*	**(3.1)**	**-**	**(3.1)**	(2.6)	-	(2.6)
Net finance costs	*8*	**(2.6)**	**-**	**(2.6)**	(2.2)	-	(2.2)
Profit before taxation		**37.0**	**(10.5)**	**26.5**	37.5	(10.5)	27.0
Taxation	*9*	**(8.2)**	**1.6**	**(6.6)**	(8.0)	(1.3)	(9.3)
Profit for the year		**28.8**	**(8.9)**	**19.9**	29.5	(11.8)	17.7
Profit attributable to:							
- Owners of the parent		**28.7**	**(8.9)**	**19.8**	29.4	(11.8)	17.6
- Non-controlling interests	*37*	**0.1**	**-**	**0.1**	0.1	-	0.1
		28.8	**(8.9)**	**19.9**	29.5	(11.8)	17.7

Earnings per ordinary share attributable to owners of the parent during the year	Note	2019	2018 Restated[1]
Basic	*10*	**37.1p**	33.0p
Diluted	*10*	**36.9p**	32.8p

(1) Comparative information has been restated in accordance with IFRS 15 *Revenue from Contracts with Customers* as set out in Note 38(a). The Group has initially applied IFRS 15 and IFRS 9 *Financial Instruments* as at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9. Comparative information has also been represented to reclassify certain indirect payroll expenses (£4.5m) and depreciation charges (£0.8m) from cost of sales to administrative expenses in a manner that is consistent with their classification in the current year.

(2) Specific adjusting items comprise amortisation of acquired intangible assets, acquisition-related expenditure, reorganisation costs and non-recurring items that are disclosed separately due to the significance of their nature or amount. Further details are given in Note 4.

Consolidated statement of comprehensive income
for the year ended 30 June

	Note	2019 £m	2018 Restated[1] £m
Profit for the year		**19.9**	17.7
Other comprehensive income			
Items that will not be reclassified to profit or loss:			
Remeasurements of the defined benefit pension scheme	*24*	**(7.9)**	13.8
Deferred tax on remeasurements of the defined benefit pension scheme	*25*	**1.4**	(2.7)
Total items that will not be reclassified to profit or loss		**(6.5)**	11.1
Items that may be subsequently reclassified to profit or loss:			
Currency translation on foreign currency net investments	*30*	**1.2**	0.1
Fair value gains on foreign currency cash flow hedges	*22*	**0.1**	-
Total items that may be subsequently reclassified to profit or loss		**1.3**	0.1
Total other comprehensive (loss)/income for the year (net of tax)		**(5.2)**	11.2
Total comprehensive income for the year		**14.7**	28.9
Attributable to:			
- Owners of the parent		**14.6**	28.8
- Non-controlling interests		**0.1**	0.1
		14.7	28.9

(1) Comparative information has been restated in accordance with IFRS 15 *Revenue from Contracts with Customers* as set out in Note 38(a). The Group has initially applied IFRS 15 and IFRS 9 *Financial Instruments* at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9.

The Company has not presented its own Income Statement and Statement of Comprehensive Income as permitted by Section 408 of the Companies Act 2006. The Company's profit for the year was £10.7m (2018: £0.2m).

Consolidated and parent company statements of financial position
as at 30 June

	Note	Group 2019 £m	Group 2018 Restated(1) £m	Group 1 July 2017 Restated(1) £m	Company 2019 £m	Company 2018 £m
Assets						
Non-current assets						
Goodwill	*13*	**84.2**	65.5	62.0	**-**	-
Other intangible assets	*14*	**41.0**	31.7	32.4	**0.9**	1.6
Property, plant and equipment	*15*	**44.6**	45.3	48.0	**4.5**	4.5
Investments	*16*	**-**	-	-	**103.1**	103.1
Deferred tax assets	*25*	**6.7**	8.9	15.3	**2.1**	1.7
		176.5	151.4	157.7	**110.6**	110.9
Current assets						
Inventories	*17*	**14.5**	13.3	13.9	**-**	-
Trade, contract and other receivables	*18*	**141.4**	135.3	133.1	**91.8**	89.6
Derivative financial assets	*22*	**0.3**	0.1	0.9	**0.3**	0.1
Current tax assets		**-**	1.3	0.6	**-**	0.2
Cash and cash equivalents	*33*	**36.3**	33.1	27.9	**1.7**	0.3
		192.5	183.1	176.4	**93.8**	90.2
Non-current assets held for sale	*19*	**2.9**	-	2.8	**-**	-
		195.4	183.1	179.2	**93.8**	90.2
Total assets		**371.9**	334.5	336.9	**204.4**	201.1
Liabilities						
Current liabilities						
Borrowings	*21*	**(4.0)**	(9.4)	(6.0)	**(0.1)**	(8.6)
Trade, contract and other payables	*20*	**(84.8)**	(83.0)	(83.1)	**(76.0)**	(70.3)
Current tax liabilities		**(3.5)**	(6.3)	(6.3)	**(1.3)**	-
Derivative financial liabilities	*22*	**(1.2)**	(1.0)	(0.7)	**(1.2)**	(1.0)
Provisions	*26*	**(2.2)**	(2.8)	(1.3)	**-**	-
		(95.7)	(102.5)	(97.4)	**(78.6)**	(79.9)
Net current assets		**99.7**	80.6	81.8	**15.2**	10.3
Non-current liabilities						
Borrowings	*21*	**(79.7)**	(49.8)	(59.8)	**(14.1)**	(6.8)
Trade, contract and other payables	*20*	**(5.1)**	-	-	**-**	-
Defined benefit obligation	*24*	**(8.5)**	(4.6)	(22.2)	**(8.5)**	(4.6)
Deferred tax liabilities	*25*	**(7.3)**	(3.9)	(5.0)	**(0.5)**	(0.6)
Provisions	*26*	**(3.7)**	(2.9)	(1.3)	**(0.1)**	-
		(104.3)	(61.2)	(88.3)	**(23.2)**	(12.0)
Total liabilities		**(200.0)**	(163.7)	(185.7)	**(101.8)**	(91.9)
Net assets		**171.9**	170.8	151.2	**102.6**	109.2
Equity						
Share capital	*27*	**13.4**	13.4	13.3	**13.4**	13.4
Share premium	*28*	**14.3**	14.3	14.3	**14.3**	14.3
Other reserves	*30*	**16.9**	15.7	15.6	**-**	-
Retained earnings	*31*	**126.8**	127.0	107.7	**74.9**	81.5
Equity attributable to owners of the parent		**171.4**	170.4	150.9	**102.6**	109.2
Non-controlling interests	*37*	**0.5**	0.4	0.3	**-**	-
Total equity		**171.9**	170.8	151.2	**102.6**	109.2

(1) Comparative information has been restated in accordance with IFRS 15 *Revenue from Contracts with Customers* as set out in Note 38(a). The Group has initially applied IFRS 15 and IFRS 9 *Financial Instruments* at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9.

The notes on pages 128 to 173 form an integral part of these financial statements.

The financial statements of Ricardo plc (registered number 222915) on pages 124 to 173 were approved by the Board of Directors on 11 September 2019 and signed on its behalf by:

Dave Shemmans
Chief Executive Officer

Ian Gibson
Chief Financial Officer

Consolidated and parent company statements of changes in equity
for the year ended 30 June

Group	Note	Share capital £m	Share premium £m	Other reserves £m	Retained earnings £m	Total £m	Non-controlling interests £m	Total equity £m
		Attributable to owners of the parent						
At 30 June 2017 (previously reported)		13.3	14.3	15.6	112.2	155.4	0.3	155.7
Adjustment on retrospective application of IFRS 15 (net of tax)[1]	*38(a)*	-	-	-	(4.5)	(4.5)	-	(4.5)
At 1 July 2017 (restated)		13.3	14.3	15.6	107.7	150.9	0.3	151.2
Profit for the year (restated)[1]	*38(a)*	-	-	-	17.6	17.6	0.1	17.7
Other comprehensive income for the year		-	-	0.1	11.1	11.2	-	11.2
Total comprehensive income for the year		-	-	0.1	28.7	28.8	0.1	28.9
Proceeds from shares issued	*27*	0.1	-	-	-	0.1	-	0.1
Equity-settled transactions	*29*	-	-	-	1.0	1.0	-	1.0
Tax credit relating to share option schemes	*31*	-	-	-	0.1	0.1	-	0.1
Ordinary share dividends	*11*	-	-	-	(10.5)	(10.5)	-	(10.5)
At 30 June 2018 (restated)		13.4	14.3	15.7	127.0	170.4	0.4	170.8
Adjustment on initial application of IFRS 9 (net of tax)[1]	*38(b)*	**-**	**-**	**-**	**(2.7)**	**(2.7)**	**-**	**(2.7)**
At 1 July 2018 (adjusted)		**13.4**	**14.3**	**15.7**	**124.3**	**167.7**	**0.4**	**168.1**
Profit for the year		**-**	**-**	**-**	**19.8**	**19.8**	**0.1**	**19.9**
Other comprehensive income/(loss) for the year		**-**	**-**	**1.2**	**(6.4)**	**(5.2)**	**-**	**(5.2)**
Total comprehensive income for the year		**-**	**-**	**1.2**	**13.4**	**14.6**	**0.1**	**14.7**
Equity-settled transactions	*29*	**-**	**-**	**-**	**1.0**	**1.0**	**-**	**1.0**
Purchases of own shares to settle awards	*31*	**-**	**-**	**-**	**(0.9)**	**(0.9)**	**-**	**(0.9)**
Ordinary share dividends	*11*	**-**	**-**	**-**	**(11.0)**	**(11.0)**	**-**	**(11.0)**
At 30 June 2019		**13.4**	**14.3**	**16.9**	**126.8**	**171.4**	**0.5**	**171.9**

Company	Note	Share capital £m	Share premium £m	Other reserves £m	Retained earnings £m	Total £m	Non-controlling interests £m	Total equity £m
		Attributable to owners of the parent						
At 1 July 2017		13.3	14.3	-	79.6	107.2	-	107.2
Profit for the year		-	-	-	0.2	0.2	-	0.2
Other comprehensive income for the year		-	-	-	11.1	11.1	-	11.1
Total comprehensive income for the year		-	-	-	11.3	11.3	-	11.3
Proceeds from shares issued	*27*	0.1	-	-	-	0.1	-	0.1
Equity-settled transactions	*29*	-	-	-	1.0	1.0	-	1.0
Tax credit relating to share option schemes	*31*	-	-	-	0.1	0.1	-	0.1
Ordinary share dividends	*11*	-	-	-	(10.5)	(10.5)	-	(10.5)
At 30 June 2018		13.4	14.3	-	81.5	109.2	-	109.2
Profit for the year		**-**	**-**	**-**	**10.7**	**10.7**	**-**	**10.7**
Other comprehensive loss for the year		**-**	**-**	**-**	**(6.4)**	**(6.4)**	**-**	**(6.4)**
Total comprehensive income for the year		**-**	**-**	**-**	**4.3**	**4.3**	**-**	**4.3**
Equity-settled transactions	*29*	**-**	**-**	**-**	**1.0**	**1.0**	**-**	**1.0**
Purchases of own shares to settle awards	*31*	**-**	**-**	**-**	**(0.9)**	**(0.9)**	**-**	**(0.9)**
Ordinary share dividends	*11*	**-**	**-**	**-**	**(11.0)**	**(11.0)**	**-**	**(11.0)**
At 30 June 2019		**13.4**	**14.3**	**-**	**74.9**	**102.6**	**-**	**102.6**

(1) See Note 38(a) for details of the restatements arising from the retrospective application of IFRS 15 *Revenue from Contracts with Customers* and Note 38(b) for details of the adjustments arising from the initial application of IFRS 9 *Financial Instruments*. The Group has applied IFRS 15 and IFRS 9 as at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9.

Consolidated and parent company statements of cash flow
for the year ended 30 June

		Group		Company	
		2019	2018	**2019**	2018
	Note	**£m**	£m	**£m**	£m
Cash flows from operating activities					
Cash generated from/(used in) operations	*32*	**32.4**	44.2	**(0.5)**	19.6
Net finance (costs)/income		**(2.3)**	(2.1)	**1.8**	-
Tax (paid)/received		**(4.9)**	(7.7)	**1.9**	0.7
Net cash generated from operating activities		**25.2**	34.4	**3.2**	20.3
Cash flows from investing activities					
Acquisitions of subsidiaries, net of cash acquired	*12*	**(18.9)**	(4.6)	**-**	-
Purchases of property, plant and equipment		**(7.6)**	(7.7)	**(0.2)**	(0.1)
Proceeds from disposal of property, plant and equipment		**0.7**	6.4	**-**	-
Purchases of intangible assets and capitalised development costs		**(9.1)**	(6.5)	**(0.3)**	-
Dividends received from subsidiaries		**-**	-	**11.8**	-
Net cash (used in)/generated from investing activities		**(34.9)**	(12.4)	**11.3**	(0.1)
Cash flows from financing activities					
Proceeds from issuance of ordinary shares	*27*	**-**	0.1	**-**	0.1
Purchases of own shares to settle awards	*31*	**(0.9)**	-	**(0.9)**	-
Proceeds from finance leases	*33*	**0.7**	-	**-**	-
Proceeds from borrowings	*33*	**64.0**	15.0	**42.0**	10.0
Repayments of borrowings	*33*	**(34.8)**	(25.0)	**(34.8)**	(23.0)
Dividends paid to shareholders	*11*	**(11.0)**	(10.5)	**(11.0)**	(10.5)
Net cash generated from/(used in) financing activities		**18.0**	(20.4)	**(4.7)**	(23.4)
Effect of exchange rate changes on cash and cash equivalents		**0.3**	0.2	**-**	-
Net increase/(decrease) in cash and cash equivalents	*33*	**8.6**	1.8	**9.8**	(3.2)
Net cash and cash equivalents at 1 July		**23.8**	22.0	**(8.2)**	(5.0)
Net cash and cash equivalents at 30 June		**32.4**	23.8	**1.6**	(8.2)
At 1 July					
Cash and cash equivalents		**33.1**	27.9	**0.3**	0.9
Bank overdrafts		**(9.3)**	(5.9)	**(8.5)**	(5.9)
		23.8	22.0	**(8.2)**	(5.0)
At 30 June					
Cash and cash equivalents	*33*	**36.3**	33.1	**1.7**	0.3
Bank overdrafts	*33*	**(3.9)**	(9.3)	**(0.1)**	(8.5)
Net cash and cash equivalents at 30 June		**32.4**	23.8	**1.6**	(8.2)

Notes to the financial statements

1 Accounting policies

Ricardo plc (the 'Company') and its subsidiaries (together, the 'Group') provide engineering, technical, environmental and strategic consultancy services, together with accreditation and independent assurance services. The Group also manufactures and assembles high-quality prototypes and niche volumes of complex engine, transmission and vehicle products, together with the provision of advanced computer-aided engineering and simulation software for conventional and electrified powertrains, as well as complex physical systems. The Group sells its products and services to customers in the UK, the rest of Europe, the Middle East, Asia and North America.

Ricardo plc, a public company limited by shares, is listed on the London Stock Exchange and incorporated and domiciled in the United Kingdom. The address of its registered office is: Shoreham Technical Centre, Shoreham-by-Sea, West Sussex, BN43 5FG, England, United Kingdom, and its registered number is 222915.

The principal accounting policies applied in the preparation of these financial statements are set out below. These policies have been consistently applied to the years ended 30 June 2018 and 30 June 2019, except the Group's accounting policy for financial instruments as disclosed in Note 1(u). Under the transition method chosen, comparative information has not been restated for IFRS 9 *Financial Instruments*, which was adopted as at 1 July 2018. Comparative information complies with the Group's accounting policy for financial instruments under IAS 39 *Financial Instruments: Recognition and Measurement*, the changes from which are also disclosed in Note 1(u).

(a) Basis of preparation

These financial statements of Ricardo plc have been prepared in accordance with International Financial Reporting Standards ('IFRS'), IFRS Interpretations Committee ('IFRS IC') interpretations adopted by the European Union ('EU') and the Companies Act 2006 applicable to companies reporting under IFRS.

The financial statements have been prepared on a going concern basis under the historical cost convention, as modified by financial assets and liabilities (including derivative financial instruments) and contingent consideration assumed in a business combination, which are measured at fair value, together with the defined benefit obligation, which is measured at the fair value of plan assets less the present value of pension liabilities.

Having assessed the principal risks and the other matters discussed in connection with the Viability Statement on page 47, the Directors considered it appropriate to adopt the going concern basis of accounting in preparing the financial statements.

The preparation of financial statements in conformity with IFRS requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Group's accounting policies. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements are disclosed in Note 1(c).

Changes in accounting policies

The issued standards, amendments and interpretations shown below are mandatory for the first time for the financial year ended 30 June 2019:

Issued standards, amendments and interpretations effective for this financial year	Effective date (periods commencing)	Endorsed by EU
Issued International Financial Reporting Standards		
IFRS 9 *Financial Instruments*	1 Jan 2018	Yes
IFRS 15 *Revenue from Contracts with Customers* (including amendments and clarifications)	1 Jan 2018	Yes
Amendments and Interpretations to International Financial Reporting Standards		
IAS 40 *Investment Property*: Transfers of Investment Property	1 Jan 2018	Yes
IFRS 2 *Share-based Payment:* Classification and Measurement of Share-based Payment Transactions	1 Jan 2018	Yes
IFRS 4 *Insurance Contracts:* Applying IFRS 9 *Financial Instruments* with IFRS 4 *Insurance Contracts*	1 Jan 2018	Yes
Annual Improvements to IFRS Standards 2014-2016 Cycle: IFRS 1 *First-time Adoption of International Financial Reporting Standards* and IAS 28 *Investments in Associates and Joint Ventures*	1 Jan 2018	Yes
IFRIC 22 *Foreign Currency Transactions and Advance Consideration*	1 Jan 2018	Yes

None of the amendments and interpretations of existing standards have had, or are expected to have, any significant impact on these financial statements. The impact of issued standards which have had a significant impact on these financial statements are disclosed below and on the following page:

IFRS 15 *Revenue from Contracts with Customers*

IFRS 15 *Revenue from Contracts with Customers* replaces both IAS 11 *Construction Contracts* and IAS 18 *Revenue* and establishes principles for reporting the nature, amount and timing of revenue arising from contracts with customers. The principal areas of revenue recognition that were impacted related to the identification of performance obligations and whether those obligations were distinct within the context of the contract. Types of contracts were identified which had distinct performance obligations that required separate revenue recognition treatment under IFRS 15, while other types of contracts were identified which had indistinct performance obligations that required a combined revenue recognition treatment under IFRS 15.

The Standard became effective for the Group as at 1 July 2018 and the Group has applied the full retrospective approach upon adoption of IFRS 15. This approach requires all open contracts with customers that are presented in the financial statements to be transitioned under the new Standard. Comparative information has been restated, together with a cumulative adjustment to retained earnings as at 1 July 2017. See Note 38(a) for further information.

IFRS 9 *Financial Instruments*

IFRS 9 *Financial Instruments* replaces IAS 39 *Financial Instruments: Recognition and Measurement*. The Standard includes requirements for the recognition and measurement, impairment and derecognition of financial assets and liabilities, together with general hedge accounting. The primary area of change is that financial assets are now assessed for impairment using an 'expected credit loss' model, which assumes that

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1 Accounting policies (continued)

(a) Basis of preparation (continued)

IFRS 9 *Financial Instruments* (continued)

every trade receivable and contract asset, such as amounts recoverable on contracts ('AROC'), carries with it some risk of default at the point of origination that increases as the unpaid asset ages. The 'simplified approach' of the Standard applies a 'default rate' to trade receivables and contract assets, which considers both past experience and future expectations of credit losses. The 'general approach' of the Standard applies to other financial assets.

The Group is unable to apply IFRS 9 retrospectively and without the use of hindsight, and therefore comparative information has not been restated. An adjustment for the transitional impact has been applied to opening retained earnings as at 1 July 2018. See Note 38(b) for further information.

The Group did not adopt hedge accounting under IAS 39, resulting in no transitional impact to opening retained earnings. The hedge accounting requirements of IFRS 9 have been adopted prospectively as at 1 July 2018. This has resulted in the recognition of foreign exchange movements arising from hedged items and their corresponding designated cash flow hedges within other comprehensive income as opposed to the income statement.

Issued standards, amendments and interpretations that are not yet effective have not been early adopted, but where these are expected to have a material impact on the financial statements, this is disclosed in Note 1(x).

(b) Basis of consolidation

The consolidated financial statements comprise the financial statements of the Company and the Group are prepared to the end of the financial year. Subsidiaries are all entities (including structured entities) over which the Group has control. The Group controls an entity when the Group is exposed to, or has rights to, variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. Subsidiaries are fully consolidated from the date on which control is transferred to the Group and are deconsolidated from the date that control ceases. Intercompany transactions and balances are eliminated on consolidation.

The Group applies the acquisition method of accounting for business combinations. The consideration transferred for an acquisition is the fair value of the assets acquired and the liabilities assumed. The consideration transferred includes the fair value of any asset or liability resulting from a contingent consideration arrangement. Contingent consideration dependent upon the employment or retention of specific individuals is expensed over the specified period and included within specific adjusting items. Identifiable assets acquired, together with liabilities and contingent liabilities assumed in a business combination are measured initially at their fair values at the acquisition date. Acquisition-related expenditure is expensed as incurred.

(c) Management judgements and key accounting estimates

The preparation of financial statements under IFRS requires the Group's management to make judgements and estimates that affect the application of accounting policies and the reported amounts of assets, liabilities, revenues and costs.

These judgements and estimates are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances.

Critical judgements in applying the Group's accounting policies

The following are the critical judgements, apart from those involving estimations (which are dealt with separately on the following page), that the Directors have made in the process of applying the Group's accounting policies and that have the most significant effect on the amounts recognised in the financial statements:

Acquisition accounting

The fair value of contingent consideration payable for post-acquisition financial performance of acquired businesses against agreed targets during an earn-out period, as defined by a sale and purchase agreement, requires judgement and is based on a probability-weighted and discounted assessment as at the acquisition date and recognised at the reporting date as goodwill. The difference between goodwill recognised and earn-out payments made, together with any arrangement that is wholly or partially contingent on the continuing employment of specific individuals, is charged to the income statement as a specific adjusting item as incurred on a pro rata basis, as set out in Note 4. The use of different assumptions could change the fair value of contingent consideration recognised as goodwill and the amounts chargeable to the income statement. Further details are given in Notes 12 and 13.

Other intangible assets include acquired intangible assets which primarily relate to customer contracts and relationships arising from business combinations. The significance of these assets relative to the Group's financial position requires critical judgements to be exercised in their identification, initial recognition and subsequent measurement. The identification of these assets separable from goodwill and their expected useful lives are considered as part of pre-acquisition due diligence processes and post-acquisition activities carried out with management of acquired businesses. The fair value of identified acquired intangible assets is determined through the use of appropriate valuation techniques, including the excess earnings method, for which an expectation of discounted future cash flows is derived from a combination of due diligence reports and post-acquisition management forecasts and business plans, together with other readily available sources of financial information. The subsequent amortisation of acquired intangible assets is charged to the income statement as a specific adjusting item, as set out in Note 4. The use of different assumptions could change the fair value used in the initial recognition of acquired intangible assets and the amounts chargeable to the income statement. Further details are given in Notes 12 and 14.

Recoverability of capitalised development costs

Judgement is required as to when development costs meet the criteria to be recognised as intangible assets. The majority of capitalised development costs relate to the development of software, products and other technology, tools and processes. These costs are recognised as an asset once it has been determined that the attributable expenditure can be measured reliably, that there is an intention and the necessary resources to complete development and that it is considered probable that the resulting asset will generate future economic benefits for the Group. Determining whether it is probable that the resulting asset will generate sufficient economic benefits in the future requires management judgement. Further details are given in Note 14.

Impairment of financial assets

Management has applied judgement to rebut the presumption of IFRS 9 *Financial Instruments* that default does not occur later than when a financial asset is 90 days past due. This is based upon the Group's customer profile and limited experience of bad debts, which demonstrates that although debts can become significantly overdue, they are rarely irrecoverable. The default rate used for each overdue period is reassessed annually and is based upon the Group's historic ageing profile, adjusted for forward-looking information. Further details are given in Note 18.

Current taxation

Legislation related to taxation is complex and the Group's taxation charge, as set out in Note 9, may be uncertain. In preparing the Group's financial statements, management makes judgements on the existence of risks, primarily in respect of permanent establishment and transfer pricing, having taken appropriate professional advice. Although uncertainty of estimates made on individual risks is not considered to be significant, determination of an agreed amount of taxation payable may take several years, and the final amount paid may differ from the liabilities recorded in these financial statements.

1 Accounting policies (continued)

(c) Management judgements and key accounting estimates (continued)

Deferred taxation

The extent to which deferred tax assets should be recognised requires management to exercise judgement over their recoverability. Further details are given in Note 25.

Key sources of estimation uncertainty

Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the period in which the estimate is revised if the revision affects only that period, or in the period of the revision and future periods if the revision affects both current and future periods. The areas involving significant risk of a material adjustment to the carrying amounts of assets and liabilities within the next financial year are as follows:

Revenue recognition on fixed price contracts

A significant proportion of revenue recognised within the Technical Consulting segment relates to the provision of consultancy services under fixed price contracts, where revenue is measured on each distinct performance obligation on a percentage of completion basis.

The identification and separate accounting of distinct performance obligations within the context of a contract is considered to be a critical judgement. Fixed price contracts often have multiple performance obligations that are indistinct from one another within the context of the contract. This is due to a homogeneous pattern of transfer of control to the customer who is unable to benefit from the performance of less than all of the promises set out in the contract. This is particularly the case where any intellectual property created is stipulated as not being owned by the customer until the full transaction price has been paid.

The percentage of completion basis of revenue recognition is determined as actual costs incurred as a proportion of total forecast contract costs to complete. This method places importance on the accuracy of uncertain estimates, including total costs to complete, the outcome of contract and technical risks, as well as the extent to which variation requests are recognised for proposed changes to the agreed schedule, price or scope of a contract under negotiation with a customer at the reporting date. Changes in these estimates may impact revenue recognised at the reporting date with the revenue recognition in the reporting period appropriately adjusted as required.

The actual outcome of wholly or partially unsatisfied performance obligations may differ to the estimate made at a reporting date and it is reasonably possible that outcomes on these contracts within the next reporting period could differ, adversely or favourably, in aggregate to those estimated. It is not possible to fully quantify the expected impact of this, but the estimated costs to complete reflect management's best estimate at that point in time and no individual estimate is expected to have a materially different outcome.

As set out further on pages 45 and 86, management undertakes a process to assess the risks on inception of all contracts within the Technical Consulting segment and then monitors and reviews the risks and performance of contracts as they progress to completion. The highest value, highest risk, most technically complex and financially challenging contracts to deliver, as measured against a number of quantitative and qualitative factors, are categorised as 'Red Category 4' contracts, which are subject to more frequent and senior levels of management review.

As at 30 June 2019, the number of live contracts within the Technical Consulting portfolio was in excess of 3,000 (2018: 3,000), with a total value in excess of £700m (2018: £750m). Of this portfolio of contracts, 7 contracts (2018: 11) were categorised as Red Category 4. At 30 June 2019, £3.9m (2018: £3.9m) of recoveries for work performed on these contracts were under negotiation with the customer and had been recognised as revenue. Provisions of £1.7m (2018: £1.0m) were recognised against these recoveries, resulting in a net exposure of £2.2m (2018: £2.9m).

Defined benefit obligation

The Group operates a defined benefit pension scheme that provides benefits to a number of current and former employees. This scheme is closed to new entrants and the accrual of future benefits for active members ceased at the end of February 2010. The value of the deficit is particularly sensitive to the market value of the scheme's assets, discount rates and actuarial assumptions related to mortality. The sensitivity of the defined benefit obligation to changes in the principal assumptions is set out in Note 24.

(d) Segmental reporting

Operating segments are reported in a manner consistent with the discrete financial information that is internally reported and provided to the Chief Operating Decision Maker, who is responsible for allocating resources and assessing performance of the operating segments. Further details are given in Note 2.

(e) Revenue

Principle approach

The Group principally earns revenue through the provision of consultancy services and bespoke products and recognises revenue based on the satisfaction of performance obligations in contracts with its customers. The core principle is that revenue is recognised in a manner that depicts the transfer of promised goods and services to customers in an amount that reflects the consideration to which the Group expects to be entitled in exchange for those goods and services.

A contract with a customer is considered to exist when the Group is in possession of documentation to provide an agreed scope of goods or services on mutually understood terms and conditions that are acceptable to the Group which, subject to the successful execution of the contract, is expected to be invoiced against and paid for by the customer. Each contract with a customer is assessed to identify the promises to transfer distinct goods or services, or a series of distinct goods or services, that are substantially the same and have the same pattern of transfer to the customer. Goods and services are distinct and accounted for as separate performance obligations if they are separately identifiable in the contract and if the customer can benefit from them, either on their own or together with other readily available resources.

The total transaction price for a contract is estimated as the amount of consideration to which the Group expects to be entitled in exchange for transferring the promised goods or services to the customer, excluding sales taxes. Where multiple distinct performance obligations are identified within a contract with a customer, the total transaction price is allocated to each of the distinct performance obligations in proportion to their relative stand-alone selling prices. Given the bespoke nature of many of the Group's products and services, which are designed or manufactured under contract to the customer's individual scope and specifications, there are typically no observable stand-alone selling prices. Instead, stand-alone selling prices are typically estimated based on expected costs plus contract margin.

Costs of fulfilling performance obligations on existing contracts with customers are expensed as incurred. Costs incurred in advance of obtaining a new contract or an anticipated contract that directly relate to the fulfilment of specific performance obligations are initially recognised as an asset and subsequently expensed once the new contract is obtained or obtaining the contract is no longer anticipated. Incremental costs incurred to obtain new contracts with customers are recognised as an asset and amortised consistently with the recognition of revenue over the contract term, providing the contract term is greater than one year, the costs are only incurred as a direct result of the new contract being obtained, and the costs do not directly relate to the fulfilment of specific performance obligations. Costs incurred to obtain new contracts with customers are expensed when those costs are incurred irrespective of whether a contract is obtained from a customer.

Revenue is recognised as distinct performance obligations are satisfied and as control of the goods or services is transferred to the customer. For each distinct performance obligation within a contract, the Group determines whether they are satisfied over time or at a point in time. Performance

1 Accounting policies (continued)

(e) Revenue (continued)

Principle approach (continued)

obligations are considered to be satisfied over time if the goods or services provided have no alternative use to the Group and there is an enforceable right to payment for performance completed to date, or the customer simultaneously receives and consumes the goods or services as the Group provides them.

Services provided under fixed price contracts

The majority of the Group's revenue in Technical Consulting is earned from contracts for the provision of consultancy services that are typically awarded on a fixed price basis. Low volumes of similar contracts are also awarded to Performance Products to design and set up production lines and supply chains. Services provided under a fixed price contract generally have a single distinct performance obligation, or a single distinct series of performance obligations, which is satisfied over time. For each distinct performance obligation recognised over time, revenue is recognised using an input method, based on total costs incurred to date as a percentage of total estimated costs to satisfy each performance obligation.

Revenue and attributable margin are calculated by reference to reliable estimates of transaction price and total expected costs, after making suitable allowances for technical and other risks. Revenue and associated margin are therefore recognised progressively as costs are incurred, and estimated costs to complete are updated regularly as anticipated risks are mitigated or unanticipated risks materialise. The Group has determined that this method faithfully depicts the Group's performance in transferring control of the services to the customer.

The transaction price generally does not include consideration resulting from contract modifications of distinct performance obligations, such as variation orders, until they have been approved by the customer. Variable consideration, such as for the achievement of performance targets or variation requests under negotiation with the customer at the reporting date, can be included in the transaction price together with the estimated costs to perform the associated obligations. These estimates of the expected value or most likely amount are recognised to the extent that it is highly probable that there will not be a significant reversal in the amount of cumulative revenue recognised in a future reporting period.

Changes in transaction price from contract modifications that do not create separate distinct performance obligations are added to the transaction price of pre-existing performance obligations to which the modification relates. Contract modifications for goods or services that do create separate distinct performance obligations are accounted for separately from pre-existing performance obligations, together with the expected costs to satisfy those separate distinct performance obligations.

Contract assets arising from the recognition of revenue as and when performance obligations are satisfied are initially recognised as accrued revenue or amounts recoverable on contracts ('AROC') within trade, contract and other receivables, and transferred to trade receivables when invoiced. Contract liabilities arising from amounts received from customers for services not yet performed are initially recognised as deferred revenue or payments received in advance on contracts ('POA') within trade, contract and other payables, and transferred to revenue as and when performance obligations are satisfied.

A loss on a distinct performance obligation is recognised immediately when it becomes probable that the total estimated directly attributable costs to satisfy the distinct performance obligation will exceed the transaction price allocated to that distinct performance obligation. Monthly reviews of contracts by local management, in conjunction with reviews by senior management of contracts deemed to be of higher risk, ensure that the Group identifies and immediately recognises expected losses on fixed price performance obligations within a contract.

Services provided under time and materials contracts

Certain contracts within Technical Consulting for the provision of consultancy services may be awarded on a time and materials basis. Services provided under a time and materials basis typically have a single distinct performance obligation to provide a variable amount of labour to the customer at an agreed set of time-based labour rates, which represents the sales value. Revenue is therefore recognised over time based upon the agreed sales value of the time worked and costs incurred to date, as the customer simultaneously receives and consumes these services as the Group provides them.

Services provided under subscription and software support contracts

Other contracts within Technical Consulting primarily relate to annual subscriptions by customers to emergency response and support services for chemical incidents and crisis management. Subscription services are considered to be a single distinct performance obligation for which revenue is recognised at the agreed transaction price on a straight-line basis over the period of subscription.

Revenue is recognised primarily within Performance Products for software maintenance and support services separately from the supply of software products on a straight-line basis over the period of maintenance and support. Revenue derived from the supply of ad hoc software-related services, such as training and application engineering, is recognised at the agreed transaction price on a straight-line basis over a typically short period during which the obligation is performed.

Supply of manufactured or assembled products

The majority of the Group's revenue in Performance Products is earned from the supply of manufactured or assembled high-performance products, some of which are supplied with assurance-type warranties. Revenue for the supply of these products is measured at the agreed transaction price per unit that is expected to flow to the Group, and is recognised at the point in time that the Group has transferred control of the products to the customer, which is typically on delivery or collection. The point in time at which revenue is recognised can vary based on the specific incoterms present in a contract with a customer.

Revenue recognised from bill-and-hold arrangements occurs when all performance obligations have been satisfied and there is a substantive reason for the arrangement, which is typically that the customer has requested the products to be held by the Group until such times as delivery or collection is required by the customer. Revenue is recognised and billed under usual payment terms when the customer formally agrees to accept control of the bespoke products which cannot be sold to another customer and provided that the products have been separately identified and made available for delivery or collection.

Supply of software products

The Group's software products are standard version controlled computer-aided design, engineering and analysis tools, available for general sale and are primarily sold through Performance Products. The majority of revenue is derived from new and renewed licences of these software products, for which the customer has the right to access the product during the licence period, including rolling releases of the latest functionality. A new or renewed licence is considered to be a single distinct performance obligation for which revenue is recognised at the agreed transaction price on a straight-line basis over the licence period.

Perpetual licence sales provide the customer with an indefinite right to use the product, excluding rolling releases of the latest functionality. Rolling releases are provided through the separate provision of maintenance and support services. The transaction price of these two distinct performance obligations are separately identifiable within a contract. Revenue is recognised for perpetual licence sales when the performance obligation is satisfied, being the point of delivery of the licence key to the customer.

(f) Research and development expenditure

Research and development expenditure is recognised as an administrative expense in the income statement in the year in which it is incurred and is disclosed in Note 5. Where the activity is performed for customers the cost is recognised as a cost of sale. Directly attributable development expenditure that meets the criteria for recognition as an intangible asset is described in Note 1(o).

1 Accounting policies (continued)

(g) Government grants

The Group receives income-related grants from various national and supranational government agencies, principally for credits in respect of qualifying research and development expenditure, together with funding of research and development and capital projects. A grant is not recognised in the income statement until there is reasonable assurance that the Group will comply with its conditions and that the grant will be received. Grants are presented in the income statement as a deduction from the related expenses.

Grants contributing to the cost of an asset are deducted from the cost of the asset and reflected in its depreciation throughout its useful life.

Grants are not normally received until after qualification conditions have been met and the related expenditure has been incurred. Where this is not the case, they are recorded within trade, contract and other payables either as payments received in advance on contracts or as deferred revenue.

(h) Pension costs

The Group operates one defined benefit and several defined contribution pension schemes, the assets of which are held in separately administered funds. The defined benefit pension scheme is closed to new entrants and the accrual of future benefits for active members ceased at the end of February 2010. Payments to defined contribution pension schemes are charged as an expense as they fall due. Differences between contributions payable in the year and contributions actually paid are included in either accruals or prepayments. Payments to state-managed pension schemes are dealt with as payments to defined contribution pension schemes as the Group's obligations under the schemes are similar in nature.

For the defined benefit pension scheme, the cost of providing benefits is determined using the projected unit credit method, with actuarial valuations being carried out at each reporting date. Remeasurements are recognised in other comprehensive income except where they result from settlements or curtailments, in which case they are reported in the income statement.

Where necessary, past service costs are recognised immediately in the income statement at the earlier of when the plan amendment or curtailment occurs and when the related restructuring costs or termination benefits are recognised. The defined benefit obligation recognised represents the present value of the pension scheme liabilities net of the fair value of scheme assets. Any asset resulting from this calculation is limited to past service cost, plus the present value of available refunds and reductions in future contributions to the plan.

The interest cost on the net defined benefit obligation for the year is determined by applying the discount rate used to measure the defined benefit obligation at the beginning of the year to the net defined benefit obligation at the end of the year, and is included in finance costs.

(i) Share-based payments

Equity-settled share-based payments are measured at fair value at the date of grant. The fair value determined at the grant date is expensed on a straight-line basis over the vesting period. The amount expensed is adjusted over the vesting period for changes in the estimate of the number of shares that will eventually vest, save for changes resulting from any market-related performance conditions.

Cash-settled share-based payments are measured at fair value at the date of grant and expensed over the vesting period until the vesting date with the recognition of a corresponding liability. The liability is remeasured to fair value at each reporting date up to and including the settlement date, with changes in fair value recognised in the income statement for the year. The amount expensed is adjusted over the vesting period for changes in the estimate of the number of shares that will eventually vest.

Fair value is measured by using the Monte Carlo and Black Scholes models as explained in Note 29. The expected life used in the models are adjusted for the effects of exercise restrictions and behavioural considerations.

(j) Leases

The costs of operating leases and amortisation of operating lease incentives are charged to the income statement on a straight-line basis over the period of the lease.

(k) Foreign currency

Transactions

The functional currency of the Company and the presentation currency of the Group is Pounds Sterling. The functional currency of each subsidiary is the currency of the primary economic environment in which the entity operates. Transactions in currencies other than the functional currency are recorded at prevailing exchange rates. At each reporting date, monetary assets and liabilities denominated in foreign currencies are retranslated at the rates prevailing on the reporting date. Non-monetary assets and liabilities denominated in foreign currencies are translated at the rates prevailing at the date when the transaction occurred. Gains and losses arising on retranslation and settlements are included in the income statement for the year.

Consolidation

On consolidation the assets and liabilities of foreign operations, including goodwill and fair value adjustments, are translated into the presentation currency at exchange rates prevailing on the reporting date. Revenues and costs are translated at the average exchange rates of the year unless exchange rates fluctuate significantly. All resulting exchange differences are recognised in other comprehensive income and the translation reserve within equity. On disposal of an operation, or part thereof, the related cumulative translation differences are recognised in the income statement as a component of the gain or loss arising on disposal.

(l) Taxation

The tax expense for the year comprises current and deferred tax. Tax is recognised in the income statement, except to the extent that it relates to items recognised in other comprehensive income or directly in equity.

The current tax charge is the expected tax payable on taxable income for the year, calculated using the average rate applicable for the year on the basis of the tax laws enacted or substantively enacted at the reporting date in the countries where the Group operates. The current tax charge also includes any adjustment to tax payable in respect of previous years. Management periodically evaluates uncertain positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation and establishes provisions where appropriate on the basis of amounts expected to be paid to the relevant tax authorities.

The Group submits annual claims in respect of the UK Government's Research and Development Expenditure Credit ('RDEC') scheme. RDEC is taxable income and is a form of government grant that effectively gives corporation tax relief on qualifying research and development ('R&D') expenditure. In accordance with IAS 20 *Accounting for Government Grants and Disclosure of Government Assistance*, credits receivable under the RDEC scheme are offset against the associated qualifying R&D expenditure incurred, both of which are included within operating profit.

Deferred tax is recognised on temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for taxation purposes. Deferred tax liabilities are not recognised if they arise from the initial recognition of goodwill. Deferred tax is not accounted for if it arises from the initial recognition of an asset or liability in a transaction other than a business combination that at the time of the transaction affects neither accounting nor taxable profit and differences relating to investments in subsidiaries to the extent that it is not probable that they will reverse in the foreseeable future. The amount of deferred tax provided is based on the expected manner of realisation or settlement of the carrying amount of assets and liabilities, using tax rates enacted or substantively enacted at the reporting date.

Deferred tax assets are recognised only to the extent that it is probable that taxable profits will be available in the foreseeable future against which the asset can be utilised. Deferred tax assets are reduced to the extent that it is no longer probable that the related tax benefit will be realised within the foreseeable future.

1 Accounting policies (continued)

(m) Dividends

Dividends are recognised as a liability in the year in which they are fully authorised. Interim dividends are recognised when paid.

(n) Goodwill

Goodwill arises on the acquisition of subsidiaries and represents the excess of the consideration transferred and the fair value of contingent consideration, over the fair value of the identifiable assets acquired and liabilities assumed. Goodwill arising on acquisitions denominated in foreign currencies is retranslated using exchange rates prevailing at each reporting date.

Goodwill is recognised as an asset and is carried at cost less accumulated impairment losses. It is not subject to amortisation, but is reviewed for impairment annually, or more frequently if events or changes in circumstances indicate a potential impairment. For the purpose of impairment testing, goodwill acquired in a business combination is allocated to each of the cash-generating units ('CGUs'), or groups of CGUs, that is expected to benefit from that business combination. Each CGU or group of CGUs to which goodwill is allocated represents the lowest level at which goodwill is monitored for internal management purposes.

The Group's impairment review compares the carrying value of the goodwill to the recoverable amount of the CGU to which the goodwill has been allocated. The recoverable amount is the higher of the value in use or the fair value less costs of disposal. Estimating the value in use requires the Directors to perform an assessment of the discounted future cash flows that the CGU is able to generate. An impairment is deemed to have occurred where the recoverable amount of a CGU is less than the carrying value of the allocated goodwill. Any impairment is recognised immediately in the income statement and is not subsequently reversed. On disposal of an operation, the attributable amount of goodwill is included in the determination of the gain or loss on disposal.

(o) Other intangible assets

Acquired intangible assets

Acquired intangible assets that are either separable or arising from contractual rights are recognised at fair value at the date of acquisition, and subsequently at amortised cost. Such intangible assets include customer contracts and relationships, together with acquired software and technology. The fair value of acquired intangible assets is determined by use of appropriate valuation techniques.

Software

Purchased software is capitalised on the basis of the purchase price of the software product plus any external and internal costs subsequently incurred that are directly attributable to bring the software product to the condition necessary for it to be capable of operating in the manner intended.

Development costs

Directly attributable costs which are incurred in the development of certain assets are capitalised and amortised over their finite useful lives once the Group has determined that it has the intention and the necessary resources to complete the relevant project, that it is probable the resulting asset will generate economic benefits for the Group and the attributable expenditure can be reliably measured.

Amortisation

Amortisation is typically calculated using the straight-line method to allocate the cost of intangible assets over their estimated useful lives, as follows:

• Acquisition-related intangible assets:	
• Customer contracts and relationships	Between 3 and 9 years
• Software and technology	Between 5 and 7 years
• Software	Between 2 and 10 years
• Development costs	Between 3 and 5 years

For certain assets classified as development costs in the Group's Performance Products operating segment, amortisation is charged on a units of production basis, as this is considered to more accurately reflect the expected pattern of consumption of the future economic benefits embodied in the assets.

Assets under construction are carried at cost less any impairment in value, and are included in the relevant asset category. Amortisation of these assets commences when they are available for their intended use or sale.

(p) Property, plant and equipment

Property, plant and equipment is stated at historical cost less depreciation. The gross cost of an item of property, plant and equipment is the purchase price and any costs directly attributable to bring the asset to the location and condition necessary for it to be capable of operating in the manner intended. Grants contributing to the cost of an asset are deducted from the cost of the asset and reflected in its depreciation throughout its useful life.

Depreciation is typically calculated using the straight-line method to allocate the cost of items of property, plant and equipment less any residual value, over their estimated useful lives, as follows:

• Freehold land	Not depreciated
• Freehold buildings including fixed plant	Between 25 and 50 years
• Leasehold property including fixed plant	Over the term of the lease
• Plant and machinery	Between 4 and 10 years
• Fixtures, fittings and equipment	Between 2 and 10 years

The residual values and useful lives of assets are reviewed, and adjusted if appropriate, at the end of each reporting period.

For certain assets classified as plant and machinery in the Group's Performance Products operating segment, depreciation is charged on a units of production basis, as this is considered to more accurately reflect the expected pattern of consumption of the future economic benefits embodied in the assets.

Assets under construction are carried at cost less any impairment in value, and are included in the relevant asset category. Depreciation of these assets commences when they are available for their intended use or sale.

(q) Non-current assets held for sale

Non-current assets are classified as held for sale when their carrying amount is to be recovered principally through a sale transaction, rather than through continuing use, and a sale is considered highly probable within twelve months of their classification as held for sale. They are stated at the lower of their carrying amount and fair value less costs to sell. An impairment loss is recognised in the income statement for any initial or subsequent write-down of the assets to fair value less costs to sell. A gain is recognised in the income statement for any subsequent increases in fair value less costs to sell an asset, but not in excess of any cumulative impairment losses previously recognised.

A gain or loss not previously recognised by the date of the sale of the non-current assets is recognised in the income statement at the date of derecognition. Non-current assets are not depreciated or amortised while they are classified as held for sale and are presented separately from other non-current assets.

(r) Investments

Investments in subsidiaries are stated at cost less any impairment in value.

(s) Impairment of non-financial assets

Intangible assets that have an indefinite useful life or that are not available for use or sale are not subject to amortisation and are tested annually for impairment. Other intangible assets and items of property, plant and equipment with finite useful lives are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable.

1 Accounting policies (continued)

(s) Impairment of non-financial assets (continued)

An impairment loss is recognised for the amount by which the carrying amount of the asset exceeds its recoverable amount. The recoverable amount is the higher of the fair value less costs to sell of the asset and its value in use. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset for which the estimates of future cash flows have not been adjusted. Where assets do not generate cash flows independently from other assets, the Group estimates the recoverable amount of the cash-generating unit to which the asset belongs.

If the recoverable amount of an asset or cash-generating unit is estimated to be less than its carrying amount, the carrying amount of the asset or cash-generating unit is reduced to its recoverable amount. Prior impairments of non-financial assets are reviewed for possible reversal at each reporting date, other than goodwill.

(t) Inventories

Inventories are stated at the lower of cost, including attributable overheads allocated on the basis of normal operating capacity, and net realisable value. Cost is calculated using the 'weighted average' method in Technical Consulting and the 'first-in, first-out' method in Performance Products.

(u) Financial instruments

Non-derivative financial instruments

The Group's non-derivative financial instruments comprise trade receivables, trade payables, amounts owed by and to fellow Group undertakings (for standalone subsidiaries within the Group), cash and cash equivalents and borrowings. Cash and cash equivalents comprise cash balances and bank overdrafts repayable on demand. Bank overdrafts are shown within borrowings in current liabilities and bank loans and finance leases are shown within borrowings in either current liabilities or non-current liabilities depending on the maturity date.

Financial assets are measured initially at fair value, and subsequently at amortised cost. Trade receivables are stated net of impairment and for the purposes of impairment testing includes the non-financial contract assets of amounts recoverable on contracts ('AROC') and accrued revenue. These assets are assessed for impairment using the 'simplified approach' to the 'expected credit loss' model, which applies a 'default rate' at the point of origination that increases as the unpaid asset ages. Although past experience of significant credit losses on these assets has been negligible, the impairment assessment considers both past experience and future expectations of credit losses. As a result of this assessment, the Group considers the risk of expected credit losses on contract assets to be immaterial.

Trade receivables and contract assets are provided in full and subsequently written off when there is no reasonable expectation of recovery. Indicators that there may be no reasonable expectation of recovery could include, amongst others, evidence that the customer has entered administration or liquidation proceedings, or the persistent failure of a customer to enter into or adhere to a repayment plan.

The 'general approach' is applied to the impairment of other financial assets, the amount of which is based on whether there has been a significant deterioration in the credit risk of a financial asset.

Financial liabilities are classified as either amortised cost or fair value through profit and loss. Borrowings are recognised initially at fair value net of direct issue costs and subsequently at amortised cost. Differences between initial value and redemption value are recorded in the income statement over the period of the loan.

The fair values of all non-derivative financial instruments due for repayment after more than one year are approximately equal to their carrying values. The fair value of borrowings due for repayment after more than one year approximates to the carrying value as they are primarily floating rate loans where payments are reset to market rates at regular short-term intervals.

IFRS 9 *Financial Instruments* became effective for the Group from 1 July 2018. Prior to this, trade receivables were stated net of allowances for irrecoverable amounts. Evidence of impairment of trade receivables included indications that customers was experiencing significant financial difficulty or have significantly overdue balances.

Derivative financial instruments

The Group employs derivative financial instruments, including foreign exchange contracts, to mitigate currency exposures on trading transactions. Fair values of derivative financial instruments are based on the market values of similar instruments at the reporting date.

The Group designates the fair value of foreign currency swap contracts on intercompany loans as hedging instruments. The initial fair value is determined with reference to the relevant spot market exchange rate. The differential between the contracted strike rate and the discounted spot market exchange rate is defined as the movement in fair value. Fair value gains and losses on the remeasurement of cash flow derivatives are hedge accounted and recognised in retained earnings through other comprehensive income. The Group hedges the entire carrying value of all intercompany loans denominated in foreign currencies, on which credit risk is considered to be immaterial. Therefore, only when the economic relationship fails or ceases to exist would the Group recognise the net financial impact of the hedging instrument and the hedged item as ineffective in the income statement. Changes in fair value of foreign currency forward and option contracts that relate to hedged items are recognised in retained earnings through the income statement, together with the change in the fair value of the related hedge at the reporting date.

Though the Group did not hedge account up to 30 June 2018, cash flow derivatives held up to this date were used to manage foreign exchange exposures. Prior to 1 July 2018 and the implementation of IFRS 9, the gain or loss in fair value on remeasurement of all derivative financial instruments was taken to the income statement.

(v) Provisions

Provisions are required for restructuring costs and employment-related benefits when the Group has a present legal or constructive obligation at the reporting date as a result of a past event and it is probable that settlement will be required of an amount that can be reliably estimated. Provisions for warranty costs are recognised at the date of sale of the relevant products, at the Directors' best estimate of the expenditure required to settle the Group's probable liability.

Other provisions reflect the Directors' best estimate of future obligations relating to legal claims and litigation, together with dilapidation costs for the maintenance of leasehold properties arising from past events such as lease renewals or terminations.

These estimates are reviewed at the reporting date and updated as necessary.

(w) Specific adjusting items

Specific adjusting items are disclosed separately in the financial statements where it is necessary to do so to provide further understanding of the financial performance of the Group. These items comprise the amortisation of acquired intangible assets, acquisition-related expenditure, reorganisation costs and other non-recurring items that are included due to the significance of their nature or amount. Acquisition-related expenditure is incurred by the Group to effect a business combination, including the costs associated with the integration of acquired businesses. Reorganisation costs relate to non-recurring expenditure incurred as part of fundamental restructuring activities. Further information is provided in Note 4.

1 Accounting policies (continued)

(x) Issued standards, amendments and interpretations not yet effective

At 30 June 2019, the International Accounting Standards Board ('IASB') and IFRS IC had issued standards, amendments and interpretations as shown below, that subject to adoption by the EU, are not yet effective and have not been adopted prior to the financial period commencing after their effective date.

Issued standards, amendments and interpretations not yet effective	Effective date (periods commencing)	Endorsed by EU
Issued International Financial Reporting Standards		
IFRS 16 *Leases*	1 Jan 2019	Yes
IFRS 17 *Insurance Contracts*	1 Jan 2021	No
Amendments and Interpretations to International Financial Reporting Standards		
Annual Improvements to IFRS Standards 2015-2017 Cycle: IFRS 3 *Business Combinations*, IFRS 11 *Joint Arrangements*, IAS 12 *Income Taxes*, and IAS 23 *Borrowing Costs*	1 Jan 2019	Yes
IAS 19 *Employee Benefits*: Plan Amendment, Curtailment or Settlement	1 Jan 2019	Yes
IAS 28 *Investments in Associates and Joint Ventures*: Long-term Interests in Associates and Joint Ventures	1 Jan 2019	Yes
IFRIC 23 *Uncertainty over Income Tax Treatments*	1 Jan 2019	Yes
IFRS 9 *Financial Instruments:* Prepayment Features with Negative Compensation	1 Jan 2019	Yes
Amendments to References to the Conceptual Framework in IFRS Standards	1 Jan 2020	No
IAS 1 *Presentation of Financial Statements* and IAS 8 *Accounting Policies, Changes in Accounting Estimates and Errors:* Definition of Material	1 Jan 2020	No
IFRS 3 *Business Combinations:* Definition of a Business	1 Jan 2020	No

It is not expected that the adoption of the issued standards, amendments and interpretations listed above will have a significant impact on the financial statements of the Group or the Company in future periods, with the exception of the following:

IFRS 16 *Leases*

Summary

IFRS 16 *Leases* becomes effective to the Group as at 1 July 2019 and replaces IAS 17 Leases. IFRS 16 introduces a single lease accounting model for lessees, which requires the Group to recognise assets that represent its right to use underlying leased assets and liabilities that represent its obligation to make lease payments for all of the Group's operating leases, other than those that are short-term or low-value. Operating lease charges in the income statement will largely be replaced by depreciation charges and finance costs.

In addition, the Group sublets a small number of its leased properties. Sublessor accounting remains similar but sublet properties need to be reassessed to identify those that should be classified as finance leases under IFRS 16 and recognise these as assets that represent the net investment in sublet properties. No significant impact is expected to the income statement from sublessor accounting.

Approach

Principally all of the Group's leasing arrangements have been reviewed over the last year in light of the new accounting requirements of IFRS 16 and there are approximately 150 active leases at the transition date across the Group that will be recognised as at 1 July 2019. It is estimated that over 95% of these right-of-use assets and lease liabilities will be driven by approximately 50 active operating leases for the Group's technical centres and office locations around the world. The Group will adopt the modified retrospective approach to transition and will therefore not restate comparative information.

The Group expects to elect to adopt the following practical expedients on transition:

- Not to capitalise right-of-use assets or lease liabilities where the lease expires before 30 June 2020;
- Not to consider contracts other than those that were previously classified as leases;
- To utilise onerous lease provisions to reduce the right-of-use asset value;
- To use hindsight in determining the lease term where the contract contains renewal or termination options; and
- To exclude initial direct costs for the measurement of right-of-use assets.

Impact

The Group has assessed the estimated pre-tax impact that the initial application of IFRS 16 will have on its consolidated financial statements for the year ending 30 June 2020 based on its portfolio of lease contracts as at 30 June 2019, as described below and on the following page:

Estimated impact on the Consolidated Statement of Financial Position as at 1 July 2019	Group £m
Net investment in sublet property	2.0
Right-of-use assets:	
- Leasehold property	36.0
- Plant and machinery	1.0
Prepayments	(2.0)
Accruals	2.0
Provisions	1.0
Lease liabilities:	
- Current	(5.0)
- Non-current	(40.0)
Estimated impact on retained earnings	**(5.0)**

1 Accounting policies (continued)

(x) Issued standards, amendments and interpretations not yet effective (continued)

Impact (continued)

The right-of-use assets on transition will be lower than the lease liabilities due to a small number of longer term and higher value property leases that will be measured on transition as if the new accounting requirements had always been applied, but using an incremental borrowing rate as at 1 July 2019. This results in cumulative depreciation of these right-of-use assets to the date of transition being greater than the principal repayments of associated lease liabilities from the commencement of the lease to the date of transition. The difference between the right-of-use assets and the lease liabilities on transition will be taken to retained earnings. Remaining right-of-use assets will be measured at an amount equal to the lease liabilities on transition, adjusted for any prepaid or accrued lease expenses and onerous lease provisions.

The lease liabilities that will be recognised on transition are lower than the non-cancellable future operating lease commitments disclosed in Note 34, primarily due to the impact of discounting the future lease payments on a small number of long-term leases in the UK and the US in order to measure the lease liabilities under IFRS 16. The weighted average incremental borrowing rate applied to the lease liabilities was 4.2%.

Estimated impact on the Consolidated Income Statement for the year ending 30 June 2020	Group £m
Under IAS 17:	
- Operating lease charges	8.0
Under IFRS 16:	
- Operating lease charges	(1.0)
- Depreciation	(6.0)
Estimated impact on operating profit	1.0
- Finance costs	(2.0)
Estimated impact on profit before taxation	**(1.0)**

Estimated impact on the Consolidated Statement of Cash Flows for the year ending 30 June 2020

There is no overall impact on cash flows from the adoption of IFRS 16, but a change in presentation will see an improvement in the Group's cash flows from operating activities and a corresponding decline in cash flows from financing activities of approximately £5.0m. The Group does not expect the adoption of IFRS 16 to impact on its ability to comply with its loan covenants.

The actual impact of adopting IFRS 16 as at 1 July 2019 may change as the Group has not finalised the development and implementation of its new IT system to manage the Group's leases and produce the financial information required. The new accounting policies are subject to change until the Group presents its first financial statements that include the date of initial application.

2 Operating segments

The Group's reported operating segments are based on the financial information provided to the Chief Operating Decision Maker who is the Chief Executive Officer. The information reported includes financial performance but does not include the financial position of assets and liabilities. The operating segments were identified by evaluating the Group's products and services, processes, types of customers and delivery methods. The reportable segments are Technical Consulting and Performance Products.

Technical Consulting

Technical Consulting generates revenue from the provision of engineering programmes and technical, environmental and strategic consultancy services. This segment comprises consulting businesses in Automotive, Off-Highway & Commercial Vehicles, Rail, Energy & Environment, Defence, and Strategy.

These businesses have similar economic characteristics, as they each:

- provide a similar nature of services, with each segment providing technical consultancy services, with their respective cost bases being predominantly direct and indirect payroll costs;
- provide their services across a number of different geographies and market sectors;
- have diverse client bases, from small to large companies, as well as a mixture of private and government-backed organisations; and
- have similar distribution channels and operate across markets requiring adherence to regulatory frameworks that are similar in nature.

We have therefore deemed it appropriate to aggregate the results of these consulting businesses into a single reportable Technical Consulting operating segment.

Performance Products

Performance Products generates income from the production of low-volume and high-performance products, including bespoke engines, transmissions, and virtual engineering software products. Performance Products can manage the complete supply chain for customers and earns revenue for either the supply of products or for the provision of development, manufacturing or assembly services. This segment comprises businesses in High-Performance Vehicles & Motorsport, Defence, and Software.

These businesses have been aggregated on the basis that they provide the development, manufacture or assembly of specific products, as opposed to technical consultancy services, and face similar financial and competitive risks.

2 Operating segments (continued)

Measurement of performance

Management monitors the financial results of its operating segments separately for the purpose of making decisions about allocating resources and assessing performance. Segmental performance is measured based on operating profit, as this measure provides management with an overall view of how the different operating segments are managing their total cost base against the revenue generated from their portfolio of contracts.

Included within Head Office in the following tables are functions managed by a central division, including the costs of running the public limited company, which are recharged to the other operating segments.

Inter-segment revenue is eliminated on consolidation. Transactions are entered into on an arm's length basis in a manner similar to transactions with third parties.

For the year ended 30 June 2019	Technical Consulting £m	Performance Products £m	Head Office £m	Total £m
Total segment revenue	271.5	118.6	-	390.1
Inter-segment revenue	(1.0)	(4.7)	-	(5.7)
Revenue from external customers	270.5	113.9	-	384.4
Underlying operating profit	27.7	11.9	-	39.6
Specific adjusting items	(7.4)	-	(3.1)	(10.5)
Operating profit	20.3	11.9	(3.1)	29.1
Net finance costs	-	-	(2.6)	(2.6)
Profit before taxation	20.3	11.9	(5.7)	26.5
Depreciation and amortisation	10.1	3.9	1.4	15.4
Capital expenditure – other intangible assets	2.9	5.9	0.3	9.1
Capital expenditure – property, plant and equipment	3.5	3.9	0.2	7.6

Revenues from one customer represent approximately 19% of the Group's external revenue, which is primarily reported in the Performance Products segment.

For the year ended 30 June 2018 (restated)(1)	Technical Consulting £m	Performance Products £m	Head Office £m	Total £m
Total segment revenue	287.1	95.8	-	382.9
Inter-segment revenue	(0.3)	(4.1)	-	(4.4)
Revenue from external customers	286.8	91.7	-	378.5
Underlying operating profit	30.4	9.3	-	39.7
Specific adjusting items	(9.9)	-	(0.6)	(10.5)
Operating profit	20.5	9.3	(0.6)	29.2
Net finance costs	-	-	(2.2)	(2.2)
Profit before taxation	20.5	9.3	(2.8)	27.0
Depreciation and amortisation	12.2	2.1	1.6	15.9
Capital expenditure – other intangible assets	3.9	2.2	0.4	6.5
Capital expenditure – property, plant and equipment	7.5	0.6	0.1	8.2

Revenues from one customer represent approximately 16% of the Group's external revenue, which is primarily reported in the Performance Products segment.

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*, all of which relates to the Technical Consulting operating segment. See Note 38(a) for more details.

Non-current assets by geographical location (excluding deferred tax assets)

Asset location	2019 £m	2018 £m
United Kingdom	97.2	97.2
Netherlands	20.3	21.0
North America	15.8	16.2
Australia	27.7	-
Rest of the World	8.8	8.1
Total	169.8	142.5

3 Revenue

Disaggregation of revenue by:

(a) Stream

For the year ended 30 June	**2019 Technical Consulting £m**	**2019 Performance Products £m**	**2019 Total £m**	2018 Restated[1] Technical Consulting £m	2018 Restated[1] Performance Products £m	2018 Restated[1] Total £m
Services provided under:						
- fixed price contracts	**207.1**	**3.4**	**210.5**	219.2	4.5	223.7
- time and materials contracts	**53.9**	**-**	**53.9**	61.8	-	61.8
- subscription and software support contracts	**4.7**	**1.8**	**6.5**	4.2	1.0	5.2
Goods supplied:						
- manufactured or assembled products	**3.4**	**102.1**	**105.5**	-	80.1	80.1
- software products	**1.4**	**6.6**	**8.0**	1.6	6.1	7.7
Total revenue	**270.5**	**113.9**	**384.4**	286.8	91.7	378.5

(b) Customer location

For the year ended 30 June	**2019 Technical Consulting £m**	**2019 Performance Products £m**	**2019 Total £m**	2018 Restated[1] Technical Consulting £m	2018 Restated[1] Performance Products £m	2018 Restated[1] Total £m
United Kingdom	**79.9**	**72.5**	**152.4**	83.6	61.0	144.6
Mainland Europe	**73.7**	**22.7**	**96.4**	75.4	23.9	99.3
North America	**48.8**	**12.5**	**61.3**	45.2	2.4	47.6
China	**30.6**	**0.3**	**30.9**	38.8	0.1	38.9
Rest of Asia	**25.8**	**5.6**	**31.4**	37.1	3.7	40.8
Rest of the World	**11.7**	**0.3**	**12.0**	6.7	0.6	7.3
Total revenue	**270.5**	**113.9**	**384.4**	286.8	91.7	378.5

(c) Timing of recognition

For the year ended 30 June	**2019 Technical Consulting £m**	**2019 Performance Products £m**	**2019 Total £m**	2018 Restated[1] Technical Consulting £m	2018 Restated[1] Performance Products £m	2018 Restated[1] Total £m
Over time	**266.7**	**11.0**	**277.7**	286.0	11.1	297.1
At a point in time	**3.8**	**102.9**	**106.7**	0.8	80.6	81.4
Total revenue	**270.5**	**113.9**	**384.4**	286.8	91.7	378.5

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

4 Specific adjusting items

	2019 £m	2018 £m
Amortisation of acquired intangible assets (Note 14)	**4.0**	4.3
Acquisition-related expenditure[(1)]	**1.8**	1.4
Reorganisation costs[(2)]	**3.4**	4.8
Guaranteed Minimum Pensions ('GMP') equalisation[(3)]	**1.3**	-
Total before tax	**10.5**	10.5
Tax credit on specific adjusting items	**(1.6)**	(0.9)
Derecognition of net deferred tax assets[(4)]	**-**	2.2
Total after tax	**8.9**	11.8

(1) Acquisition-related expenditure in the current and prior year comprised the costs of maintaining an internal acquisitions department which primarily incurred professional fees to effect acquisition processes that were either successful (see Notes 12 and 39(a)) or unsuccessful, together with integration and employee retention costs on a pro rata basis in relation to previously acquired businesses.

(2) Reorganisation costs in the current and prior year comprised non-recurring expenditure incurred as part of a fundamental restructuring of the Group's Technical Consulting business, primarily in Automotive across the UK, Europe and the US. These costs comprised redundancy-related and dual-running costs in relation to headcount reductions and the establishment of a shared service centre. In addition, contractor costs, professional fees, onerous contract costs and other non-recurring costs associated with asset disposals in the prior year and the subsequent scaling down of operations in Germany are also included.

(3) In October 2018, the High Court issued a judgement confirming that pension schemes are required to equalise male and female members' benefits for the effect of GMP. The past service cost due to GMP equalisation in the current year is considered to be non-recurring in nature and significant in its amount.

(4) In the prior year a net deferred tax asset which primarily comprised historical accumulated losses in Germany was derecognised. Due to the various restructuring actions taken in Germany during the prior year, it was considered unlikely that sufficient taxable profits would be available in the foreseeable future against which the net deferred tax asset could be utilised.

Amortisation of acquired intangible assets and reorganisation costs are reported in the Technical Consulting segment. Third party acquisition-related expenditure and GMP equalisation costs are reported in the Head Office segment. See Note 2 for further details.

5 Operating profit

The following items have been charged/(credited) to operating profit:	2019 £m	2018 £m
Amortisation of other intangible assets (Note 14)	**9.8**	9.5
Depreciation of property, plant and equipment (Note 15)	**5.6**	6.4
Cost of inventories recognised as expense	**70.9**	50.4
Operating lease rentals payable	**8.5**	8.7
Repairs and maintenance on property, plant and equipment	**12.2**	12.3
Redundancy and termination costs	**2.4**	4.0
Rental income	**(0.9)**	(0.5)
Net impairment reversals on trade receivables (Note 18)	**(0.6)**	(0.6)
Profit on disposal of non-current assets held for sale (Note 19)	**-**	(1.6)
Profit on disposal of property, plant and equipment	**(0.7)**	-
Research and Development Expenditure Credits ('RDEC')	**(7.1)**	(8.0)

The following items for research and development activities have been charged/(credited) to operating profit:	2019 £m	2018 £m
Research and development expenditure	**5.8**	4.4
Government grant income received in respect of this expenditure	**(2.2)**	(1.6)
Total	**3.6**	2.8

6 Auditors' remuneration

Fees payable for services provided by the Company's auditors and its associates[1]	KPMG 2019 £m	PwC 2018 £m
Statutory audit of the Company and its consolidated financial statements[2]	**0.2**	0.3
Statutory audit of the Company's subsidiaries and their financial statements[3]	**0.3**	0.2
Total audit fees	**0.5**	0.5
Audit-related assurance services[4]	**0.1**	0.1
Other non-audit services[5]	**-**	0.1
Total non-audit fees	**0.1**	0.2

(1) Following legislation requiring a mandatory change of the external auditors of the Group by 17 June 2020, an audit tender process was undertaken and KPMG LLP ('KPMG') were appointed as the Company's and the Group's external auditors for the year ended 30 June 2019. This was subsequently approved by shareholders at the AGM on 15 November 2018.

(2) Fees payable during the year to the Company's auditors and its associates for the statutory audit of the Company and its consolidated financial statements were £195,000 (2018: £274,000).

(3) Fees payable during the year to the Company's auditors and its associates for the statutory audit of the Company's subsidiaries and their financial statements were £351,000 (2018: £212,000).

(4) Fees payable during the year to the Company's auditors and its associates for audit-related assurance services were £50,000 (2018: £59,000) and comprised £42,000 (2018: £44,000) pursuant to the interim review and £8,000 (2018: £15,000) for independent reviews, agreed-upon procedures and other services closely related to the audit of the Company and its subsidiaries.

(5) Fees payable during the year to the Company's auditors and its associates for other non-audit services were £Nil (2018: £80,000). Prior year fees comprised £75,000 for services in respect of acquisition and disposal processes, together with £5,000 for other services.

Total non-audit fees payable to the external auditors for audit-related assurance services and other non-audit services for the financial year were 9% (2018: 29%) of total audit fees. These non-audit fees in the current year comprised the Group's interim review and other audit-related assurance services. In the prior year the services provided by PricewaterhouseCoopers LLP ('PwC') as the previous auditors comprised fees in respect of due diligence on targets for acquisition and assistance with disposals of assets. It was considered to be in the interests of the Group to purchase these services from the external auditors at the time due to their in-depth knowledge of the Group.

7 Employees

Staff costs	2019 £m	2018 £m
Wages and salaries (including redundancy and termination costs)	**153.6**	147.3
Social security costs	**15.8**	17.1
Pension costs – defined contribution schemes	**9.5**	9.6
Share-based payments (Note 29)	**1.0**	1.0
Total staff costs	**179.9**	175.0

Average monthly number of employees (including Executive Directors)	2019 Number	2018 Number
Technical Consulting	**2,356**	2,525
Performance Products	**389**	323
Head Office	**55**	48
Total average number of employees	**2,800**	2,896

Key management compensation	2019 £m	2018 £m
Short-term employee benefits	**4.1**	4.2
Share-based payments	**0.5**	0.8
Post-employment benefits	**0.3**	0.3
Termination benefits	**-**	0.1
Total key management compensation	**4.9**	5.4

Key management personnel are the Board of Directors, together with the Managing Directors who have the authority and responsibility for planning, directing and controlling the Group's activities and resources within the market sectors in which the Group operates.

The remuneration received by all Executive and Non-Executive Directors during the year is disclosed in the Directors' Remuneration Report on page 91.

8 Net finance costs

	2019 £m	2018 £m
Finance income:		
Bank interest receivable	**0.5**	0.4
Total finance income	**0.5**	0.4
Finance costs:		
Bank interest payable on borrowings	**(3.0)**	(2.1)
Defined benefit pension financing costs (Note 24)	**(0.1)**	(0.5)
Total finance costs	**(3.1)**	(2.6)
Net finance costs	**(2.6)**	(2.2)

9 Taxation

	2019 £m	2018 Restated(1) £m
Current income tax:		
- UK corporation tax	**1.6**	3.6
- Adjustments in respect of prior years	**(0.8)**	0.2
- Total UK tax	**0.8**	3.8
- Foreign corporation tax	**1.7**	2.7
- Adjustments in respect of prior years	**0.1**	0.5
- Total foreign tax	**1.8**	3.2
Total current income tax	**2.6**	7.0
Deferred tax:		
- Charge for the year(2)	**3.0**	2.8
- Adjustments in respect of prior years	**1.0**	(0.5)
Total deferred tax	**4.0**	2.3
Total taxation	**6.6**	9.3
Tax on items recognised in other comprehensive income	**1.4**	2.7
Tax on items recognised directly in equity	**-**	(0.1)

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details. During the current financial year the £1.3m deferred tax asset that arose on transition unwound as a deferred tax charge, with a corresponding credit to UK corporation tax.

(2) Included within the Group's restated deferred tax charge for the prior year of £2.8m, is the derecognition of a net deferred tax asset brought forward of £2.2m, as set out in further detail in Footnote 4 of Note 4.

Tax on items recognised in other comprehensive income relate to the tax impact of remeasurements of the defined benefit pension scheme. Tax on items recognised directly in equity relate to equity-settled share-based payment transactions.

Changes to the UK corporation tax rates were enacted on 15 September 2016 as part of the Finance Act 2016. These included a reduction to the main rate from 19% to 17% from 1 April 2020. Deferred taxes at the reporting date have been measured and reflected in these financial statements by using the enacted rate within each jurisdiction.

The tax charge for the year is higher (2018: higher) than the standard rate of corporation tax in the UK. The differences are set out below:

	2019 £m	2018 Restated(1) £m
Profit for the year before tax	**26.5**	27.0
Multiplied by the standard rate of corporation tax in the UK of 19% (2018: 19%)	**5.0**	5.1
Effects of:		
Losses not recognised	**0.1**	0.8
Expenses not deductible for tax purposes	**0.5**	0.7
Government tax incentives(3)	**(0.2)**	(0.2)
Other overseas taxes(4)	**0.5**	0.3
Adjustments in respect of prior years	**0.3**	0.2
Changes in corporation tax rates	**0.4**	0.2
Derecognition of deferred taxes	**-**	2.2
Total taxation	**6.6**	9.3

(3) Primarily relates to R&D tax credits.

(4) Primarily relates to withholding taxes.

10 Earnings per share

Basic earnings per share is calculated by dividing the earnings attributable to ordinary shareholders by the weighted average number of shares outstanding during the year, excluding those held by an employee benefit trust for the Long-Term Incentive Plan ('LTIP') and by the Share Incentive Plan ('SIP') for the free share scheme which are treated as cancelled for the purposes of the calculation.

For diluted earnings per share, the weighted average number of ordinary shares in issue is adjusted to assume conversion of all dilutive potential ordinary shares. These include potential awards of LTIP shares and options granted to employees. The assumed proceeds from these is regarded as having been received at the average market price of ordinary shares during the year.

Reconciliations of the earnings and the weighted average number of shares used in the calculations are set out below. Underlying earnings per share is also shown because the Directors consider that this provides a more useful indication of underlying performance and trends over time.

	2019 £m	2018 Restated[1] £m
Earnings attributable to owners of the parent	**19.8**	17.6
Add back the net-of-tax impact of:		
- Amortisation of acquired intangible assets	**3.4**	3.5
- Acquisition-related expenditure	**1.2**	1.4
- Reorganisation costs	**3.0**	4.7
- Guaranteed Minimum Pensions ('GMP') equalisation	**1.3**	-
- Derecognition of net deferred tax assets	**-**	2.2
Underlying earnings attributable to owners of the parent	**28.7**	29.4

	2019 Number of shares millions	2018 Number of shares millions
Basic weighted average number of shares in issue	**53.4**	53.4
Effect of dilutive potential shares	**0.2**	0.2
Diluted weighted average number of shares in issue	**53.6**	53.6

Earnings per share	2019 pence	2018 Restated[1] pence
Basic	**37.1**	33.0
Diluted	**36.9**	32.8

Underlying earnings per share	2019 pence	2018 Restated[1] pence
Basic	**53.7**	55.1
Diluted	**53.5**	54.9

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

11 Dividends

	2019 £m	2018 £m
Final dividend for the year ended 30 June 2018 of 14.71p (2017: 13.88p) per share	**7.8**	7.4
Interim dividend for the year ended 30 June 2019 of 6.00p (2018: 5.75p) per share	**3.2**	3.1
Equity dividends paid	**11.0**	10.5

The Directors are proposing a final dividend in respect of the financial year ended 30 June 2019 of 15.28p per share which will utilise £8.2m of retained earnings. It will be paid on 21 November 2019 to shareholders who are on the register of members at the close of business on 8 November 2019, subject to approval at the Annual General Meeting on 14 November 2019.

12 Acquisitions

(a) Acquisitions in the current year – Transport Engineering

On 31 May 2019, the Group acquired the entire issued share capital of Transport Engineering Pty Ltd ('Transport Engineering') for initial cash consideration payable of £21.7m (AUD 39.5m) which includes an adjustment for cash and normalised net working capital of £0.5m (AUD 0.9m) paid post year-end, together with the accrued provisional fair value of contingent cash consideration payable of £5.1m (AUD 9.4m).

Transport Engineering is a leading rail technical services consultancy based in Australia. It expands upon the Group's existing capabilities within the growing Asia-Pacific rail market and provides a footprint for other Ricardo businesses in Australia. Transport Engineering was renamed Ricardo Rail Australia on 11 June 2019.

The following tables set out the provisional fair value of cash consideration payable to acquire Transport Engineering, together with the provisional assessment of the fair value of net assets acquired.

Provisional fair value of cash consideration	£m
Initial cash consideration	21.7
Provisional fair value of contingent cash consideration	5.1
Total provisional fair value of cash consideration	**26.8**

Provisional assessment of the fair value of identifiable net assets acquired	£m
Customer contracts and relationships (Note 14)	9.7
Property, plant and equipment (Note 15)	0.1
Trade, contract and other receivables	2.3
Cash and cash equivalents	2.3
Trade, contract and other payables	(1.7)
Current tax liabilities	(0.9)
Deferred tax liabilities (Note 25(b))	(2.9)
Total provisional assessment of the fair value of identifiable net assets acquired	**8.9**
Goodwill	17.9
Total provisional fair value of cash consideration	**26.8**

The Group has also acquired all of Transport Engineering's shareholding in its associate, Wamarragu Transport Services Pty Ltd, the financial results of which are immaterial to the Group.

The cash impact of the acquisition in the year was £18.9m (AUD 34.4m), being the initial cash consideration of £21.2m (AUD 38.6m) paid on completion, less cash acquired of £2.3m (AUD 4.2m).

The maximum contingent cash consideration payable is £8.2m (AUD 15.0m). The amounts payable will be based on the achievement of annual performance targets measured against the profit before tax of Transport Engineering across a two year earn-out period. Each earn-out is only payable in full if the performance target is achieved.

Provisional adjustments have been made to identifiable net assets acquired to reflect their fair value. These include the recognition of customer-related intangible assets separable from goodwill amounting to £9.7m (AUD 17.8m). The provisional fair values of contingent cash consideration and identifiable net assets acquired may be adjusted in future in accordance with the requirements of IFRS 3 *Business Combinations* and the sale and purchase agreement.

The provisional assessment of goodwill arising on acquisition can be ascribed to the existence of a skilled, active workforce, developed expertise and processes and the opportunities to obtain new contracts and develop the business. None of these meet the criteria for recognition as intangible assets separable from goodwill. None of the goodwill recognised on consolidation is expected to be deductible for tax purposes.

The provisional assessment of the fair value of trade, contract and other receivables acquired of £2.3m (AUD 4.2m) includes trade receivables of £0.3m (AUD 0.6m) and amounts recoverable on contracts of £1.8m (AUD 3.2m), all of which is expected to be collectible.

Acquisition-related expenditure of £0.5m has been charged to the income statement for the year ended 30 June 2019 and is included as a specific adjusting item in Note 4.

The revenue included in the income statement in relation to the acquired business was £1.4m. The underlying operating profit over the same period was £0.3m. This is reported in the Technical Consulting segment in Note 2.

Had Transport Engineering been acquired and consolidated from 1 July 2018, revenue and underlying operating profit in the income statement would be £14.0m and £3.2m higher, respectively, based on available information for the period from 1 July 2018 to the acquisition date.

12 Acquisitions (continued)

(b) Acquisitions in the prior year – Control Point Corporation

On 8 September 2017, the Group acquired the entire issued share capital of Control Point Corporation ('CPC'), which was subsequently renamed Ricardo Defense, Inc., for initial cash consideration of £6.3m (USD 8.3m) and fair value of contingent cash consideration of £1.7m (USD 2.2m), based upon CPC achieving certain financial performance targets. The acquisition of CPC expanded upon the Group's vehicle engineering capabilities in the Defence sector and added expertise in distributed software-based systems and fleet management technologies.

The following tables set out the fair value of cash consideration paid to acquire CPC, together with the fair value of net assets acquired:

Fair value of cash consideration	£m
Initial cash consideration	6.3
Fair value of contingent cash consideration	1.7
Total fair value of cash consideration	**8.0**

Fair value of identifiable net assets acquired	£m
Customer contracts and relationships (Note 14)	2.0
Software and technology (Note 14)	0.3
Property, plant and equipment (Note 15)	0.1
Trade, contract and other receivables	2.1
Cash and cash equivalents	1.7
Trade, contract and other payables	(0.8)
Deferred tax liabilities (Note 25(b))	(0.4)
Provisions (Note 26)	(0.4)
Total fair value of identifiable net assets acquired	**4.6**
Goodwill	3.4
Total fair value of cash consideration	**8.0**

All of the initial cash consideration of £6.3m (USD 8.3m) was paid in the prior year, net of cash acquired of £1.7m (USD 2.2m).

Adjustments were made to identifiable assets and liabilities on acquisition to reflect their fair value. These included the recognition of customer-related intangible assets amounting to £2.0m (USD 2.6m) and developed software and technology assets of £0.3m (USD 0.4m). The fair value of the contingent cash consideration and identifiable net assets acquired were identified in accordance with the requirements of IFRS 3 *Business Combinations* and the sale and purchase agreement.

The goodwill arising on acquisition can be ascribed to the existence of a skilled, active workforce, developed expertise and processes and the opportunities to obtain new contracts and develop the business. None of these meet the criteria for recognition as intangible assets separable from goodwill. The goodwill recognised is deductible for tax purposes.

The fair value of trade, contract and other receivables of £2.1m (USD 2.8m) included net trade receivables of £2.0m (USD 2.6m) and amounts recoverable on contracts of £0.1m ($0.1m), all of which has been collected.

Acquisition-related expenditure of £0.8m was charged to the income statement for the year ended 30 June 2018 and was included as a specific adjusting item in Note 4.

The revenue included in the prior year income statement in relation to the acquired business was £10.3m. The underlying operating profit over the same period was £1.0m. This was reported in the Technical Consulting segment in Note 2.

Had CPC been acquired and consolidated from 1 July 2017, revenue and underlying operating profit in the prior year income statement would have been £2.2m and £0.2m higher respectively, based on available information for the period from 1 July 2017 to the acquisition date.

13 Goodwill

Group	£m
At 1 July 2017	62.0
Acquisition of business (Note 12(b))	3.4
Exchange adjustments	0.1
At 30 June 2018	65.5
Acquisition of business (Note 12(a))	17.9
Exchange adjustments	0.8
At 30 June 2019	**84.2**

The recoverable amount of each cash-generating unit ('CGU') is calculated by assessing its value in use, which is determined by performing discounted future pre-tax cash flow calculations for a five-year period and projected into perpetuity. The five-year cash flow forecasts are based on the budget for the following year (year one), the business plans for years two and three (the three-year plan), and operating profit projections for years four and five, with a 80% operating cash flow conversion rate.

The three-year plan is prepared by management, and is reviewed and approved by the Board. The three-year plan reflects past experience, management's assessment of the current contract portfolio, contract wins, contract retention, price increases, gross margin, as well as future expected market trends. Operating profit projections for years four and five, and cash flows beyond year five are projected into perpetuity using a long-term growth rate, which is determined as being the lower of the planned compound annual growth rate in each CGU's three-year plan and external third party forecasts of the prevailing inflation and economic growth rates for each of the territories in which each CGU primarily operates.

Apart from operating cash flows and long-term growth rates, the other key assumption is the pre-tax discount rate, which is derived from externally sourced data and reflects the current market assessment of the Group's time value of money and risks specific to each CGU.

The carrying value of goodwill and key assumptions used in determining the recoverable amount of each CGU are as follows:

	Carrying value		Pre-tax discount rate		Long-term growth rate	
	2019	2018	**2019**	2018	**2019**	2018
Group	**£m**	£m	**%**	%	**%**	%
Technical Consulting:						
Ricardo Rail[1]	**46.0**	27.6	**8.0**	8.1	**4.5**	4.8
Ricardo Automotive Europe	**20.3**	20.1	**8.1**	7.6	**3.2**	4.1
Ricardo Energy & Environment	**13.3**	13.3	**7.1**	7.6	**3.5**	4.1
Ricardo Defense	**3.5**	3.4	**8.4**	9.2	**3.5**	3.7
Technical Consulting total	**83.1**	64.4				
Performance Products:						
Ricardo Performance Products	**1.1**	1.1	**7.1**	7.6	**3.5**	4.1
At 30 June	**84.2**	65.5				

(1) As set out in further detail in Note 12(a), the Group acquired Transport Engineering Pty Ltd ('Transport Engineering') on 31 May 2019, adding goodwill of £17.9m to the Ricardo Rail CGU. This Acquisition provides an active presence for Ricardo Rail in Australia, a strategically important, sizeable and growing market. Transport Engineering was renamed Ricardo Rail Australia on 11 June 2019 and forms a core part of the Group's Rail business, adding breadth and depth to Ricardo Rail's existing capabilities.

The three-year plan and discounted cash flow calculations thereon provide a value in use which supports the carrying value of the goodwill allocated to each CGU at 30 June 2019, resulting in no impairment for the year (2018: £Nil). In considering sensitivities, no reasonable change in any of the above key assumptions would cause the value in use of the CGUs to fall below the carrying value of the allocated goodwill. The sensitivities assessed include a 10% reduction in planned operating profit, a 20% reduction in the planned operating cash flow conversion rate, a 1% increase in the pre-tax discount rate and a 1% decrease in the long-term growth rate, together with a further scenario whereby all sensitivities were combined together.

14 Other intangible assets

Group	Acquired intangible assets: Customer contracts and relationships £m	Acquired intangible assets: Software and technology £m	Software £m	Development costs £m	Total £m
Cost					
At 1 July 2017	25.5	1.9	24.7	15.5	67.6
Acquisition of business (Note 12(b))	2.0	0.3	-	-	2.3
Additions	-	-	1.4	5.1	6.5
Assets classified as held for sale (Note 19)	-	-	(1.4)	-	(1.4)
Reclassifications	-	-	0.2	(0.2)	-
Exchange rate adjustments	0.1	-	(0.1)	(0.1)	(0.1)
At 30 June 2018	27.6	2.2	24.8	20.3	74.9
Acquisition of business (Note 12(a))	9.7	-	-	-	9.7
Additions	-	-	1.5	7.6	9.1
Disposals	-	-	(0.5)	(0.2)	(0.7)
Exchange rate adjustments	0.3	-	0.1	0.4	0.8
At 30 June 2019	**37.6**	**2.2**	**25.9**	**28.1**	**93.8**
Accumulated amortisation					
At 1 July 2017	10.2	0.8	17.1	7.1	35.2
Charge for the year	3.9	0.4	2.3	2.9	9.5
Assets classified as held for sale (Note 19)	-	-	(1.4)	-	(1.4)
Reclassifications	-	-	0.1	(0.1)	-
Exchange rate adjustments	(0.1)	-	-	-	(0.1)
At 30 June 2018	14.0	1.2	18.1	9.9	43.2
Charge for the year	3.6	0.4	2.3	3.5	9.8
Disposals	-	-	(0.5)	(0.2)	(0.7)
Exchange rate adjustments	0.1	0.1	0.1	0.2	0.5
At 30 June 2019	**17.7**	**1.7**	**20.0**	**13.4**	**52.8**
Net book value					
At 30 June 2019	**19.9**	**0.5**	**5.9**	**14.7**	**41.0**
At 30 June 2018	13.6	1.0	6.7	10.4	31.7
At 30 June 2017	15.3	1.1	7.6	8.4	32.4

Customer contracts and relationships were primarily identified as part of the previous acquisitions of AEA and LR Rail. The assets specific to these acquisitions have carrying values of £1.5m (2018: £2.6m) and £7.4m (2018: £9.3m) and have remaining amortisation periods of one and four years, respectively. Customer contracts and relationships were also identified as part of the acquisition in the current year of Transport Engineering (see Note 12(a)), which has a carrying value of £9.5m and a remaining amortisation period of five years.

Software which is not acquired through business combinations primarily comprises costs that have been capitalised in respect of an internally developed ERP system. The ERP system has a carrying value of £1.9m (2018: £2.8m) and has a remaining amortisation period of four years. Software includes £0.9m (2018: £0.9m) in respect of assets under construction which are not being amortised until the assets are made available for use.

Development costs are incurred to develop and regularly update a suite of simulation and analysis software tools used in the Automotive sector, but also with applications in other sectors. The suite of assets have a carrying value of £5.0m (2018: £3.6m) and an amortisation period of three years is applied to each annual update when released. Development costs also include a patented system that combines anti-lock braking and electronic stability control ('ABS brake kits') to mitigate rollover fatalities commonly associated with the High Mobility Multipurpose Wheeled Vehicle ('HMMWV' or 'Humvee'). The asset has a carrying value of £2.4m (2018: £2.0m).

In addition, development costs include £5.3m (2018: £5.8m) in respect of assets under construction which are not being amortised until the assets are made available for use or sale. Development costs under construction include assets such as engineering software updates under development, together with new technology, tools and processes in the Automotive and Energy & Environment businesses.

The amortisation charge of £9.8m (2018: £9.5m) is comprised of £2.4m (2018: £1.8m) included within cost of sales and £7.4m (2018: £7.7m) included within administrative expenses in the income statement, of which £4.0m (2018: £4.3m) relates to acquired intangible assets and is presented within specific adjusting items, as set out in Note 4.

14 Other intangible assets (continued)

Company	Software £m
Cost	
At 1 July 2017 and 30 June 2018	8.8
Additions	0.3
Disposals	(0.2)
At 30 June 2019	**8.9**
Accumulated amortisation	
At 1 July 2017	6.1
Charge for the year	1.1
At 30 June 2018	7.2
Charge for the year	1.0
Disposals	(0.2)
At 30 June 2019	**8.0**
Net book value	
At 30 June 2019	**0.9**
At 30 June 2018	1.6
At 30 June 2017	2.7

Software primarily comprises costs that have been capitalised in respect of an internally developed ERP system. The ERP system has a carrying value of £0.2m (2018: £0.9m) and a remaining amortisation period of one year. Software includes £0.4m (2018: £0.3m) in respect of assets under construction which are not being amortised until the assets are made available for use.

15 Property, plant and equipment

Group	Freehold land and buildings £m	Leasehold property £m	Plant and machinery £m	Fixtures, fittings and equipment £m	Total £m
Cost					
At 1 July 2017	24.1	4.0	109.8	24.2	162.1
Acquisition of business (Note 12(b))	-	-	0.1	-	0.1
Additions	0.5	0.6	4.4	2.7	8.2
Disposals	(0.3)	-	(0.5)	(0.5)	(1.3)
Assets classified as held for sale (Note 19)	(3.8)	-	(13.8)	(2.7)	(20.3)
Exchange rate adjustments	-	(0.1)	(0.7)	-	(0.8)
At 30 June 2018	20.5	4.5	99.3	23.7	148.0
Acquisition of business (Note 12(a))	-	-	0.1	-	0.1
Additions	0.5	0.5	4.6	2.0	7.6
Disposals	-	-	(5.0)	(1.9)	(6.9)
Assets classified as held for sale (Note 19)	-	-	(19.5)	-	(19.5)
Reclassifications	(0.6)	0.6	0.6	(0.6)	-
Exchange rate adjustments	-	0.1	0.6	0.2	0.9
At 30 June 2019	**20.4**	**5.7**	**80.7**	**23.4**	**130.2**
Accumulated depreciation					
At 1 July 2017	5.4	2.2	87.4	19.1	114.1
Charge for the year	0.6	0.3	3.4	2.1	6.4
Disposals	(0.1)	-	(0.5)	(0.5)	(1.1)
Assets classified as held for sale (Note 19)	(1.5)	-	(12.0)	(2.6)	(16.1)
Exchange rate adjustments	0.1	(0.1)	(0.5)	(0.1)	(0.6)
At 30 June 2018	4.5	2.4	77.8	18.0	102.7
Charge for the year	0.4	0.4	2.8	2.0	5.6
Disposals	-	-	(5.0)	(1.9)	(6.9)
Assets classified as held for sale (Note 19)	-	-	(16.6)	-	(16.6)
Reclassifications	(0.3)	0.3	-	-	-
Exchange rate adjustments	-	-	0.7	0.1	0.8
At 30 June 2019	**4.6**	**3.1**	**59.7**	**18.2**	**85.6**
Net book value					
At 30 June 2019	**15.8**	**2.6**	**21.0**	**5.2**	**44.6**
At 30 June 2018	16.0	2.1	21.5	5.7	45.3
At 30 June 2017	18.7	1.8	22.4	5.1	48.0

The carrying value of assets under construction included in property, plant and equipment amounts to £5.0m (2018: £4.4m). Property, plant and equipment under construction includes a hybrid powertrain rig within plant and machinery with a carrying value of £1.8m (2018: £1.5m). Amortisation is expected to commence in the next financial year.

At 30 June 2019, the Group had plant and machinery purchased during the year under a finance lease and secured on the asset (see Note 21) with a carrying value of £0.7m (2018: £Nil).

At 30 June 2019, contracts had been placed for future capital expenditure, which have not been provided for in the financial statements, amounting to £1.7m (2018: £1.3m).

15 Property, plant and equipment (continued)

Company	Freehold land and buildings £m	Leasehold property £m	Fixtures, fittings and equipment £m	Total £m
Cost				
At 1 July 2017	5.7	1.1	1.0	7.8
Additions	-	-	0.1	0.1
At 30 June 2018	5.7	1.1	1.1	7.9
Additions	-	-	0.2	0.2
Disposals	-	-	(0.4)	(0.4)
Reclassifications	(0.1)	-	0.1	-
At 30 June 2019	**5.6**	**1.1**	**1.0**	**7.7**
Accumulated depreciation				
At 1 July 2017	2.0	0.5	0.6	3.1
Charge for the year	0.1	-	0.2	0.3
At 30 June 2018	2.1	0.5	0.8	3.4
Charge for the year	0.1	-	0.1	0.2
Disposals	-	-	(0.4)	(0.4)
At 30 June 2019	**2.2**	**0.5**	**0.5**	**3.2**
Net book value				
At 30 June 2019	**3.4**	**0.6**	**0.5**	**4.5**
At 30 June 2018	3.6	0.6	0.3	4.5
At 30 June 2017	3.7	0.6	0.4	4.7

A contingent liability of up to £2.8m which is associated with a guarantee provided to the Ricardo Group Pension Fund in July 2013 is secured on specific land and buildings. Further detail is given in Note 35.

16 Investments

Company	Shares in subsidiaries £m
At 1 July 2017, 30 June 2018 and 30 June 2019	**103.1**

The Directors consider that the fair value of investments is not less than the carrying value.

Details of the Company's subsidiaries and related undertakings are shown in Note 37.

17 Inventories

Group	**2019 £m**	2018 £m
Raw materials and consumables	**9.5**	8.4
Work in progress	**3.9**	3.9
Finished goods	**1.1**	1.0
At 30 June	**14.5**	13.3

Inventories of £70.9m (2018: £50.4m) were recognised as an expense during the year and included in cost of sales.

During the year £0.4m (2018: £0.5m) of inventory was written down and also included in cost of sales.

18 Trade, contract and other receivables

	Group 2019	Group 2018 Restated[1]	Company 2019	Company 2018
	£m	£m	£m	£m
Trade receivables	**65.3**	65.5	**-**	-
Less provision for impairment of trade receivables[2]	**(2.8)**	(1.1)	**-**	-
Trade receivables – net	**62.5**	64.4	**-**	-
Contract assets:				
- Amounts recoverable on contracts ('AROC')	**54.1**	46.1	**-**	-
- Accrued revenue	**1.4**	2.3	**-**	-
Amounts owed by Group undertakings	**-**	-	**90.0**	88.5
Prepayments	**11.0**	9.1	**0.9**	1.1
Other receivables	**12.4**	13.4	**0.9**	-
At 30 June	**141.4**	135.3	**91.8**	89.6

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

(2) In the prior year, the provision for impairment of trade receivables was measured in accordance with IAS 39 *Financial Instruments: Recognition and Measurement*. In the current year, the provision for impairment of trade receivables was measured in accordance with IFRS 9 *Financial Instruments*, which became effective for the Group from 1 July 2018. Comparative information has not been restated as a result of the transition method adopted, with the transitional adjustment impacting retained earnings as at 1 July 2018. Please see Note 38(b) for further details.

All trade, contract and other receivables are due within the next 12 months.

Contract assets primarily relate to the Group's rights to consideration for work completed but not yet invoiced at the reporting date. The carrying amount at year-end is presented net of a provision for impairment of contract assets of £1.1m (2018: £1.2m). Contract assets have increased in the current year primarily due to changes in the mix of milestones and invoicing schedules on contracts, together with acquired contract assets (see Note 12(a)). Contract assets are transferred to trade receivables when an invoice is issued to the customer. Payment terms typically range from immediate payment to 60 days after the invoice date and standard payment terms are usually 30 days after the invoice date.

The net revenue recognised in the year from wholly or partially satisfied distinct performance obligations in previous years is £25.9m (2018: £28.2m). This is primarily due to the net impact of variation orders and cancellations for changes in scope and transaction price on contracts.

In respect of the Company, £8.2m (2018: £8.8m) of the amounts owed by Group undertakings are due for repayment within the next 12 months and the remaining £81.8m (2018: £79.7m) have no fixed repayment date. £70.5m (2018: £67.6m) of the amounts owed by Group undertakings carry interest at rates between 2.3% and 5.0% (2018: 2.4% and 5.0%) with the remaining £19.5m (2018: £20.9m) being interest-free. All amounts owed by Group undertakings are unsecured.

Group provision for impairment of trade receivables	2019 £m	2018 £m
At 1 July	**(1.1)**	(1.8)
Transitional IFRS 9 adjustment to opening retained earnings[2]	**(2.4)**	-
Net impairment reversals to the income statement (Note 5)	**0.6**	0.6
Amounts utilised	**0.1**	0.1
At 30 June	**(2.8)**	(1.1)

Information about the Group's exposure of its trade receivables to credit and market risk is included in Notes 23(d) and 23(e).

Order book

Order book comprises the value of all unworked purchase orders and contracts received from customers at the reporting date and provides an indication of the amount of revenue that has been secured and will be recognised in future accounting periods. Order book represents the transaction price allocated to wholly and partially unsatisfied distinct performance obligations, as defined by IFRS 15 *Revenue from Contracts with Customers*. The periods from 30 June in which the distinct performance obligations are expected to be satisfied are as follows:

Group	2019 £m	2018 £m
Less than 6 months	**145.5**	138.2
6 to 12 months	**66.8**	52.6
Over 12 months	**101.5**	103.8
At 30 June	**313.8**	294.6

19 Non-current assets held for sale

Group	2019 £m	2018 £m
Property, plant and equipment (Note 15)	**2.9**	-
At 30 June	**2.9**	-

In January 2019, the Directors made a decision to commence a process to actively market the test cell assets at the Group's Detroit Technical Center for sale, which had a net book value of £2.9m (USD 3.7m). The assets are part of the Technical Consulting segment.

In order to reduce the Group's fixed cost base and improve efficiency of international test operations, the Group sold its test assets situated at its Chicago Technical Center and Schechingen Technical Centre during the previous financial year. The profits on disposal of these assets held for sale in the prior year are set out below:

Chicago Technical Center disposal	£m
Cash consideration	4.1
Carrying value of property, plant and equipment (Note 15):	
- Leasehold property	(0.2)
- Plant and machinery	(2.6)
Exchange rate adjustments	0.1
Profit on disposal before tax	**1.4**

On 2 April 2018, the Group completed the sale of its test assets situated at its Chicago Technical Center for £4.1m (USD 5.5m) to Power Solutions International, a US manufacturer of engines and power systems. The proceeds were received in the prior year. The profit on disposal was included within specific adjusting items in the prior year, as set out in Footnote 2 of Note 4.

Schechingen Technical Center disposal	£m
Cash consideration	4.4
Carrying value of other intangible assets (Note 14):	
- Software	-
Carrying value of property, plant and equipment (Note 15):	
- Freehold land and buildings	(2.3)
- Plant and machinery	(1.8)
- Fixtures, fittings and equipment	(0.1)
Profit on disposal before tax	**0.2**

On 30 June 2018, the Group completed the sale of its test assets and its Schechingen Technical Centre for £4.4m (EUR 5.0m) to a subsidiary of IAVF Antriebstechnik GmbH, a German developer and test operator of engines. The first tranche of sales proceeds of £1.9m (EUR 2.2m) was received at the end of the prior year and the remaining £2.5m (EUR 2.8m) was received at the beginning of the current year. The profit on disposal was included within specific adjusting items in the prior year, as set out in Footnote 2 of Note 4.

20 Trade, contract and other payables

	Group		Company	
	2019	2018 Restated[1]	**2019**	2018
	£m	£m	**£m**	£m
Trade payables	**21.3**	15.0	**0.4**	0.6
Contract liabilities:				
- Payments received in advance on contracts ('POA')	**24.5**	25.8	**-**	-
- Deferred revenue	**6.2**	6.8	**-**	-
Tax and social security payable	**7.7**	7.5	**0.3**	0.1
Amounts owed to Group undertakings	**-**	-	**71.1**	64.4
Accruals	**27.2**	23.2	**3.0**	4.0
Other payables	**3.0**	4.7	**1.2**	1.2
At 30 June	**89.9**	83.0	**76.0**	70.3
Current	**84.8**	83.0	**76.0**	70.3
Non-current	**5.1**	-	**-**	-
At 30 June	**89.9**	83.0	**76.0**	70.3

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

Revenue recognised in the year from contract liabilities at the beginning of the year was £24.9m (2018: £23.4m).

Contract liabilities primarily relate to the Group's obligation to perform services, which are paid by customers in advance of those services being provided. Contract liabilities have decreased due to changes in the mix of contracts containing upfront payment terms.

Non-current amounts include accruals for the provisional fair value of contingent cash consideration payable for Transport Engineering of £5.1m (AUD 9.4m), as set out in Note 12(a).

In respect of the Company, £6.7m (2018: £8.1m) of the amounts owed to Group undertakings are due for repayment within the next 12 months and the remaining £64.4m (2018: £56.3m) has no fixed repayment date. £64.4m (2018: £51.3m) of the amounts owed to Group undertakings carry interest at rates between 2.4% and 2.5% (2018: 2.4% and 3.1%) with the remaining £6.7m (2018: £13.1m) being interest-free. All amounts owed to Group undertakings are unsecured.

21 Borrowings

	Group		Company	
	2019	2018	**2019**	2018
	£m	£m	**£m**	£m
Current borrowings:				
- Bank overdrafts	**3.9**	9.3	**0.1**	8.5
- Other loans	**-**	0.1	**-**	0.1
- Finance lease liabilities	**0.1**	-	**-**	-
Total current borrowings	**4.0**	9.4	**0.1**	8.6
Non-current borrowings:				
- Finance lease liabilities	**0.6**	-	**-**	-
- Bank loans	**79.1**	49.8	**14.1**	6.8
Total non-current borrowings	**79.7**	49.8	**14.1**	6.8
At 30 June	**83.7**	59.2	**14.2**	15.4

The Group purchased plant and machinery on finance lease during the year (see Note 15). At the year-end, the Group had current finance lease liabilities of £0.1m and non-current finance lease liabilities of £0.6m. This finance lease has an implicit rate of interest of 2.4%. The future undiscounted minimum lease payments due within one year is £0.1m and due after one year is £0.7m.

The Group completed a refinance of its banking facilities during the year. At the year-end, the Group held total banking facilities of £166.4m (2018: £90.9m), which included committed facilities of £150.0m (2018: £75.0m). The committed facility consists of a £150m multi-currency Revolving Credit Facility ('RCF') which provides the Group with committed funding through to July 2023. In addition, the Group has uncommitted facilities including overdrafts of £16.4m (2018: £15.9m), which mature throughout this and the next financial year and are renewable annually.

Non-current bank loans comprise committed facilities of £79.1m (2018: £49.8m), net of direct issue costs, which were drawn primarily to fund acquisitions and general corporate purposes. These are denominated in Pounds Sterling and have variable rates of interest dependent upon the Group's adjusted leverage, which range from 1.4% to 2.2% (2018: 1.6% to 2.6%) above LIBOR.

Adjusted leverage is defined as being the ratio of total net debt to adjusted EBITDA. Adjusted EBITDA is defined as being operating profit before interest, tax, depreciation and amortisation, adjusted for any one-off, non-recurring, exceptional or extraordinary costs and acquisitions or disposals during the relevant period. At the reporting date, the Group has an adjusted leverage which attracts the lowest rate of interest, being LIBOR plus 1.4% (2018: LIBOR plus 1.6%).

The Group has banking facilities for its UK companies which together have a net overdraft limit, but the balances are presented on a gross basis in the financial statements. Bank balances are presented as cash and cash equivalents, whereas bank overdrafts are presented as borrowings within current liabilities.

22 Fair value of financial assets and liabilities

There are no differences between the fair value of financial assets and liabilities and their carrying value. The Group and the Company holds the following financial instruments:

	Group		Company	
	2019	2018	**2019**	2018
Financial assets	**£m**	£m	**£m**	£m
Amortised cost:				
- Trade receivables – net (Note 18)	**62.5**	64.4	**-**	-
- Amounts owed by Group undertakings (Note 18)	**-**	-	**90.0**	88.5
- Other receivables (Note 18)	**12.4**	13.4	**0.9**	-
- Cash and cash equivalents (Note 33)	**36.3**	33.1	**1.7**	0.3
Fair value through other comprehensive income ('FVOCI'):				
- Fair value hedging instruments	**0.3**	-	**0.3**	-
Fair value through profit or loss ('FVTPL'):				
- Derivative financial assets	**-**	0.1	**-**	0.1
At 30 June	**111.5**	111.0	**92.9**	88.9
Financial liabilities				
Amortised cost:				
- Borrowings (Note 21)	**83.7**	59.2	**14.2**	15.4
- Trade payables (Note 20)	**21.3**	15.0	**0.4**	0.6
- Amounts owed to Group undertakings (Note 20)	**-**	-	**71.1**	64.4
- Other payables (Note 20)	**3.0**	4.7	**1.2**	1.2
Fair value through other comprehensive income ('FVOCI'):				
- Fair value hedging instruments	**1.1**	-	**1.1**	-
Fair value through profit or loss ('FVTPL'):				
- Derivative financial liabilities	**0.1**	1.0	**0.1**	1.0
At 30 June	**109.2**	79.9	**88.1**	82.6

For both the Group and Company, net derivative financial liabilities of £0.9m (2018: £0.9m) relate to foreign exchange contracts.

Summary of methods and assumptions

Short-term borrowings and deposits:

The fair value of short-term deposits, loans and overdrafts approximates to the carrying amount because of the short maturity of these instruments.

Long-term borrowings:

The fair value of borrowings approximates to the carrying amount as they are primarily floating rate loans where payments are reset to market rates at regular intervals.

Derivatives:

Derivative financial instruments are initially recognised and measured at fair value on the date a derivative contract is entered into and subsequently measured at fair value on the reporting date. Fair value is estimated by discounting expected future contractual cash flows using prevailing interest rate curves. Amounts denominated in foreign currencies are valued at the exchange rate prevailing at the reporting date (Level 2 of the fair value hierarchy within IFRS 13 *Fair Value Measurement*). See Notes 1(u) and 23(g) for further details.

During the year the following foreign exchange differences were credited/(charged) in respect of the Group's derivative financial instruments:

	2019	2018
Measured at FVTPL	**£m**	£m
Foreign exchange swap contract assets traded pre-transition to IFRS 9:		
- Fair value losses	**-**	(0.9)
- Fair value gains	**0.9**	0.7
Foreign exchange swap contract liabilities traded pre-transition to IFRS 9:		
- Fair value losses	**-**	(0.8)
Foreign exchange forward contract liabilities:		
- Fair value losses	**(0.1)**	(0.1)
At 30 June	**0.8**	(1.1)
Measured at FVOCI		
Foreign exchange swap contract assets:		
- Fair value losses	**(1.1)**	-
- Fair value gains	**1.1**	-
Foreign exchange swap contract liabilities:		
- Fair value losses	**(0.2)**	-
- Fair value gains	**0.3**	-
At 30 June	**0.1**	-

23 Financial risks

(a) Objectives, policies and strategies

The financial risks faced by the Group and the Company comprise capital risk, liquidity risk, credit risk and market risk (comprising interest rate risk and foreign exchange risk). The Board reviews and agrees policies for managing each of these risks. The Group and the Company have no material exposure to commodity price fluctuations and this situation is not expected to change in the foreseeable future.

The financial instruments of the Group and the Company comprise floating rate borrowings, the main purpose of which is to raise finance for the Group's operations, and foreign exchange contracts used to manage currency risks.

(b) Capital risk

The objectives when managing capital are to safeguard the ability to continue as a going concern in order to provide returns for shareholders, benefits for other stakeholders and to maintain an optimal capital structure to reduce the cost of capital.

Capital is monitored on the basis of the gearing ratio. This ratio is calculated as net debt divided by total capital. Net debt is calculated as borrowings less cash and cash equivalents. Total capital is calculated as equity, plus net debt.

	Group		Company	
	2019	2018 Restated(1)	**2019**	2018
Gearing ratio	**£m**	£m	**£m**	£m
Net debt (Note 33)	**47.4**	26.1	**12.5**	15.1
Total equity	**171.9**	170.8	**102.6**	109.2
Total capital	**219.3**	196.9	**115.1**	124.3
At 30 June	**21.6%**	13.3%	**10.9%**	12.1%

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

(c) Liquidity risk

The Group's policy towards managing its liquidity risks is to maintain a mix of short- and medium-term borrowing facilities. Short-term flexibility is provided by bank overdraft facilities. In addition, the Group maintains medium-term borrowing facilities in order to provide the appropriate level of finance to support current and future working capital requirements. As the cash profile on large contracts can vary significantly, the Group seeks committed facilities that provide sufficient headroom against forecast requirements to mitigate its exposure. Further detail on the Group's facilities is given in Note 21.

The tables below analyse the Group's external non-derivative financial liabilities into relevant maturity groupings, based on the remaining period at the reporting date to the contractual maturity date. All amounts disclosed in the tables below are the contractual undiscounted cash flows. These amounts approximate to their carrying amount as the impact of discounting on trade payables that mature after more than one year is insignificant and borrowings that mature after more than one year are primarily floating rate bank loans where payments are reset to market rates at regular short-term intervals.

Not included within the tables below are the following financial liabilities:
- Derivative financial liabilities as their contractual maturities are not considered to be essential for an understanding of the timing of the cash flows;
- Other payables as the phasing of these liabilities is not contractually defined; and
- Amounts owed to Group undertakings by the Company as the maturity of these liabilities is provided in Note 20.

	Group		Company	
	2019	2018	**2019**	2018
Maturity of trade payables	**£m**	£m	**£m**	£m
Within 1 month	**12.7**	12.2	**0.4**	0.6
After 1 month and within 3 months	**8.2**	2.7	**-**	-
After 3 months and within 12 months	**0.4**	0.1	**-**	-
At 30 June	**21.3**	15.0	**0.4**	0.6

	Group		Company	
	2019	2018	**2019**	2018
Maturity of borrowings	**£m**	£m	**£m**	£m
Overdrafts repayable on demand	**3.9**	9.3	**0.1**	8.5
Within 12 months:				
- Other loans	**-**	0.1	**-**	0.1
- Finance lease liabilities	**0.1**	-	**-**	-
After 12 months and within 5 years:				
- Finance lease liabilities	**0.6**	-	**-**	-
- Bank loans	**79.1**	49.8	**14.1**	6.8
At 30 June	**83.7**	59.2	**14.2**	15.4

23 Financial risks (continued)

(d) Credit risk

The Group is exposed to credit risk in respect of its trade receivables, which are stated net of provision for impairment. Exposure to this risk is mitigated by careful evaluation of the granting of credit and the use of credit insurance where practicable.

Concentrations of credit risk with respect to trade receivables are limited due to the Group's customer base being large and unrelated.

Ageing of Group net trade receivables(2)	2019 £m	2018 £m
Not overdue and not impaired	**50.5**	51.9
Overdue but not impaired:		
Less than 90 days overdue	**10.5**	8.9
91 to 180 days overdue	**0.8**	2.0
Over 180 days overdue	**0.7**	1.6
At 30 June	**62.5**	64.4

The Group's customers include the world's major transportation original equipment manufacturers, tier 1 suppliers, energy companies and government agencies. Revenue by customer location is disclosed within Note 3(b) and trade receivables are derived from these customer groups and locations.

We have limited experience of bad debts with any of these customers. Of the total net trade receivables balance as at 30 June 2019 of £62.5m (2018: £64.4m). £36.6m was received in July 2019 (2018: £30.2m).

An analysis of net trade receivables by currency is as follows:

Group net trade receivables by currency(2)	2019 £m	2018 £m
Pounds Sterling	**31.1**	34.2
Euros	**8.7**	8.5
US Dollars	**12.9**	7.9
Chinese Renminbi	**5.8**	7.7
Other currencies	**4.0**	6.1
At 30 June	**62.5**	64.4

The geographic analysis of the location of gross trade receivables across the Group is as follows:

Neither past due nor impaired(2)	2019 £m	2018 £m
United Kingdom	**-**	34.2
Mainland Europe	**-**	3.3
North America	**-**	4.8
Asia	**-**	6.4
Rest of the World	**-**	2.0
At 30 June	**-**	50.7

Not past due but impaired(2)	2019 £m	2018 £m
United Kingdom	**31.3**	1.2
Mainland Europe	**3.4**	-
North America	**9.6**	-
Asia	**5.4**	-
Rest of the World	**1.4**	-
At 30 June	**51.1**	1.2

Overdue but not impaired(2)	2019 £m	2018 £m
United Kingdom	**-**	4.1
Mainland Europe	**-**	0.9
North America	**-**	2.1
Asia	**-**	3.8
Rest of the World	**-**	0.5
At 30 June	**-**	11.4

(2) The provision for impairment for the current year is presented in accordance with IFRS 9 *Financial Instruments*, under which all trade receivables in the current year are impaired to some extent, as set out in more detail in Note 1(u). In the prior year, under IAS 39 *Financial Instruments: Recognition and Measurement* the individually impaired trade receivables primarily related to customers where there was evidence of impairment and it was assessed that a portion of these trade receivables were expected to be recovered. Trade receivables that were overdue but not impaired related to customers for whom there was no recent history of default.

23 Financial risks (continued)

(d) Credit risk (continued)

Overdue and impaired(2)	2019 £m	2018 £m
United Kingdom	**5.8**	0.6
Mainland Europe	**1.2**	0.1
North America	**3.9**	1.4
Asia	**2.7**	0.1
Rest of the World	**0.6**	-
At 30 June	**14.2**	2.2

The ageing analysis of overdue gross trade receivables across the Group is as follows:

Overdue but not impaired(2)	2019 £m	2018 £m
Less than 90 days overdue	**-**	8.9
91 to 180 days overdue	**-**	2.0
Over 180 days overdue	**-**	0.5
At 30 June	**-**	11.4

Overdue and impaired(2)	2019 £m	2018 £m
Less than 90 days overdue	**10.9**	-
91 to 180 days overdue	**0.9**	-
Over 180 days overdue	**2.4**	2.2
At 30 June	**14.2**	2.2

(2) The provision for impairment for the current year is presented in accordance with IFRS 9 *Financial Instruments*, under which all trade receivables in the current year are impaired to some extent, as set out in more detail in Note 1(u). In the prior year, under IAS 39 *Financial Instruments: Recognition and Measurement* the individually impaired trade receivables primarily related to customers where there was evidence of impairment and it was assessed that a portion of these trade receivables were expected to be recovered. Trade receivables that were overdue but not impaired related to customers for whom there was no recent history of default.

The Group and Company is exposed to bank credit risk in respect of money held on deposit and certain derivative transactions entered into with banks. Exposure to this form of risk is mitigated as material transactions are only undertaken with bank counterparties that have high credit ratings assigned by international credit-rating agencies. The Group and Company further limits risk in this area by setting an overall credit limit for all transactions with each bank counterparty in accordance with the institution's credit standing.

	Group		Company	
Maximum exposure to bank counterparty risk	2019 £m	2018 £m	2019 £m	2018 £m
Cash and cash equivalents	**36.3**	33.1	**1.7**	0.3
Derivative financial assets	**0.3**	0.1	**0.3**	0.1
At 30 June	**36.6**	33.2	**2.0**	0.4

Analysis of Group cash and cash equivalents by geographic location	2019 £m	2018 £m
United Kingdom	**10.5**	8.0
Mainland Europe	**4.3**	4.0
North America	**3.4**	1.7
Asia	**13.2**	17.7
Australia	**3.4**	-
Rest of the World	**1.5**	1.7
At 30 June	**36.3**	33.1

23 Financial risks (continued)

(e) Market risk

Interest rate risk

The Group's and Company's borrowings and cash balances held at floating interest rates are exposed to cash flow interest rate risk. As set out in further detail in Note 21, the exposure to interest rate movements is not currently hedged as the variable rates of interest are largely dependent upon the adjusted leverage of the Group, which is currently attracting the lowest possible rate of interest. The effect of any foreseen changes in the LIBOR remain unhedged, although the policy is reviewed on an ongoing basis.

	Group		Company	
	2019	2018	**2019**	2018
Financial assets and liabilities by interest type	**£m**	£m	**£m**	£m
Financial assets:				
- Fixed rate	**-**	-	**70.5**	67.6
- Floating rate	**19.6**	28.4	**-**	-
- Interest-free	**91.9**	82.6	**22.4**	21.3
Financial liabilities:				
- Fixed rate	**(0.7)**	-	**(64.4)**	(51.3)
- Floating rate	**(83.0)**	(59.1)	**(14.2)**	(15.3)
- Interest-free	**(25.5)**	(20.8)	**(9.5)**	(16.0)
Net financial assets at 30 June	**2.3**	31.1	**4.8**	6.3

Foreign exchange risk

The Group faces currency exposures on trading transactions undertaken by its subsidiaries in foreign currencies and balances arising there from, and on the translation of profits earned in, and net assets of, overseas subsidiaries primarily in the US, Europe and China.

The carrying amounts of the Group's foreign currency denominated monetary assets and liabilities are:

	Assets		Liabilities	
	2019	2018	**2019**	2018
	£m	£m	**£m**	£m
US Dollar	**19.5**	10.7	**(2.5)**	(2.4)
Euro	**15.1**	15.6	**(6.8)**	(6.6)
Chinese Renminbi	**15.1**	22.3	**(0.4)**	(0.3)

The following foreign exchange differences were (charged)/credited to the income statement for the Group:

	2019	2018
Group	**£m**	£m
Derivative contracts measured at FVTPL (Note 22):		
- Foreign exchange contract assets	**0.9**	(0.2)
- Foreign exchange contract liabilities	**(0.1)**	(0.9)
Other financial assets	**(1.0)**	0.9
Other financial liabilities	**0.1**	1.3
At 30 June	**(0.1)**	1.1

It is the Group's policy not to undertake any speculative currency transactions.

The Group and Company use derivative financial instruments primarily to manage currency risk on its US Dollar, Euro, Chinese Renminbi, Japanese Yen and Hong Kong Dollar denominated receivables from its subsidiaries, in addition to managing transactional exposures relating to customer contracts denominated in foreign currencies.

(f) Sensitivity analysis of financial instruments to market risk

Exchange rate sensitivity

The Group and the Company has financial assets and liabilities denominated in foreign currencies, principally in US Dollars, Euros and Chinese Renminbi, which are not in the functional currency of the entity that holds them. A 20% change in the value of the US Dollar, Euro or Chinese Renminbi would have an immaterial impact on the value of these financial instruments at the year-end. Given the relative strengthening of the Company's and the Group's principal foreign currencies against the Pound Sterling since the UK referendum vote to leave the EU, a 20% sensitivity in these exchange rates is deemed to be appropriate.

Interest rate sensitivity

A 1% increase in interest rates would have an insignificant impact on the value of the Group's and the Company's floating rate financial instruments at the year-end. A 1% sensitivity is deemed to be appropriate as loans are based on LIBOR and so are unlikely to be subjected to significant fluctuations in interest rates in the foreseeable future.

23 Financial risks (continued)

(g) Cash flow derivatives

As set out in Notes 1(u) and 23(e), the Group employs derivative financial instruments, including foreign exchange contracts, to mitigate currency exposures on trading transactions that could affect the income statement. Any change in the fair value of derivative foreign exchange forward and option contracts are recognised in the income statement. Changes in the fair value of effective derivative foreign exchange swap contracts are hedge accounted and recognised in other comprehensive income, with any ineffective amount recognised in the income statement.

Though the Group did not hedge account up to 30 June 2018, derivative financial instruments held up to this date were used to manage foreign exchange exposures. The net change in the fair value of derivative financial instruments was recognised in retained earnings through the income statement up to 30 June 2018.

IFRS 9 *Financial Instruments* became effective for the Group from 1 July 2018. The Group's foreign exchange swap contracts entered into on or after 1 July 2018 qualified for hedge accounting as cash flow hedges under IFRS 9. The Group's risk management strategies and hedge documentation are aligned with the requirements of IFRS 9 and these relationships are therefore treated as continuing hedges.

Cash flows expected to occur from derivative financial instruments used by the Group for hedging purposes are set out below, which will be largely offset by cash flows expected to occur from hedged items:

Affecting the income statement	**2019 £m**	2018 £m
Within 3 months	**0.9**	54.3
After 3 months and within 12 months	**1.3**	2.3
After 12 months and within 3 years	**-**	2.2
Total	**2.2**	58.8

Affecting other comprehensive income	**2019 £m**	2018 £m
Within 3 months	**42.0**	-
After 3 months and within 12 months	**11.2**	-
Total	**53.2**	-

24 Defined benefit obligation

Group and Company

The Group operates a defined benefit pension scheme, the Ricardo Group Pension Fund ('RGPF'), which closed to future accrual on 28 February 2010. Responsibility for the governance of the RGPF lies with the Board of Trustees. The Board of Trustees must be comprised of representatives of the Group and RGPF participants in accordance with the RGPF's regulations.

The last triennial valuation of the RGPF was completed with an effective date of 5 April 2017 and was approved on 24 September 2018. At the effective date, the assets of the RGPF had a market value of £134.0m and were sufficient to cover 86% of the benefits that had accrued to members when assessed on the Trustees' prudent funding basis. Annual contributions due to the RGPF during the year ending 30 June 2020 will be £4.6m and the Company has agreed with the Trustees that this will continue until 31 July 2022, in order to eliminate the Trustees' funding deficit revealed at the 5 April 2017 valuation. The next triennial valuation will be on 5 April 2020, and this process is expected to complete in the year ending 30 June 2021. The results of the 2020 triennial valuation will determine whether the Group's current contribution commitment remains appropriate.

The IAS 19 *Employee Benefits* valuation was completed as at 30 June 2019. The pension costs relating to the RGPF were assessed using the projected unit credit method, in accordance with the advice of Mercer, qualified actuaries.

From June 2016, the Company and Trustees decided to introduce a 'retirement flexibility' option to the RGPF, which allows members to transfer out their benefits at retirement. The Company continues to make no allowance within the defined benefit obligation as at 30 June 2019 for members who may elect to transfer out their benefits at retirement. This assumption will be reviewed on an ongoing basis and may change in future as experience emerges as to the level of members who elect to transfer out their benefits at retirement.

In addition to the above ongoing option, the Company undertook a transfer value exercise and a pension increase exchange exercise in the year ended 30 June 2019. Four members requested transfer values as part of the transfer value exercise. Several more members proceeded with the pension increase exchange exercise. As a result, a number of members elected to exchange a portion of their pension for a higher flat annual pension. These members would otherwise have been entitled to a pension accrued prior to 6 April 1997 (in excess of Guaranteed Minimum Pensions ('GMP')) that would have increased in line with Retail Price Index ('RPI') inflation at a rate of no less than 3% but capped at 5%. The impact of the transfer value exercise has been allowed for as a settlement and the impact of the pension increase exercise has been allowed for as a plan amendment.

The post-retirement mortality assumptions for the current year have been reviewed and use morality tables known as the SAPS 'Series 2' tables, with an 83% multiplier for males applicable to the 'standard' version of the table (2018: 85% multiplier for males applied to the 'light' version of the table), and a 91% (2018: 93%) multiplier for females applicable to the 'standard' version of the table. The future improvements component has been updated to be in line with the Continuous Mortality Investigation ('CMI') 2018 projection model (2018: CMI 2017) with an 'S-kappa' smoothing parameter of 7.5. The latest available CMI model will be used at each year-end to provide the most accurate representation of the defined benefit obligation. The use of a 1.25% long-term trend is consistent with the prior year.

24 Defined benefit obligation (continued)

Under these principal mortality assumptions the expected future life expectancy from age 65 is as follows:

	2019		2018	
Age	**Males**	**Females**	Males	Females
65 now	**23.2**	**24.4**	24.3	24.4
65 in 20 years	**24.6**	**25.9**	25.6	25.9

Other principal assumptions made were as follows:

	2019	2018
	%	%
Discount rate	**2.25**	2.85
RPI inflation rate	**3.25**	3.10

Other assumptions made include the following:

	2019	2018
	%	%
Rate of increase in pensions in payment accrued:		
- Pre 1 July 2002	**3.60**	3.60
- Post 1 July 2002	**3.05**	2.95
Rate of increase in deferred pension revaluation	**2.25**	2.10
Percentage of pension to be commuted for a lump sum at retirement	**15.00**	25.00

Scheme assets are comprised as follows:

	2019			2018		
	Quoted £m	**Unquoted £m**	**Total £m**	Quoted £m	Unquoted £m	Total £m
Equities	**33.1**	**-**	**33.1**	34.4	-	34.4
Debt	**74.1**	**-**	**74.1**	66.8	-	66.8
Cash and other	**-**	**0.6**	**0.6**	-	1.0	1.0
Property	**-**	**7.9**	**7.9**	-	7.7	7.7
Investment funds	**21.8**	**-**	**21.8**	21.1	-	21.1
At 30 June	**129.0**	**8.5**	**137.5**	122.3	8.7	131.0

Movements in the fair value of scheme assets and present value of the defined benefit obligation were as follows:

	2019			2018		
	Fair value of plan assets £m	**Present value of obligation £m**	**Net total £m**	Fair value of plan assets £m	Present value of obligation £m	Net total £m
At 1 July	**131.0**	**(135.6)**	**(4.6)**	131.0	(153.2)	(22.2)
Past service costs(1)	**-**	**(0.5)**	**(0.5)**	-	-	-
Gains on settlements	**-**	**0.3**	**0.3**	-	-	-
Finance income/(costs)	**3.7**	**(3.8)**	**(0.1)**	3.4	(3.9)	(0.5)
Total credit/(charge) to the income statement	**3.7**	**(4.0)**	**(0.3)**	3.4	(3.9)	(0.5)
Return on plan assets excluding finance income	**7.9**	**-**	**7.9**	2.1	-	2.1
Loss from change in demographic assumptions	**-**	**(0.1)**	**(0.1)**	-	(3.0)	(3.0)
(Loss)/gain from change in financial assumptions	**-**	**(15.7)**	**(15.7)**	-	7.7	7.7
Experience gains	**-**	**-**	**-**	-	7.0	7.0
Total remeasurements in other comprehensive income	**7.9**	**(15.8)**	**(7.9)**	2.1	11.7	13.8
Contributions from sponsoring companies	**4.3**	**-**	**4.3**	4.3	-	4.3
Settlement payments from plan assets	**(3.1)**	**3.1**	**-**	-	-	-
Benefit payments from plan assets	**(6.3)**	**6.3**	**-**	(9.8)	9.8	-
Total cash flows	**(5.1)**	**9.4**	**4.3**	(5.5)	9.8	4.3
Total movements	**6.5**	**(10.4)**	**(3.9)**	-	17.6	17.6
At 30 June	**137.5**	**(146.0)**	**(8.5)**	131.0	(135.6)	(4.6)

(1) Past service costs comprised £1.3m cost of Guaranteed Minimum Pensions ('GMP') equalisation as described in Footnote 3 of Note 4, offset by a £0.8m credit from plan amendments, as described on page 158.

24 Defined benefit obligation (continued)

Sensitivity of the defined benefit obligation to changes in principal assumptions:	Change in assumption	Impact on present value of obligation
Discount rate	-0.25%	Increase by £6.9m
Inflation rate	+0.25%	Increase by £3.8m
Post-retirement mortality assumptions	-1 year	Increase by £7.8m

The above sensitivity analyses are based on a change in an assumption while holding all other assumptions constant. In practice this is unlikely to occur and changes in some of the assumptions may be correlated. When calculating the sensitivity of the defined benefit obligation to significant actuarial assumptions, the same method has been applied as when calculating the pension liability recognised within non-current liabilities. The methods and types of assumptions used in preparing the sensitivity analysis did not change when compared to the previous year.

Exposure to significant risks from the RGPF are as follows:

Risks	Impact
Asset volatility	The RGPF liabilities are calculated using a discount rate set with reference to corporate bond yields. If the RGPF assets underperform this yield, the deficit will increase. The RGPF holds a significant proportion of equities and diversified growth funds, which are expected to outperform corporate bonds in the long-term while providing volatility and risk in the short-term. The Directors are of the view that due to the long-term nature of the RGPF liabilities and the strength of the supporting Group, this is an appropriate strategy to manage the RGPF efficiently.
Corporate bond yields	A decrease in corporate bond yields will increase RGPF liabilities, although this will be partially offset by an increase in the value of the RGPF's bond holdings. The UK referendum vote to leave the EU has caused volatility in the market, which may continue to adversely affect corporate bond yields, with a corresponding impact on discount rates as described above.
Inflation	Although there are some caps in place to protect the RGPF against extreme inflation, increases in the level of inflation will lead to higher liabilities.
Post-retirement mortality assumptions	The RGPF provides benefits for the life of the members, therefore increases in post-retirement mortality assumptions will result in an increase in the RGPF's liabilities.

The weighted average duration of the defined benefit obligation is 17.5 (2018: 16.9) years.

Expected maturity analysis of undiscounted pension benefits	**2019 £m**	2018 £m
Less than 1 year	**4.3**	4.1
Between 1 and 2 years	**4.4**	4.2
Between 2 and 5 years	**14.2**	13.5
Beyond 5 years	**26.7**	25.5

Amounts charged/(credited) to the income statement in respect of the defined benefit obligation	**2019 £m**	2018 £m
Past service costs for:		
- GMP equalisation (Note 4)	**1.3**	-
- Plan amendments	**(0.8)**	-
Gains on settlements	**(0.3)**	-
Net financing costs (Note 8)	**0.1**	0.5
Total	**0.3**	0.5

25 Deferred tax

(a) Analysis of net deferred tax

	Group		Company	
	2019	2018 Restated[1]	**2019**	2018
Non-current	**£m**	£m	**£m**	£m
Assets	**6.7**	8.9	**2.1**	1.7
Liabilities	**(7.3)**	(3.9)	**(0.5)**	(0.6)
At 30 June	**(0.6)**	5.0	**1.6**	1.1

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

(b) Movements in net deferred tax by category

Group	Accelerated capital allowances £m	Defined benefit obligation £m	Tax losses and credits £m	Unrealised capital gains £m	Other £m	Total £m
At 30 June 2017 (previously reported)	(4.6)	4.1	9.3	(0.4)	0.9	9.3
Adjustment on retrospective application of IFRS 15[2]	-	-	-	-	1.0	1.0
At 1 July 2017 (restated)	(4.6)	4.1	9.3	(0.4)	1.9	10.3
Arising on acquisition (Note 12(b))	-	-	-	-	(0.4)	(0.4)
Credited/(charged) to the income statement (restated)[2]	1.1	(0.7)	(3.5)	-	0.8	(2.3)
Charged to other comprehensive income	-	(2.7)	-	-	-	(2.7)
Credited directly to equity	-	-	-	-	0.1	0.1
At 30 June 2018 (restated)	(3.5)	0.7	5.8	(0.4)	2.4	5.0
Adjustment on initial application of IFRS 9[2]	-	-	-	-	(0.3)	(0.3)
At 1 July 2018 (adjusted)	(3.5)	0.7	5.8	(0.4)	2.1	4.7
Arising on acquisition (Note 12(a))	-	-	-	-	(2.9)	(2.9)
Charged to the income statement[3]	(1.3)	(0.7)	(0.1)	-	(1.9)	(4.0)
Credited to other comprehensive income	-	1.4	-	-	-	1.4
Exchange rate adjustments	-	-	(0.1)	-	0.3	0.2
At 30 June 2019	**(4.8)**	**1.4**	**5.6**	**(0.4)**	**(2.4)**	**(0.6)**

(2) See Note 38(a) for details of the restatements arising from the retrospective application of IFRS 15 *Revenue from Contracts with Customers* and Note 38(b) for details of the adjustments arising from the initial application of IFRS 9 *Financial Instruments*. The Group has applied IFRS 15 and IFRS 9 as at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9.

(3) A £1.3m deferred tax asset that arose on transition to IFRS 15 as at 1 July 2018 (see Note 38(a)) is presented within the 'other' category above. During the year this unwound as a deferred tax charge, with a corresponding credit to UK corporation tax.

At 30 June 2019 and 30 June 2018 there were no temporary differences associated with undistributed earnings of subsidiaries for which deferred tax liabilities have been recognised. No liability would be recognised in respect of these differences because the Group is in a position to control the timing of the reversal of the temporary differences and it is probable that such differences will not reverse in the foreseeable future.

As set out in Footnote 4 of Note 4, a net deferred tax asset of £2.2m (EUR 2.5m) which primarily comprised historical accumulated losses in Germany was derecognised in the prior year. The deferred tax asset not recognised in respect of losses incurred in Germany as at 30 June 2019 amounts to £10.9m (EUR 12.2m) (2018: £10.7m (EUR 12.2m)).

A deferred tax asset continues to be recognised in the United States as at 30 June 2019 in respect of historic research and development claims ('R&D credits') that can be utilised against future taxable profits. These R&D credits carry a 20-year statute of limitation and must be utilised within that period. The carrying value of the R&D credits recognised at 30 June 2019 is £4.9m (USD 6.3m) (2018: £5.5m (USD 7.2m)).

The Directors have performed an assessment and consider that it is probable that future taxable profits will be available in the United States against which the carrying value of the recognised deferred tax asset can be utilised in the foreseeable future. This assessment was based on a review of the projected annual profit before tax of the consolidated tax group in the United States, based upon the latest Board-approved budgets and business plans for the next three years, together with long-term growth assumptions based on prevailing inflation and economic growth rates. Based on the 'base case' assumptions, the entire deferred tax asset is forecast to be predominantly utilised by 30 June 2022, with each individual R&D credit being utilised in no less than three years before the expiry of its 20-year statute of limitation period. The assessment was subject to reverse-stress testing, the results of which did not change management's view of the recoverability of the asset.

Company	Accelerated capital allowances £m	Defined benefit obligation £m	Tax losses and credits £m	Unrealised capital gains £m	Other £m	Total £m
At 1 July 2017	-	4.1	0.2	(0.5)	0.9	4.7
Charged to the income statement	(0.1)	(0.7)	-	-	(0.2)	(1.0)
Charged to other comprehensive income	-	(2.7)	-	-	-	(2.7)
Credited directly to equity	-	-	-	-	0.1	0.1
At 30 June 2018	(0.1)	0.7	0.2	(0.5)	0.8	1.1
Charged to the income statement	-	(0.7)	-	-	(0.2)	(0.9)
Credited to other comprehensive income	-	1.4	-	-	-	1.4
At 30 June 2019	**(0.1)**	**1.4**	**0.2**	**(0.5)**	**0.6**	**1.6**

26 Provisions

Group	Warranty £m	Restructuring costs £m	Employment-related benefits £m	Other £m	Total £m
At 1 July 2017	1.6	0.1	0.5	0.4	2.6
Arising on acquisition (Note 12(b))	-	-	-	0.4	0.4
Charged to the income statement	1.5	2.4	0.6	-	4.5
Utilised in the year	(0.8)	(0.1)	-	(0.4)	(1.3)
Released in the year	(0.3)	-	(0.1)	(0.1)	(0.5)
At 30 June 2018	2.0	2.4	1.0	0.3	5.7
Charged to the income statement	1.8	0.2	0.4	0.1	2.5
Utilised in the year	(0.6)	(1.3)	-	-	(1.9)
Released in the year	(0.3)	(0.1)	-	-	(0.4)
At 30 June 2019	**2.9**	**1.2**	**1.4**	**0.4**	**5.9**

The warranty provision reflects the Directors' best estimate of the cost required to fulfil the Group's assurance-type warranty obligations within a number of contracts. Subsequent to their initial recognition, warranty provisions are utilised or released over the periods of the various warranty obligations, which are expected to be less than five years.

The provision for restructuring costs included amounts payable to former employees who have been made redundant, primarily as part of the reorganisation of our Automotive businesses within Technical Consulting, as set out in further detail in Note 4. The element of the provision relating to redundancy costs was partially utilised during the year with the remaining balance expected to be utilised in less than one year. Provisions for onerous lease obligations are also included which will be utilised over the duration of the lease, predominantly expected to be over the next five years.

Employment-related benefits are statutory provisions which include long-service awards and termination indemnity schemes. The timing of the cash outflows is dependent upon the retirement or attrition of employees, but is predominantly expected to be more than five years.

Other provisions comprise expected costs of legal claims and litigation, together with dilapidation and restoration costs for leasehold property. The associated cash outflows for legal claims and litigation are predominantly expected to be less than one year. Dilapidation and restoration costs reflects the Directors' best estimate of future obligations relating to the maintenance and restoration of leasehold properties arising from past contractual commitments to new, extended or terminated lease agreements. The timing of the cash outflows are dependent upon the remaining term of the associated leases and are subject to negotiation.

Group	**2019 £m**	2018 £m
Current	**2.2**	2.8
Non-current	**3.7**	2.9
At 30 June	**5.9**	5.7

The Company has a provision within current liabilities for expected costs of legal claims and litigation of £0.1m (2018: £Nil).

27 Share capital

Group and Company	**2019 Number**	2018 Number	**2019 £m**	2018 £m
Allotted, called-up and fully paid ordinary shares of 25p each:				
At 1 July	**53,406,250**	53,163,423	**13.4**	13.3
Allotted under share option schemes	**-**	2,827	**-**	-
Allotted under the LTIP scheme	**-**	136,140	**-**	0.1
Allotted under the DBP scheme	**-**	69,834	**-**	-
Unallocated shares remaining in EBT	**-**	34,026	**-**	-
At 30 June	**53,406,250**	53,406,250	**13.4**	13.4

The consideration received for shares allotted under the share option schemes, Long-Term Incentive Plan ('LTIP') and Deferred Share Bonus Plan ('DBP') during the year ended 30 June 2019 was £Nil (2018: £0.1m).

No dividends were paid for interim and final dividends in respect of shares held by an Employee Benefit Trust ('EBT') in relation to the LTIP. There were 40,631 such shares at 30 June 2019 (2018: 36,839 shares).

28 Share premium

Group and Company	£m
At 1 July 2017, 30 June 2018 and 30 June 2019	**14.3**

29 Share-based payments

The Group operates the following share-based payment schemes: an equity-settled Executive Share Option Plan (the '2004 Plan'); an equity-settled and a cash-settled Long-Term Incentive Plan ('LTIP'); a Deferred Share Bonus Plan ('DBP') and an equity-settled all-employee Share Incentive Plan ('SIP').

The general terms and conditions, including vesting requirements and performance conditions for the 2004 Plan, the equity-settled LTIP, the DBP and the equity-settled SIP are described in the Directors' Remuneration Report.

The 2004 Plan, LTIP, DBP and SIP require shareholder approval for the issue of shares. There were no awards outstanding in relation to the SIP at the year-end.

50% of awards granted under the LTIP and DBP Matching Awards are dependent on a Total Shareholder Return ('TSR') performance condition. As relative TSR is defined as a market condition under IFRS 2 *Share-based Payment*, this requires the valuation model used to take into account the anticipated performance outcome. The TSR element of the charge to the income statement has been calculated using the Monte Carlo model and the earnings per share ('EPS') element has been calculated using the Black Scholes model. The following assumptions are used for the plan cycles commencing in these years:

	2019	2018
Weighted average share price at date of award	**720p**	860p
Expected volatility	**27.0%**	24.4%
Expected life	**3 yrs**	3 yrs
Risk-free rate	**0.8%**	0.5%
Dividend yield	**2.8%**	2.2%
Possibility of ceasing employment before vesting	**10.0%**	10.0%
Weighted average fair value per LTIP as a percentage of a share at date of award	**72.2%**	77.0%

Expected volatility was determined by calculating the historical volatility of the Company's share price over the three financial years preceding the date of award.

The share-based payments charge of £1.0m (2018: £1.0m) disclosed in Note 7 was all in respect of equity-settled schemes.

Equity-settled Executive Share Option Plan

	2019		2018	
Outstanding	**Number**	**Weighted average share price**	Number	Weighted average share price
At 1 July	**-**	**-**	2,827	305p
Exercised	**-**	**-**	(2,827)	305p
At 30 June	**-**	**-**	-	-

There were no outstanding options remaining at the end of the current or prior year.

Equity-settled Long-Term Incentive Plan

The current LTIP is described in the Directors' Remuneration Report. Awards are forfeited if the employee leaves the Group before the awards vest, unless they are considered 'good leavers'.

	2019	2018
Outstanding	**Shares allocated[(1)]**	Shares allocated[(1)]
At 1 July	**568,602**	595,759
Awarded	**247,187**	213,230
Lapsed	**(180,640)**	(104,247)
Vested	**(69,671)**	(136,140)
At 30 June	**565,478**	568,602

(1) Shares allocated excludes dividend roll-up.

The outstanding LTIP awards had a weighted average contractual life of 1.4 years (2018: 1.4 years). The weighted average exercise price in both 2019 and 2018 was £Nil.

During the year, the Group cash purchased shares in order to settle vested awards.

29 Share-based payments (continued)

Cash-settled Long-Term Incentive Plan

The cash-settled LTIP has the same performance conditions as the equity-settled LTIP but the award is settled in cash rather than by share issue.

Outstanding	2019 Shares allocated[1]	2018 Shares allocated[1]
At 1 July	**10,759**	10,759
Awarded	**3,000**	-
Forfeited	**(3,184)**	-
Vested	**(2,575)**	-
At 30 June	**8,000**	10,759

(1) Shares allocated excludes dividend roll-up.

The outstanding LTIP awards had a weighted average contractual life of 1.2 years (2018: 0.9 years). The weighted average exercise price in both 2019 and 2018 was £Nil.

During the year, the Group cash purchased shares in order to settle vested awards.

Deferred Share Bonus Plan

The Deferred Share Bonus Plan is described in the Directors' Remuneration Report.

Outstanding	2019 Number of deferred shares	2018 Number of deferred shares
At 1 July	**154,250**	230,471
Awarded	**96,297**	-
Forfeited	**(28,975)**	(9,228)
Dividend shares awarded in the year	**3,029**	2,841
Vested	**(54,727)**	(69,834)
At 30 June	**169,874**	154,250

The outstanding DBP awards had a weighted average contractual life of 1.2 years (2018: 0.8 years). The weighted average exercise price in both 2019 and 2018 was £Nil.

During the year, the Group cash purchased shares in order to settle vested awards.

30 Other reserves

Group	Merger reserve £m	Translation reserve £m	Total £m
At 1 July 2017	1.0	14.6	15.6
Exchange rate adjustments	-	0.1	0.1
At 30 June 2018	1.0	14.7	15.7
Exchange rate adjustments	-	1.2	1.2
At 30 June 2019	**1.0**	**15.9**	**16.9**

The merger reserve represents the amount by which the fair value of the shares issued as consideration for historic acquisitions exceeded their nominal value, offset by the goodwill on these acquisitions.

The translation reserve comprises cumulative foreign exchange differences arising from the translation of financial statements of foreign operations on consolidation.

31 Retained earnings

	Group Restated[1] £m	Company £m
At 30 June 2017 (previously reported)	112.2	79.6
Adjustment on retrospective application of IFRS 15 (net of tax)[1]	(4.5)	-
At 1 July 2017 (restated)	107.7	79.6
Profit for the year (restated)[1]	17.6	0.2
Remeasurements of the defined benefit pension scheme	13.8	13.8
Deferred tax on remeasurements of the defined benefit pension scheme	(2.7)	(2.7)
Dividends paid	(10.5)	(10.5)
Equity-settled transactions	1.0	1.0
Tax credit on equity-settled transactions	0.1	0.1
At 30 June 2018 (restated)	127.0	81.5
Adjustment on initial application of IFRS 9 (net of tax)[1]	(2.7)	-
At 1 July 2018 (adjusted)	124.3	81.5
Profit for the year	19.8	10.7
Remeasurements of the defined benefit pension scheme	(7.9)	(7.9)
Deferred tax on remeasurements of the defined benefit pension scheme	1.4	1.4
Fair value gains on foreign currency cash flow hedges	0.1	0.1
Dividends paid	(11.0)	(11.0)
Purchases of own shares to settle awards	(0.9)	(0.9)
Equity-settled transactions	1.0	1.0
At 30 June 2019	**126.8**	**74.9**

(1) See Note 38(a) for details of the restatements arising from the retrospective application of IFRS 15 *Revenue from Contracts* with Customers and Note 38(b) for details of the adjustments arising from the initial application of IFRS 9 *Financial Instruments*. The Group has applied IFRS 15 and IFRS 9 as at 1 July 2018. Under the respective transition methods chosen, comparative information is restated for IFRS 15 as at 1 July 2017, but not for IFRS 9.

32 Cash generated from/(used in) operations

		Group		Company	
	Note	**2019 £m**	2018 Restated[1] £m	**2019 £m**	2018 £m
Profit before tax		**26.5**	27.0	**11.2**	0.7
Adjustments for:					
Share-based payments	*29*	**1.0**	1.0	**1.0**	1.0
Fair value (gains)/losses on derivative financial instruments	*22*	**(0.8)**	1.1	**(0.8)**	1.1
Profit on disposal of property, plant and equipment	*5*	**(0.7)**	(1.6)	**-**	-
Dividends received from subsidiaries		**-**	-	**(11.8)**	-
Net finance costs/(income)	*8*	**2.6**	2.2	**(1.4)**	0.5
Depreciation and amortisation	*14 & 15*	**15.4**	15.9	**1.2**	1.4
Operating cash flows before movements in working capital		**44.0**	45.6	**(0.6)**	4.7
(Increase)/decrease in inventories		**(1.2)**	0.6	**-**	-
(Increase)/decrease in trade, contract and other receivables		**(5.2)**	4.9	**(1.3)**	(0.7)
Decrease in net intercompany receivables		**-**	-	**5.2**	22.5
(Decrease)/increase in trade, contract and other payables		**(1.1)**	(5.6)	**0.4**	(2.5)
Increase in provisions		**0.2**	3.1	**0.1**	-
Defined benefit pension scheme payments		**(4.3)**	(4.4)	**(4.3)**	(4.4)
Cash generated from/(used in) operations		**32.4**	44.2	**(0.5)**	19.6

(1) The prior year has been restated for IFRS 15 *Revenue from Contracts with Customers*. See Note 38(a) for more details.

33 Net debt

Net debt is defined by the Group as net cash and cash equivalents less borrowings. Net cash and cash equivalents is defined by the Group as cash and cash equivalents less bank overdrafts.

	Group		Company	
	2019	2018	**2019**	2018
Analysis of net debt	**£m**	£m	**£m**	£m
Current assets – cash and cash equivalents:				
- Cash and cash equivalents	**36.3**	33.1	**1.7**	0.3
Total	**36.3**	33.1	**1.7**	0.3
Current liabilities – borrowings:				
- Bank overdrafts repayable on demand	**(3.9)**	(9.3)	**(0.1)**	(8.5)
- Finance lease liabilities maturing within one year	**(0.1)**	-	**-**	-
- Other loans maturing within one year	**-**	(0.1)	**-**	(0.1)
Total	**(4.0)**	(9.4)	**(0.1)**	(8.6)
Non-current liabilities – borrowings:				
- Finance lease liabilities maturing after one year	**(0.6)**	-	**-**	-
- Bank loans maturing after one year	**(79.1)**	(49.8)	**(14.1)**	(6.8)
Total	**(79.7)**	(49.8)	**(14.1)**	(6.8)
At 30 June	**(47.4)**	(26.1)	**(12.5)**	(15.1)

	Group		Company	
	2019	2018	**2019**	2018
Movement in net debt	**£m**	£m	**£m**	£m
At beginning of the year	**(26.1)**	(37.9)	**(15.1)**	(24.9)
Increase/(decrease) in net cash and cash equivalents	**8.6**	1.8	**9.8**	(3.2)
Proceeds from finance leases	**(0.7)**	-	**-**	-
Proceeds from borrowings	**(64.0)**	(15.0)	**(42.0)**	(10.0)
Repayments of borrowings	**34.8**	25.0	**34.8**	23.0
At 30 June	**(47.4)**	(26.1)	**(12.5)**	(15.1)

34 Operating lease commitments

Future aggregate undiscounted minimum lease payments under non-cancellable operating leases are as follows:

	Group		Company	
	2019	2018	**2019**	2018
By due date of commitments	**£m**	£m	**£m**	£m
Within one year	**8.6**	8.7	**0.8**	0.8
Between one and five years	**22.8**	24.8	**3.2**	3.2
After five years	**29.8**	30.8	**6.6**	7.4
At 30 June	**61.2**	64.3	**10.6**	11.4

	2019	2018	**2019**	2018
By nature of commitments	**£m**	£m	**£m**	£m
Land and buildings	**60.3**	63.3	**10.6**	11.4
Other	**0.9**	1.0	**-**	-
At 30 June	**61.2**	64.3	**10.6**	11.4

35 Contingent liabilities

Group

In the ordinary course of business, the Group has £7.3m (2018: £8.2m) of possible obligations for bonds, guarantees and counter-indemnities placed with our banking institutions primarily relating to performance under contracts with customers. These possible obligations are contingent on the outcome of uncertain future events which are considered unlikely to occur. The Group is also involved in commercial disputes and litigation with some customers, which is also in the normal course of business. Whilst the result of such disputes cannot be predicted with certainty, the ultimate resolution of these disputes is not expected to have a material effect on the Group's financial position or results.

In July 2013, a guarantee was provided to the Ricardo Group Pension Fund ('RGPF') of £2.8m in respect of certain contingent liabilities that may arise, which have been secured on specific land and buildings. The outcome of this matter is not expected to give rise to any material cost to the Group.

In October 2018, a further guarantee was provided to the RGPF for an amount that shall not exceed the employers' liability were a debt to arise under Section 75 of the Pensions Act 1995. The guarantee will terminate on 5 April 2023. The outcome of this matter is not expected to give rise to any material cost to the Group on the basis that the Group continues as a going concern.

Company

Contingent liabilities exist in the form of guarantees provided in the ordinary course of business to certain subsidiaries to give assurance of their contractual and financial commitments. None of these arrangements are expected to give rise to any material cost to the Company.

36 Related party transactions

Transactions between the Company and Group undertakings	**2019 £m**	2018 £m
Sale of services	**17.6**	16.7
Finance income	**2.0**	2.4
Finance costs	**(1.7)**	(1.5)

Year-end balances between the Company and Group undertakings	**2019 £m**	2018 £m
Amounts owed by Group undertakings (Note 18)	**90.0**	88.5
Amounts owed to Group undertakings (Note 20)	**(71.1)**	(64.4)

All of these transactions with Group undertakings, which are disclosed in Note 37, and with other related parties as disclosed below, occurred on an arm's length basis.

The Chairman of Ricardo plc, Sir Terry Morgan, was also a statutory director of Crossrail Limited until 5 December 2018, which was deemed to be a related party that is external to the Ricardo Group up to that date.

Transactions between the Group and Crossrail Limited	**2019 £m**	2018 £m
Sale of services	**0.7**	2.3

Year-end balances between the Group and Crossrail Limited	**2019 £m**	2018 £m
Trade receivables	**-**	0.2

The transactions of the Group and Company with the Ricardo Group Pension Fund are disclosed in Note 24.

37 Subsidiaries and related undertakings

All subsidiaries and material related undertakings are deemed to be controlled by the Group and are therefore consolidated within these financial statements. The Company owns, directly(*) or indirectly, 100% of the issued share capital, unless otherwise noted, of the following subsidiaries and related undertakings as at 30 June 2019:

Subsidiary or related undertaking	Registered office	Principal activities
Ricardo Investments Limited(*)	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Holding Company and Management Services
Ricardo UK Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Automotive Consulting, Strategic Consulting and Performance Products
Ricardo Asia Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Automotive Consulting, Rail Consulting and Business Development
Ricardo Japan K.K.	18th Floor, Shin Yokohama Square Building, 2-3-12 Shin Yokohama, Kohoku-ku, Yokohama-shi, Kanagawa, 222-0033, Japan	Automotive Consulting, Rail Consulting and Business Development
Ricardo Shanghai Company Limited(*)	Floor 17, Phoenix Building, No. 1515 Gumei Road, Xuhui District, Shanghai, 200233, PR China	Automotive Consulting, Rail Consulting and Business Development
Ricardo Prague s.r.o.	Palác Karlín, Thámova 11-13, 186 00 Praha 8, Czech Republic	Automotive Consulting and Software
Ricardo GmbH	Güglingstraße 66-70, 73529, Schwäbisch Gmünd, Germany	Automotive Consulting and Business Development
Ricardo Motorcycle Italia s.r.l.	Via Giovanni Pascoli 47, 47853, Cerasolo, Coriano, Rimini, Italy	Automotive Consulting
Ricardo, Inc.	Detroit Technical Center, 40000 Ricardo Drive, Van Buren Township, Detroit, Michigan, 48111-1641, United States	Automotive Consulting, Strategic Consulting and Software
Ricardo India Private Limited(*)(1)	6th Floor, M6 Plaza, Jasola District Centre, New Delhi 110076, India	Business Development
Ricardo Strategic Consulting GmbH	4th Floor, Kreuzstraße 16, 80331, Munich, Germany	Strategic Consulting
Ricardo Defense Systems LLC	Detroit Technical Center, 40000 Ricardo Drive, Van Buren Township, Detroit, Michigan, 48111-1641, United States	Performance Products
Ricardo Defense, Inc.	175 Cremona Drive, Suite 140, Goleta, California, 93117, United States	Defence Consulting
C2D Joint Venture (33.3%)(2)	175 Cremona Drive, Suite 140, Goleta, California, 93117, United States	Defence Consulting
Ricardo-AEA Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Environmental Consulting
Cascade Consulting (Environment & Planning) Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Environmental Consulting
Ricardo South Africa (Pty) Ltd (formerly PPA Energy (Pty) Ltd)	111 Pretoria Road, Rynfield, Benoni, 1501, South Africa	Environmental Consulting
Ricardo Gulf Technical Consultancy LLC (49%)(3)	11th Floor, Office 8, MSMAK Building, Corniche Street, Abu Dhabi, United Arab Emirates	Environmental Consulting
Ricardo Australia Pty Ltd	Level 7, 151 Clarence Street, Sydney, New South Wales, 2000, Australia	Environmental and Rail Consulting
Ricardo Rail Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Rail Consulting
Ricardo Nederland B.V.	Catharijnesingel 33 J, 3511 GC, Utrecht, Netherlands	Rail Consulting
Ricardo Rail Australia Pty Ltd (formerly Transport Engineering Pty Ltd)	Suite 2.01, Level 2, Tower B, The Zenith, 821 Pacific Highway, Chatswood, New South Wales, 2067, Australia	Rail Consulting
Ricardo Singapore Pte Limited	141 Middle Road, 5-6 GSM Building, 188976, Singapore	Rail Consulting
Ricardo (Thailand) Ltd (49%)(4)	388 Exchange Tower Building, 29 Floor, Room 2901-2904, Sukhumvit Road, Khlong Toei, Bangkok, Thailand	Rail Consulting
Ricardo Hong Kong Limited	Units 3210-18, 32/F Shui On Centre, 6-8 Harbour Road, Wanchai, Hong Kong	Rail Consulting
Ricardo Technical Consultancy LLC (49%)(5)	Palm Tower, Block B, 15th Floor, P.O. Box 26600, West Bay, Doha, Qatar	Rail Consulting
Chongqing Transportation Railway Safety Assessment Center Limited (60%)(6)	No. 2 Yangliu Road, Mid Huangshan Street, New North District, Chongqing, 401123, PR China	Rail Consulting

37 Subsidiaries and related undertakings (continued)

Subsidiary or related undertaking	Registered office	Principal activities
Ricardo Beijing Company Limited	Suite 709-710, CCS Mansion, 9 Dongzhimen Nan Street, Beijing, 100007, PR China	Independent Assurance
Ricardo Certification Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Independent Assurance
Ricardo Certification B.V.	Catharijnesingel 33 J, 3511 GC, Utrecht, Netherlands	Independent Assurance
Ricardo Certification Denmark ApS	Nørre Farimagsgade 11, 1364 Copenhagen K, Copenhagen, Denmark	Independent Assurance
Ricardo Certification Iberia SL	Agustín de Foxá 29, 9th Floor, 28036, Madrid, Spain	Independent Assurance
Ricardo EMEA Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Software, Inc. (formerly Xogeny, Inc.)	Detroit Technical Center, 40000 Ricardo Drive, Van Buren Township, Detroit, Michigan, 48111-1641, United States	Dormant
Wamarragu Transport Services Pty Ltd (45%)(7)	Suite 2.01, Level 2, Tower B, The Zenith, 821 Pacific Highway, Chatswood, New South Wales, 2067, Australia	Dormant
Ricardo Innovations Limited (formerly Cascade Consulting Holdings Limited)	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
CDQ Joint Venture (50%)(8)	175 Cremona Drive, Suite 140, Goleta, California, 93117, United States	Dormant
Power Planning Associates Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Software Limited (formerly Ricardo Russia Limited)	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Certificación SL	Avenida Aragon 30, Edificio Europa, 13th Floor, 46021, Valencia, Spain	Dormant
Ricardo Environment Arabia LLC(9)	Bahrain Tower, Building Number 8953, 2393, King Fahd Road, Olaya, 12214, Kingdom of Saudi Arabia	Dormant
Ricardo Strategic Consulting Limited (formerly Ricardo Vepro Limited)	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Consulting Engineers Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Technology Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Transmissions Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Pension Scheme (Trustees) Limited	Shoreham Technical Centre, Old Shoreham Road, Shoreham-by-Sea, West Sussex, BN43 5FG, United Kingdom†	Dormant
Ricardo Real Estate LLC	40600 Ann Arbor Road East, Suite 201, Plymouth, Michigan, 48170, United States	Dormant
Ricardo US Holdings, Inc.	40600 Ann Arbor Road East, Suite 201, Plymouth, Michigan, 48170, United States	Dormant
Ricardo Deutschland GmbH	Güglingstraße 66-70, 73529, Schwäbisch Gmünd, Germany	Liquidation
Nanjing Delta Win Transportation Technical Services Limited (65%)(10)	Room 1101, No. 301, Zhongmen Street, Gulou District, Nanjing, Jiangsu Province, PR China	Liquidation

† Registered in England and Wales.

(1) 99% owned by Ricardo plc; 1% owned by Ricardo UK Limited.

(2) 33.3% owned by Ricardo Defense, Inc.; 33.3% owned by DG Technologies; 33.3% owned by Claxton Logistics Services LLC.

(3) 49% of share capital and 80% of retained earnings owned by Ricardo Rail Limited; 51% of share capital and 20% of retained earnings owned by SSD Commercial Investment

(4) 49% of share capital and 92.5% of retained earnings owned by Ricardo Hong Kong Limited; 51% of share capital and 7.5% of retained earning owned by First Asia Industries Limited.

(5) 49% of share capital and 97% of retained earnings owned by Ricardo Rail Limited; 51% of share capital and 3% of retained earnings owned by Pro-Partnership LLC.

(6) 60% owned by Ricardo Beijing Company Limited; 40% owned by Chongqing Science & Technology Testing Center Limited.

(7) 45% owned by Ricardo Rail Australia Pty Ltd; 55% owned by Justin Brooker Nominees Pty Ltd. This associate undertaking is immaterial to the Group.

(8) 50% owned by Ricardo Defense, Inc.; 50% owned by DG Technologies.

(9) 15% owned by Ricardo plc; 85% owned by Ricardo-AEA Limited.

(10) 40% owned by Ricardo Beijing Company Limited; 25% owned by Ricardo Hong Kong Limited; 35% owned by Jiangsu Urban Mass Transit Research & Design Institute Company Limited.

In the opinion of the Directors, the comprehensive income for the year and equity at the reporting date which is attributable to non-controlling interests is not considered to be material. Non-controlling interests are set out above in Footnotes (2) to (8), and (10).

38 Changes in significant accounting policies

(a) IFRS 15 *Revenue from Contracts with Customers*

Accounting policy

The Group's accounting policy for revenue recognition as of 1 July 2018, and retrospectively applied to the year ended 30 June 2018, under IFRS 15 *Revenue from Contracts with Customers* is disclosed in Note 1(e).

Restatement of comparative financial statements

Consolidated income statement and statement of comprehensive income (extract)

for the year ended 30 June 2018

		Performance obligations		
	Previously reported	Distinct – separation[1]	Indistinct – combination[2]	Restated
	£m	£m	£m	£m
Revenue	380.0	(0.3)	(1.2)	378.5
Gross profit[3]	138.9	(0.3)	(1.2)	137.4
Operating profit:				
- Underlying	41.2	(0.3)	(1.2)	39.7
- Total	30.7	(0.3)	(1.2)	29.2
Profit before taxation:				
- Underlying	39.0	(0.3)	(1.2)	37.5
- Total	28.5	(0.3)	(1.2)	27.0
Taxation:				
- Underlying	(8.3)	0.1	0.2	(8.0)
- Total	(9.6)	0.1	0.2	(9.3)
Profit for the year:				
- Underlying	30.7	(0.2)	(1.0)	29.5
- Total	18.9	(0.2)	(1.0)	17.7
Profit for the year attributable to owners of the parent:				
- Underlying	30.6	(0.2)	(1.0)	29.4
- Total	18.8	(0.2)	(1.0)	17.6
Total comprehensive income for the year attributable to:				
- Owners of the parent	30.0	(0.2)	(1.0)	28.8
Earnings per ordinary share attributable to owners of the parent during the year:				
- Basic	35.2p	(0.4)p	(1.8)p	33.0p
- Diluted	35.1p	(0.4)p	(1.9)p	32.8p

38 Changes in significant accounting policies (continued)

(a) IFRS 15 *Revenue from Contracts with Customers* (continued)

Consolidated statement of financial position (extract)

as at 30 June 2018

		Transition on 1 July 2017		Year ended 30 June 2018		
		Performance obligations		Performance obligations		
	Previously reported	Distinct – separation(1)	Indistinct – combination(2)	Distinct – separation(1)	Indistinct – combination(2)	Restated
	£m	£m	£m	£m	£m	£m
Assets						
Non-current assets						
Deferred tax assets	7.6	0.4	0.6	0.1	0.2	8.9
	150.1	0.4	0.6	0.1	0.2	151.4
Current assets						
Trade, contract and other receivables(4)	141.8	(2.0)	(2.5)	(0.4)	(1.6)	135.3
	189.6	(2.0)	(2.5)	(0.4)	(1.6)	183.1
Total assets	339.7	(1.6)	(1.9)	(0.3)	(1.4)	334.5
Liabilities						
Current liabilities						
Trade, contract and other payables(4)	(82.5)	(0.3)	(0.7)	0.1	0.4	(83.0)
	(102.0)	(0.3)	(0.7)	0.1	0.4	(102.5)
Net current assets	87.6	(2.3)	(3.2)	(0.3)	(1.2)	80.6
Net assets	176.5	(1.9)	(2.6)	(0.2)	(1.0)	170.8
Equity						
Retained earnings	132.7	(1.9)	(2.6)	(0.2)	(1.0)	127.0
Equity attributable to owners of the parent	176.1	(1.9)	(2.6)	(0.2)	(1.0)	170.4
Total equity	176.5	(1.9)	(2.6)	(0.2)	(1.0)	170.8

Consolidated statement of cash flows (extract)

for the year ended 30 June 2018

		Performance obligations		
	Previously reported	Distinct – separation(1)	Indistinct – combination(2)	Restated
	£m	£m	£m	£m
Profit before tax	28.5	(0.3)	(1.2)	27.0
Operating cash flows before movements in working capital	47.1	(0.3)	(1.2)	45.6
Decrease in trade, contract and other receivables	2.9	0.4	1.6	4.9
Decrease in trade, contract and other payables	(5.1)	(0.1)	(0.4)	(5.6)
Cash generated from/(used in) operations	44.2	-	-	44.2

(1) *Separation of distinct performance obligations*
The Group previously recognised revenue over time on certain Technical Consulting contracts for a similar programme of annual services to be performed over a number of years. The total programme of services for the duration of each contract were proposed as a package and were not subject to separate negotiation. Under IFRS 15, these annual services are deemed to be separate performance obligations that are distinct from one another within the context of the contract. Revenue continues to be recognised on a percentage of completion basis but based upon these separate and distinct performance obligations.

(2) *Combination of indistinct performance obligations*
On a number of Technical Consulting contracts, revenue was recognised separately for services such as sales commission and up-front fees to compensate for costs incurred in obtaining and setting up a contract or other administrative costs. Under IFRS 15, these activities are not deemed to be costs of the contract as they do not depict the transfer of services to a customer and therefore do not satisfy distinct performance obligations in the contract upon which revenue can be recognised separately. Revenue is recognised over time and measured through the consistent use of a reliable input method based on total contract costs incurred to date as a percentage of total estimated contract costs to satisfy each distinct performance obligation.

(3) In addition and separately from the impact of IFRS 15, restated gross profit has been represented on the income statement on page 124 to reclassify certain indirect payroll expenses (£4.5m) and depreciation charges (£0.8m) from cost of sales to administrative expenses in a manner that is consistent with their classification in the current year.

(4) The cumulative impact of IFRS 15 on contract assets and liabilities results in a reinstatement of those amounts into the order book as at 30 June 2018, to be recognised as revenue in future periods.

38 Changes in significant accounting policies (continued)

(b) IFRS 9 *Financial Instruments*

Accounting policy

The Group's accounting policy for financial instruments as of 1 July 2018 under IFRS 9 *Financial Instruments* is disclosed in Note 1(u), including the changes from the Group's accounting policy for financial instruments under IAS 39 *Financial Instruments: Recognition and Measurement*, which was disclosed in full in Note 1(u) to the financial statements in the *Annual Report & Accounts 2018*.

Impairment of financial assets

The provision for impairment of trade receivables as at 30 June 2018 reconciles to the opening impairment provision on 1 July 2018 as follows:

Provision for impairment of trade receivables	£m
At 30 June 2018 – under IAS 39	1.1
IFRS 9 transitional adjustment	2.4
At 1 July 2018 – under IFRS 9	3.5

Adjustment to retained earnings	£m
IFRS 9 transitional adjustment	2.4
Deferred tax impact on transition	0.3
At 1 July 2018 – under IFRS 9	2.7

The provision for impairment under IFRS 9 was £2.8m as at 30 June 2019 (see Note 18). The provision for impairment under IAS 39 would have been £1.0m as at 30 June 2019

Adjustment to financial statements

Consolidated statement of financial position (extract)

as at 1 July 2018

	Adjusted under IFRS 15 £m	IFRS 9 transitional adjustment £m	Adjusted under IFRS 9 and IFRS 15[1] £m
Assets			
Non-current assets			
Deferred tax assets	8.9	0.2	9.1
	151.4	0.2	151.6
Current assets			
Trade, contract and other receivables	135.3	(2.4)	132.9
	183.1	(2.4)	180.7
Total assets	334.5	(2.2)	332.3
Net current assets	80.6	(2.4)	78.2
Liabilities			
Non-current liabilities			
Deferred tax liabilities	(3.9)	(0.5)	(4.4)
	(61.2)	(0.5)	(61.7)
Net assets	170.8	(2.7)	168.1
Equity			
Retained earnings	127.0	(2.7)	124.3
Equity attributable to owners of the parent	170.4	(2.7)	167.7
Total equity	170.8	(2.7)	168.1

(1) Under the modified retrospective transition method, comparative information is not restated for IFRS 9.

39 Events after the reporting date

(a) Acquisitions after the reporting date – PLC Consulting

On 31 July 2019, the Group acquired the entire issued share capital of PLC Consulting Pty Ltd ('PLC Consulting') for initial cash consideration of £3.9m (AUD 7.0m) subject to any adjustment to reflect normalised levels of working capital.

PLC Consulting is an Australian firm with a strong technical advisory capability across the project life cycle in infrastructure, environment and planning, including supporting the environmental requirements of master-planning, business cases, procurement, design, construction and operation. PLC Consulting was renamed Ricardo Energy Environment and Planning Australia on 5 August 2019.

The following tables set out the provisional fair value of cash consideration payable to acquire PLC Consulting, together with the provisional assessment of the fair value of net assets acquired.

Provisional cash consideration	£m
Initial cash consideration	**3.9**

Provisional assessment of the fair value of identifiable net assets acquired	£m
Customer contracts and relationships	1.4
Trade, contract and other receivables	0.6
Cash and cash equivalents	0.4
Trade, contract and other payables	(0.1)
Deferred tax liabilities	(0.4)
Total provisional assessment of the fair value of identifiable net assets acquired	**1.9**
Goodwill	2.0
Total provisional cash consideration	**3.9**

All of the initial cash consideration of £3.9m (AUD 7.0m) was paid after the year-end in July 2019. The acquisition was completed on a cash-free and debt-free basis, subject to normal levels of working capital.

The maximum contingent cash payable is £5.4m (AUD 9.6m). The amounts payable will be based on the achievement of a range of annual performance targets measured against the earnings before interest, tax, depreciation and amortisation of PLC Consulting across a two year earn-out period. These payments are dependent upon the continuing employment of the sellers in the business and are not considered to be consideration. The expected amounts payable will be accrued within specific adjusting items on a pro rata basis.

Provisional adjustments have been made for the recognition of customer-related intangible assets separable from goodwill amounting to £1.4m (AUD 2.4m), but have not yet been made to other identifiable net assets acquired to reflect their fair value. The provisional assessment of net assets acquired is based upon available financial information and may be adjusted in future in accordance with the requirements of IFRS 3 *Business Combinations* and the sale and purchase agreement.

The provisional assessment of goodwill arising on acquisition can be ascribed to the existence of a skilled, active workforce, developed expertise and processes and the opportunities to obtain new contracts and develop the business. None of these meet the criteria for recognition as intangible assets separable from goodwill. None of the goodwill recognised on consolidation is expected to be deductible for tax purposes.

The provisional assessment of net assets acquired of £1.9m (AUD 3.4m) includes trade receivables of £0.6m (AUD 1.1m), all of which is expected to be collectible.

Acquisition-related expenditure of £0.2m has been charged to the income statement for the year ended 30 June 2019 and is included as a specific adjusting item in Note 4.

(b) Purchase of Detroit Technical Center

On 21 August 2019, the Group purchased the freehold property of its Detroit Technical Center ('DTC'), located at 40000 Ricardo Drive, Van Buren Township, Detroit, Michigan, 48111-1641, United States, for £14.2m (USD 17.3m). The purchase of the facility removes the Group from its long-term lease commitment to October 2037 and the purchase price was predicated on its tenancy. During the year the Group commenced a process to market the DTC test assets for sale and the newly acquired freehold property will form part of this process.

These activities provide the flexibility to realign the cost base of the Automotive US business with its strategy as a more operationally efficient consultancy. The freehold property will be assessed for impairment as part of being classified as held for sale and any charge will be classified as a specific adjusting item due to the non-recurring nature of the transaction.

Additional information


RICARDO

Corporate information

Group General Counsel and Company Secretary
Patricia Ryan

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Website: www.ricardo.com
A PDF version of this Annual Report & Accounts can be downloaded from the Investors page of our website.

Key dates

Final dividend record date	8 November 2019
Annual General Meeting	14 November 2019
Final dividend payment date	21 November 2019

Shareholder services
Link Asset Services provide a share portal service, which allows shareholders to access a variety of services online, including viewing shareholdings, buying and selling shares online, registering change of address details and bank mandates to have dividends paid directly into your bank account. Any shareholder who wishes to register with Link Asset Services to take advantage of this service should visit www.linkassetservices.com/shareholders.

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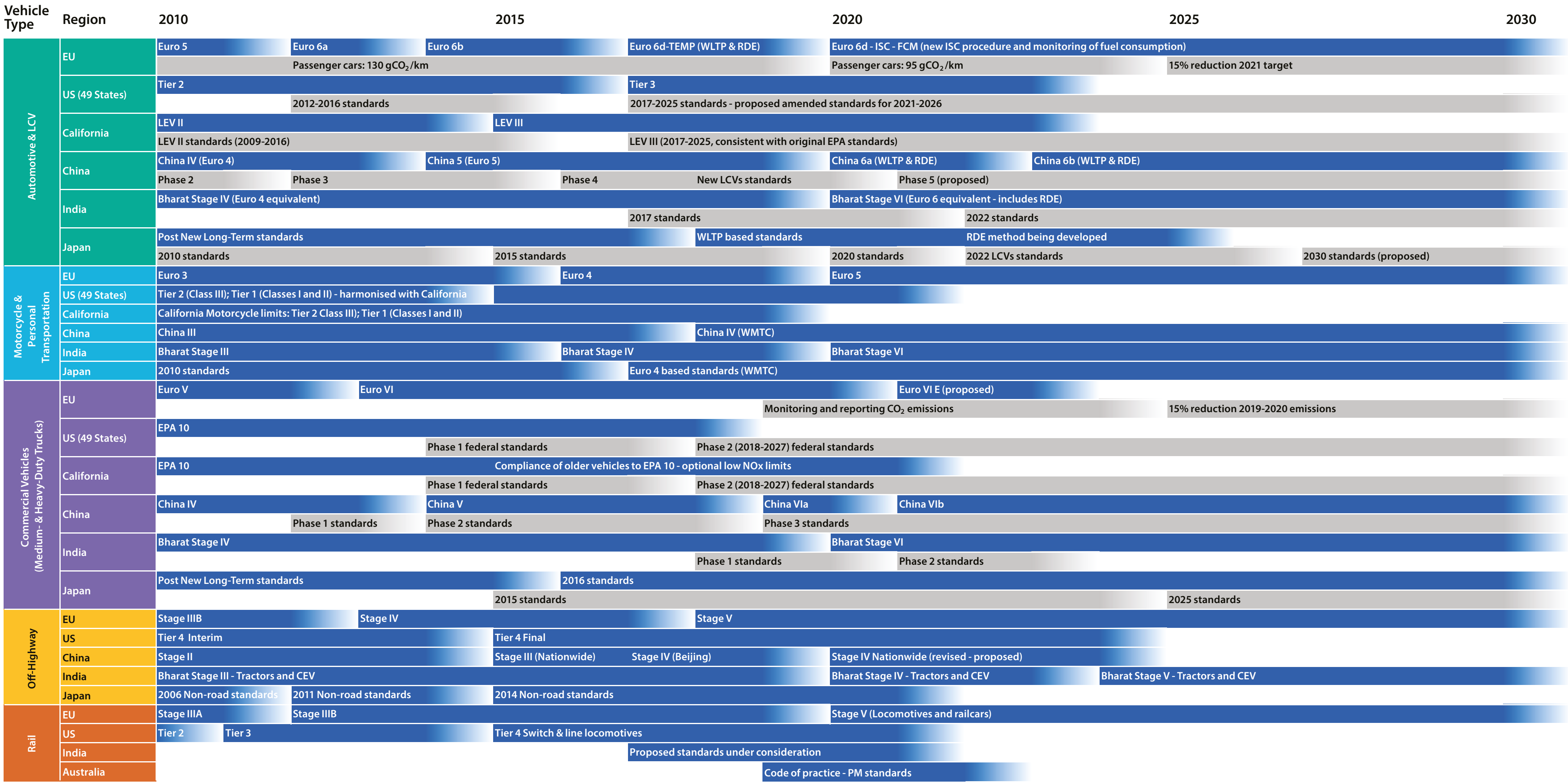
Global emissions legislation

Global tailpipe and CO_2 emissions legislation adherence are 'must haves' in the development budget of many of our clients



Pollutant Emissions Legislation

Fuel Economy or CO_2 Emissions Legislation

Glossary

CEV	Construction Equipment Vehicles
CO_2	Carbon dioxide
EPA	Environmental Protection Agency (United States)
FCM	Fuel consumption monitoring
ISC	In-service conformity
LCV	Light Commercial Vehicle
PM	Particle mass
RDE	Real Driving Emissions
WLTP	Worldwide harmonized Light vehicles Test Procedure
WMTC	Worldwide Motorcycle Test Cycle

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