UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-K

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2023
or

☐ *TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934*

Commission file number 001-36103

TECOGEN INC.

(Exact name of Registrant as specified in its charter)

Delaware	04-3536131
(State or Other Jurisdiction of Incorporation or Organization)	*(IRS Employer Identification No.)*
45 First Avenue Waltham, Massachusetts 02451	(781) 466-6400
(Address of Principal Executive Offices and Zip Code)	*Registrant's telephone number, including area code*

Securities registered pursuant to Section 12(g) of the Securities Exchange Act: **Common Stock, $.001 par value per share**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of “large accelerated filer”, “accelerated filer”, “smaller reporting company” and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☐
Non–Accelerated Filer	☒	Smaller reporting company	☒
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management’s assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes ☐ No ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. Yes ☐ No ☒

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to (§240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act).Yes ☐ No ☒

As of June 30, 2023, the last day of the registrant’s most recently completed second fiscal quarter, the aggregate market value of the voting and non-voting common equity held by non-affiliates was: $ 14,886,556. Solely for purposes of this disclosure, shares of common stock held by executive officers and directors of the registrant as of such date have been excluded because such persons may be deemed to be affiliates. This determination of executive officers and directors as affiliates is not necessarily a conclusive determination for any other purposes.

As of March 25, 2024, 24,850,261 shares of common stock, $.001 par value per share, of the registrant were issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information required for Part III of this Annual Report on Form 10-K is incorporated by reference to Tecogen Inc.'s definitive proxy statement for its 2024 Annual Meeting of Stockholders which will be filed with the Securities and Exchange Commission ("SEC") pursuant to Regulation 14A under the Securities Act of 1934, as amended, within 120 days following its fiscal year ended December 31, 2023.

CAUTIONARY NOTE CONCERNING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K and the documents incorporated herein by reference contain forward-looking statementswithin the meaning of Section 27A of the Securities Act of 1933, as amended *("Securities Act")*, Section 21E of the Securities Exchange Act of 1934, as amended*("Securities Exchange Act")*, the Private Securities Litigation Reform Act of 1995 and other federal securities laws that involve a number of risks and uncertainties. Forward-looking statements generally can be identified by the use of forward-looking terminology such as "anticipates," "believes," "contemplates," "continues," "could," "estimates," "expects," "intends," "may," "plans," "predicts," "pro forma," "potential" "seeks," "should," "target," or other variations thereof (including their use in the negative), or by discussions of strategies, plans or intentions. All statements, other than statements of historical fact, included in this report regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects and plans and objectives of management are forward-looking statements.

The outcome of the events described in these forward-looking statements is subject to known and unknown risks, uncertainties and other factors that may cause us, our customers' or our industry's actual results, levels of activity, performance or achievements expressed or implied by these forward-looking statements to differ. See *"Item 1A. Risk Factors," "Item 7.Management's Discussion and Analysis of Financial Condition and Results of Operations,"* and *"Item 1. Business,"* as well as other sections in this report that discuss some of the factors that could contribute to these differences.

In addition, such forward-looking statements are necessarily dependent upon assumptions and estimates that may prove to be incorrect.Although we believe that the assumptions and estimates reflected in such forward-looking statements are reasonable, we cannot guarantee that our plans, intentions, or expectations will be achieved. The information contained in this report, including the section discussing risk factors, identify important factors that could cause such differences.

The cautionary statements made in this report are intended to be applicable to all related forward-looking statements wherever they appear in this report.The forward-looking statements made in this Annual Report on Form 10-K relate only to events as of the date on which the statements are made. Except as required by law, we undertake no obligation to update or release any forward-looking statements as a result of new information, future events, or otherwise, and assume no obligation to update the reasons why actual results could differ materially from those anticipated in such forward-looking statements.

This report also contains or may contain market data related to our business and industry and any such market data may include projections that are based on certain assumptions. If these assumptions turn out to be incorrect, actual results may differ from the projections based on these assumptions. As a result, our markets may not grow at the rates projected by this data, or at all. The failure of these markets to grow at these projected rates may have a material adverse effect on our business, results of operations, financial condition, and the market price of our common stock.

TECOGEN INC.

ANNUAL REPORT ON FORM 10-K

FOR THE FISCAL YEAR ENDED DECEMBER 31, 2023

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PART 1

Item 1. Business

The Company

Tecogen Inc. (together with its subsidiaries, “we,” “our,” or “us,” or “Tecogen”) designs, manufactures, markets, and maintains high efficiency, ultra-clean cogeneration products. These include natural gas engine driven combined heat and power (CHP) systems and chillers for multi-family residential, commercial, recreational and industrial use. We are known for products that provide customers with substantial energy savings, resiliency from utility power outages and for significantly reducing a customer’s carbon footprint. Our products are sold with our patented Ultera® emissions technology which nearly eliminates all criteria pollutants such as nitrogen oxide ("NOx") and carbon monoxide ("CO"). We developed Ultera® for other applications including stationary engines and forklifts. We were incorporated in the State of Delaware on September 15, 2000.

We have wholly-owned subsidiaries American DG Energy, Inc. ("ADGE") and Tecogen CHP Solutions, Inc., and we own a 51% interest in American DG New York, LLC ("ADGNY"), a joint venture. ADGE and ADGNY distribute, own, and operate clean, on-site energy systems that produce electricity, hot water, heat and cooling. ADGE and ADGNY own the equipment that is installed at customers' facilities and sell the energy produced to the customer on a long-term contractual basis.

Our operations are comprised of three business segments:

- our Products segment, which designs, manufactures and sells industrial and commercial cogeneration systems;
- our Services segment, which provides operations and maintenance ("O&M") services for our products under long term service contracts, and
- our Energy Production segment, which installs, operates and maintains distributed generation electricity systems that we own and sells energy generated by such systems in the form of electricity, heat, hot water and cooling to our customers under long-term energy sales agreements.

The majority of our customers are located in regions with the highest utility rates, typically California, the Midwest and the Northeast.

Recent Developments

Assumption of Aegis Energy Services Maintenance Agreements

On March 15, 2023, we entered into an agreement ("Agreement") with Aegis Energy Services, LLC (“Aegis”) pursuant to which Aegis agreed to assign to us and we agreed to assume certain Aegis maintenance agreements, we agreed to purchase certain assets, and related matters (“Acquisition”). On April 1, 2023, the Acquisition closed. Under the Agreement, we agreed to acquire from Aegis and assume Aegis' rights and obligations arising on or after April 1, 2023 under maintenance agreements pursuant to which Aegis provided maintenance services for approximately 200 cogeneration systems, and acquired certain vehicles and inventory used by Aegis in connection with the performance of such maintenance services, and, following closing hired eight (8) Aegis employees to provide services with respect to such maintenance agreements. At closing, we acquired eight (8) Aegis vehicles for consideration consisting of $170,000 in cash. Also, we issued credits against outstanding accounts receivable due from Aegis in the amount of $300,000 for the acquisition of inventory that Aegis used to provide maintenance services. On February 1, 2024, Tecogen and Aegis amended the Agreement to add eighteen (18) additional maintenance contracts (the "Amendment"). The Amendment includes an undertaking by Aegis to use commercially reasonable efforts to support and assist our execution of maintenance service agreements for an additional thirty-six (36) cogeneration units sold to customers by Aegis. See Note 5."Aegis Contract and Related Asset Acquisition" of the Notes to the Consolidated Financial Statements.

Tecochill Hybrid-Drive Air-Cooled Chiller Development

During the third quarter of 2021 we began development of the Tecochill Hybrid-Drive Air-Cooled Chiller. We recognized that there were many applications where the customer wanted an easy to install roof top chiller. Using the inverter design from our InVerde e+ cogeneration module, the system can simultaneously take two inputs, one from the grid or a renewable energy source and one from our natural gas engine. This allows a customer to seek the optimum blend of operational cost savings and greenhouse gas benefits while providing added resiliency from two power sources. We introduced the Tecochill Hybrid-Drive Air-Cooled Chiller at the AHR Expo in February 2023 and received an order on February 8, 2024 for three hybrid-drive air-cooled chillers for a utility in Florida. A patent application based on this concept has been filed with the US Patent and Trademark Office.

Controlled Environment Agriculture

On July 20, 2022, we announced our intention to focus on opportunities for low carbon Controlled Environment Agriculture ("CEA"). We believe that CEA offers an exciting opportunity to apply our expertise in clean cooling, power generation, and greenhouse gas reduction to address critical issues affecting food and energy security. We propose to address this challenge by developing a highly efficient energy solution for CEA grown produce using our cogeneration products in conjunction with solar energy generation, energy storage, and other technologies.

CEA facilities enable multiple crop cycles (15 to 20 cycles) in one year compared to one or two crop cycles in conventional farming. In addition, growing produce close to the point of sale reduces food spoilage during transportation. Food crops grown in greenhouses typically have lower yields per square foot than in CEA facilities, and the push to situate facilities close to consumers in cities requires minimizing land area and maximizing yield per square foot. Yields are increased in CEA facilities by supplementing or replacing natural light with grow lights in a climate-controlled environment - which requires significant energy use.

In recent years our cogeneration equipment has been used in numerous cannabis cultivation facilities because our systems significantly reduce operating costs, reduce the facility GHG footprint and offer resiliency to grid outages. Our experience providing clean energy solutions to cannabis cultivation facilities has given us significant insight into requirements relating to energy-intensive indoor agriculture applications that we expect to be transferable to CEA facilities for food production.

Impact of the Russian Invasion of Ukraine

Presently, we have no operations or customers in Russia or the Ukraine. The higher energy prices for natural gas as a result of the war may affect the performance of our Energy Production Segment. However, we have also seen higher electricity prices as much of the electricity production in the United States is generated from fossil fuels. If the electricity prices continue to rise, the economic savings generated by our products are likely to increase. In addition to the direct result of changes in natural gas and electricity prices, the war in Ukraine may result in higher cybersecurity risks, increased or ongoing supply chain challenges, and volatility related to the trading prices of commodities.

Overview of Our Business

Products

Our products offer customers energy savings, resiliency and a cleaner environmental footprint. Our cogeneration, chiller and heat pump systems use an engine to generate electricity or shaft work and recover the waste heat from the engine. Our systems are greater than 88% efficient compared to typical electrical grid efficiencies of 40% to 50%. As a result, our greenhouse gas (GHG) emissions are typically half that of the electrical grid. Our systems generate electricity and hot water or in the case of our Tecochill product, both chilled water and hot water. Our products are expected to run on Renewable Natural Gas (RNG) as it is introduced into the US gas pipeline infrastructure.

Our natural gas-powered cogeneration systems (also known as combined heat and power or "CHP") are efficient because they drive electric generators or compressors, which reduce the amount of electricity purchased from the utility while recovering the engine's waste heat for water heating, space heating, and/or air conditioning at the customer's building.

Our commercial product lines include:

- the InVerde e+® and TecoPower® cogeneration units; these systems supply electricity and hot water;
- Tecochill® air-conditioning and refrigeration chillers; these systems produce chilled water and hot water;
- Tecochill® hybrid-drive air-cooled chiller; gas engine-driven chillers that provide air conditioning and hot water;
- Tecofrost® gas engine-driven refrigeration compressors; these systems circulate refrigerant and provide hot water as a byproduct; and,
- Ultera® emissions control technology.

Traditional customers for our InVerde and Tecopower products have a simultaneous need for electrical power and hot water. These include hospitals, nursing homes, schools, universities, health clubs, spas, hotels and motels, office and multi-unit residential buildings. Conversely our Tecochill product benefits customers who have a simultaneous need for cooling and hot water which is typical in sites such as hospitals, ice rinks, indoor agriculture and food processing. Our Tecofrost refrigeration compressors are applied primarily to industrial applications that include cold storage, wineries, dairies, ice rinks and food processing. Market drivers include the price of natural gas, local electricity rates, environmental regulations, and governmental energy policies, as well as customers' desire to become more environmentally responsible.

Our cooling and refrigeration products provide both cooling and make use of high grade waste heat. This is of particular advantage in facilities that control both temperature and humidity. In such facilities, climate control is achieved by cooling the facility to remove humidity and then reheating to the required temperature. Using engine waste heat to perform the reheat while utilizing natural gas to generate the cooling provides significant economic and environmental benefits. As a result our product has significant competitive advantages in applications that operate year round such as controlled environment agriculture, indoor ice rinks, and hospitals.

Through our factory service centers in California, Connecticut, Florida, Massachusetts, Michigan, New Jersey, New York, and Ontario, our specialized technical staff maintains our products via long-term service contracts. To date we have shipped over 3,200 units, some of which have been operating for almost 35 years. We established a service center in Toronto, Canada in August 2020 to support our existing population of chillers and cogeneration units including 26 cogeneration units sold in this territory during 2020 to serve public housing facilities.

In 2009, in response to the changing regulatory requirements for stationary engines, our research team developed an economically feasible process for removing air pollutants from engine exhaust.This technology's U.S. and foreign patents were granted beginning in October 2013 and other domestic and foreign patents granted or applications are pending. Branded Ultera®, the ultra-clean emissions technology repositions our engine driven products in the marketplace, making them comparable environmentally with other technologies such as fuel cells, but at a much lower cost and greater efficiency. In 2018, a group of natural gas engine-generators fitted with the Ultera system were successfully permitted in the Los Angeles region for unrestricted operation, the first natural gas engines to do so without operating time limits or other exemption. These engines were permitted to levels matching the California Air Resources Board ("CARB") stringent 2007 emissions requirements, the same emissions standard used to certify fuel cells, and the same emissions levels as a state-of-the-art central power plant. We now offer our Ultera emissions control technology as an option on all our products or as a stand-alone application for retrofitting other rich-burn spark-ignited reciprocating internal combustion engines such as the engine-generators described above.

Our products are designed as compact modular units that are intended to be installed in multiples. This approach has significant advantages over utilizing a single larger cogeneration or chiller unit, allowing placement in constrained urban settings and redundancy to mitigate service outages. Redundancy is particularly relevant in regions where the electric utility has formulated tariff structures that include high “peak demand” charges. Such tariffs are common in many areas of the country, and are applied by such utilities as Southern California Edison, Pacific Gas and Electric, Consolidated Edison of New York, and National Grid of Massachusetts. Because these tariffs are assessed based on customers’ peak monthly demand charge over a very short interval, typically only 15 minutes, a brief service outage for a system comprised of a single unit can create a high demand charge, and therefore be highly detrimental to the monthly savings of the system. For multiple unit sites, the likelihood of a full system outage that would result in a high demand charge is dramatically reduced, consequently, these customers have a greater probability of capturing peak demand savings.

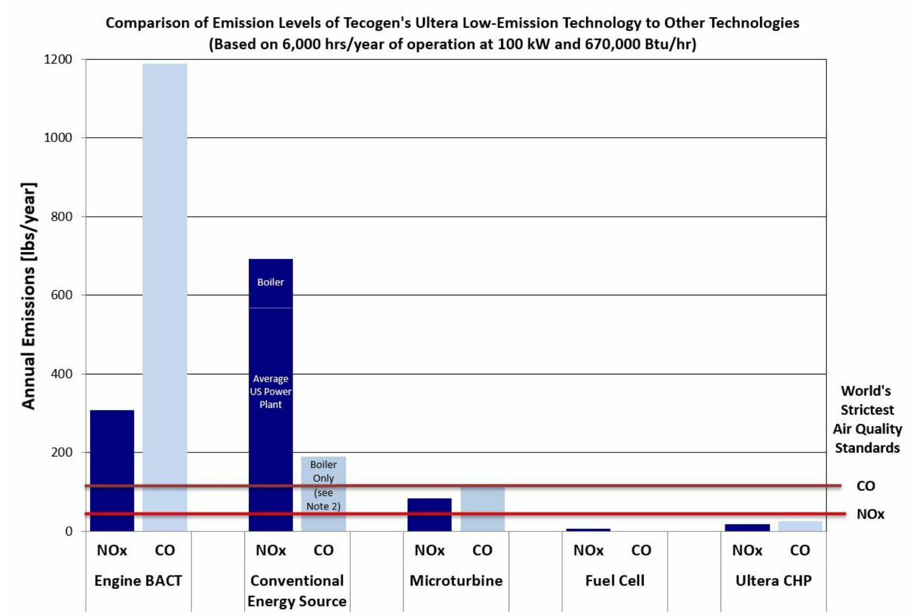
Our products are sold directly to customers by our in-house marketing team, and by established independent sales agents and representatives.

Our operations are comprised of three business segments. Our Products segment designs, manufactures and sells industrial and commercial cogeneration systems as described above. Our Services segment provides O&M services for our products under long term service contracts. Our Energy Production segment sells energy in the form of electricity, heat, hot water and cooling to our customers under long-term sales agreements.

Ultera Low-Emissions Technology

All of our CHP products are available with the patented Ultera® low-emissions technology as an equipment option. This breakthrough technology was developed in 2009 and 2010 as part of a research effort partially funded by the California Energy Commission and Southern California Gas Company.

The chart below compares emission levels of our Ultera technology to other technologies. As of December 31, 2023, our Ultera CHP and fuel cell technologies are the only technologies that we know of which comply with California's air quality standards for CO and NOx, represented in the chart by the colored horizontal lines, shown as the world's strictest air quality standards on the lower right of the chart. We believe that as environmental regulation becomes more stringent in the United States, our emissions technology may be used in markets including generators, fork trucks and biogas engines.



(5) (2) (4) (4) (3) (1)

(1) California has the strictest air quality standards for engines in the world

(2) Conventional Energy Source is U.S. power plant and gas boiler. Average U.S. power plant NOx emission rate of 0.9461 lb/MWh from (USEPA eGrid 2012), CO data not available. Gas boiler efficiency of 78% (www.eia.gov) with emissions of 20 ppm NOx @ 3% O_2 (California Regulation SCAQMD Rule 1146.2 and <50 ppmv CO @ 3% O_2 (California Regulation SCAQMD BACT).
(3) Tecogen emissions based upon actual third party source test data.
(4) Microturbine and Fuel Cell emissions from EPA CHP Partnership - Catalog of CHP Technologies- March 2015.
(5) Stationary Engine BACT as defined by SCAQMD.

After successfully developing the Ultera technology for our own equipment, our research and development team began exploring other possible emissions control applications in an effort to expand the market for the ultra-clean emissions system. Retrofit kits were developed in 2014 for other stationary engines and in 2015 the Ultera Retrofit Kit was applied successfully to natural gas stand-by generators from other manufacturers, including Generac and Caterpillar.

Historically, standby generators have not been subjected to the strict air quality emissions standards of traditional power generation. However, generators which run for more than 200 hours per year or run for non-emergency purposes (other than routine scheduled maintenance) in some territories are subject to compliance with the same stringent regulations applied to a typical electric utility. As demand response programs become more economically attractive and air quality regulations continue to become more stringent, there could be increased demand for retrofitting standby generators with our Ultera® emissions control technology, thus providing a cost-effective solution to keeping the installed base of standby generators operational and in compliance with regulatory requirements.

In 2017, a group of generators owned by a single customer in Southern California were supplied Ultera kits because of their particular requirement to exceed the 200-hour annual limit. These units are now operational and have been tested by the customer and shown to be compliant with the local pollution limits which we believe to be the strictest anywhere in the United States, and potentially the world. Our CHP products have been permitted to this same standard. However, CHP products are given a heat credit which effectively increases the allowable limit. In 2018, permitting was completed making these certification levels the lowest we have achieved. We believe no other engines have been certified to these levels since the current regulations in the Los Angeles region became effective.

It is noteworthy that these engine-generators have been used in California to power dispersed loads in a fire-prone area where frequent de-energizing of the electric overhead power lines is required for safety. We believe this application to be a new and significant application for the Ultera technology in light of the widely publicized widespread outages in California which have occurred in recent years.

Services

We provide long-term maintenance contracts, parts sales, and turnkey installation for our products through a network of eleven well-established field service centers in California, the Midwest, the Northeast, the Southeast and in Ontario, Canada. These centers are staffed by our full-time technicians, working from local leased facilities.The facilities provide office and warehouse space for inventory. We encourage our customers to provide internet connections to our units so that we may maintain remote monitoring and communications with the installed equipment. For connected installations, the machines are contacted daily to download their status and provide regular operational reports (daily, monthly, and quarterly) to our service managers. This communications link is used to support the diagnostic efforts of our service staff, and to send messages to pre-programmed phones if a unit has experienced an unscheduled shutdown. In many cases, communications received by service technicians from connected devices allow for proactive maintenance, minimizing equipment downtime and improving operating efficiency for the customer.

The work of our service managers, supervisors, and technicians focuses on our products. Because we manufacture our own equipment, our service technicians bring hands-on experience and competence to their jobs. They are trained at our corporate headquarters and primary manufacturing facility in Waltham, Massachusetts.

Most of our service revenue is in the form of annual service contracts, which are typically of an all-inclusive “bumper-to-bumper” type, with billing amounts proportional to the equipment's achieved operating hours for the period. Customers are thus invoiced in level, predictable amounts without unforeseen add-ons for such items as unscheduled repairs or engine replacements. We strive to maintain these contracts for many years, and work to maintain the integrity and performance of our equipment.

Our products have a long history of reliable operation. Since 1995, we have had a remote monitoring system in place that connects to hundreds of units daily and reports their “availability,” which is the amount of time a unit is running or is ready to run. More than 80% of the units operate above 90% availability, with the average being 93.8%. Our factory service agreements have directly impacted these positive results and represent an important long-term annuity-like stream of revenue for us.

New equipment sold beginning in 2016 and select upgrades to the existing installed equipment fleet include industrial internet solution which enables us to collect, analyze, and manage valuable asset data continuously and in real-time. This provides the service team with improved insight into the functionality of our installed CHP fleet. Specifically, it enables the service department to perform remote monitoring and diagnostics and to view system results in real time via a computer, smart phone or tablet. Consequently, we can better utilize monitoring data ensuring customers are capturing maximum possible savings and efficiencies from their cogeneration equipment.

Energy Production

Our Energy Production segment sells energy in the form of electricity, heat, hot water and cooling to our customers under long-term sales agreements which represented 7.0% of our consolidated revenues for the years ended December 31, 2023 and 2022. See Note 18. "Segments" of the Notes to the Consolidated Financial Statements.

Sales & Distribution

Our products are sold directly to end-users by our sales team and by established independent sales agents and representatives. We have agreements with manufacturers' representatives and outside sales representatives who are compensated by commissions for designated territories and product lines. During the years ended December 31, 2023 and December 31, 2022, no customer accounted for more than 10% of our revenues. We typically sell our chiller products through our manufacturing representatives with assistance from our internal sales team. Our combined heat and power products are typically sold direct to end customers by our internal sales team.

Markets and Customers

Worldwide, stationary power generation applications vary from huge central stationary generating facilities (traditional electric utility providers) to back-up generators as small as 2 kW. Historically, power generation in most developed countries such as the United States has been part of a regulated central utility system utilizing high-temperature steam turbines powered by fossil-fuels. This turbine technology, though steadily refined over the years, reached a maximum efficiency (where efficiency means electrical energy output per unit of fuel energy input) of approximately 40% to 50%.

A number of developments related primarily to the deregulation of the utility industry as well as significant technological advances have now broadened the range of power supply choices available to all types of customers. Cogeneration, which harnesses waste energy from power generation processes and puts it to work for other uses on-site, can boost the energy conversion efficiency to nearly 90%, a better than two-fold improvement over the average efficiency of a fossil fuel plant. This distributed generation, or power generated on-site at the point of consumption rather than power generated centrally, eliminates the cost, complexity, and inefficiency associated with electric transmission and distribution. The implications of the CHP distributed generation approach are significant. We believe that if cogeneration were applied on a large scale, global fuel usage might be dramatically curtailed and the utility grid made far more resilient. Furthermore, with technology we have introduced, like the Ultera low-emissions technology, our products can now contribute to better air quality level while complying with the strictest air quality regulations in the United States.

We estimate that our products can often reduce the customer's operating costs (for the portion of the facility loads to which they are applied) by approximately 30% to 60%, which provides an excellent rate of return on the equipment's capital cost in many areas of the country with high electricity rates. Our chillers are especially suited to regions where utilities impose extra charges during times of peak usage, commonly called "demand" charges. In these cases, the gas-fueled chiller reduces the use of electricity during the summer, the costliest time of year.

Decentralizing power generation or reducing energy requirements at a customer's site not only relieves the capacity burden on existing power plants, but also lessens the burden on transmission and distribution lines. This ultimately improves the grid's reliability and reduces the need for costly upgrades.

Increasingly favorable economic conditions may improve our business prospects domestically and abroad. Specifically, we believe that natural gas prices are expected to increase from their current values, and that electric rates are expected to continue to rise more significantly over the long-term as utilities pay for grid expansion, better emission controls, efficiency improvements, and the integration of renewable power sources.

Most potential new customers in the U.S. require less than 1 MW of electric power and less than 1,200 tons of cooling capacity. We are targeting customers in states with high electricity rates in the commercial sector, such as California, Connecticut, Massachusetts, New Hampshire, New Jersey, and New York. Most of these states also have high peak demand rates, which favor utilization of our modular units in groups so as to assure redundancy and peak demand savings. Governmental agencies in some of these regions may also provide generous rebates that can improve the economic viability of our systems.

The Inflation Reduction Act of 2022 increased Federal tax credits, including the investment tax credit (ITC), to up to thirty percent (30%) of the project cost for projects incorporating certain low emission technologies, including CHP equipment, that begin construction before January 1, 2025 and provides for an additional ten percent (10%) credit if the taxpayer satisfies additional requirements relating to domestic content. State and local governments and tax-exempt entities may also benefit from certain tax credits through direct payments or transfers of tax credits to unrelated third parties. This particular new direct pay option is especially impactful given the fact that many ideal facilities for CHP systems are not-for-profit, including many healthcare and hospital facilities, schools and universities, as well as recreation centers. These customers historically have not been able to benefit from previous iterations of the ITC. Under the federal definition for CHP systems, all of our products, including our air-conditioning and cooling models (Tecochill and Tecofrost) qualify for the tax credit when heat recovery is incorporated into the system design.

We aggressively market to potential customers where utility pricing aligns with our advantages. These areas include regions that have strict emissions regulations, such as California, or those that reward CHP systems that are especially non-polluting, such as New Jersey. Currently, more than 23 states recognize CHP as part of their Renewable Portfolio Standards or Energy Efficiency Resource Standards.

The traditional markets for CHP systems are buildings with long hours of operation and with corresponding demand for electricity or cooling and heat. Traditional customers for our cogeneration systems include controlled environment agriculture, hospitals, nursing homes, colleges, universities, health clubs, spas, hotels, motels, office and retail buildings, food and beverage processors, multi-unit residential buildings, laundries, ice rinks, swimming pools, factories, municipal buildings, and military installations.

Traditional customers for our chillers, refrigeration compressors and heat pumps overlap with those for our cogeneration systems. Engine-driven chillers are often used as replacements for aging electric chillers because they both occupy similar amounts of floor space and require similar maintenance schedules. This is also the case with refrigeration compressors.

Competition

The markets for our products are highly competitive, though we believe that we offer customers a suite of premier best-in-class clean energy and thermal solutions.

InVerde and Tecopower

Our combined heat and power products that produce electricity and hot water compete with the utility grid, existing technologies such as other reciprocating engine and microturbine CHP systems, and other emerging distributed generation technologies including solar power, wind-powered systems, and fuel cells. Our products are highly competitive between 60KW and 1.5MW in electrical generation capacity. In this size range we have other reciprocating engine competitors, although we have strong competitive advantages when it comes to ease of utility interconnection, ease of installation in tight spaces and our microgrid capabilities. We believe that Capstone Turbine Corporation is the only microturbine manufacturer with a commercial presence in CHP.

Although operating solar and wind powered systems produce no emissions, the main drawbacks to these renewable powered systems are their dependence on weather conditions, their reliance on backup utility grid-provided power, and high capital costs that can often make these systems uneconomical without government subsidies. Similarly, while the market for fuel cells is still developing, a number of fuel cell companies are focused on markets similar to ours. Fuel cells, like solar and wind powered systems, have received higher levels of incentives for the same type of applications as CHP systems in many territories. We believe that, notwithstanding these higher government incentives, our CHP solutions provide a better value and more robust solution to end users in most applications.

Additionally, our patents relating to the Ultera ultra-low emissions technology give our products a strong competitive advantage in markets where severe emissions limits are imposed or where very clean power is favored, such as New Jersey, California, and Massachusetts.

Overall, we compete with end users' other options for electrical power, heating, and cooling on the basis of our technology's ability to:

- Provide a more efficient solution that provides operational savings for a facility's energy needs including cooling, electricity and hot water;
- Provide power when a utility grid is not available or goes out of service;
- Reduce emissions of criteria pollutants (NOx and CO) to near-zero levels and cut the emission of greenhouse gases such as carbon dioxide due to increased efficiencies compared to the electric grid;
- Provide reliable on-site power generation, heating and cooling services.

We believe that no other company has developed a product that provides the features and benefits provided by our inverter-based InVerde e+, which offers UL-certified grid connection and sophisticated off-grid and microgrid capabilities. An inverter-based product with at least some of these features has been introduced by others, but we believe that they face serious challenges in duplicating all the unique features of the InVerde e+. Competitors' product development time and costs could be significant. We have exclusive license rights to Microgrid algorithms developed by the University of Wisconsin researchers. We have exclusive rights for engine-driven systems utilizing natural gas or diesel fuel in the application of power generation where the per-unit output is less than 500kW. The software allows our products to be integrated as a Microgrid, where multiple InVerde e+® units can be seamlessly isolated from the main utility grid in the event of an outage and re-connected to it afterward. We expect that our patents and license for Microgrid software will deter others from offering certain important functions. See *"Business-Intellectual Property."*

Similarly, in the growing Microgrid segment, neither fuel cells nor microturbines can respond to changing energy loads when the system is disconnected from the utility grid. Engines such as those used in our equipment inherently have a fast-dynamic response to step load changes, which is why they are the primary choice for emergency generators. Fuel cells and microturbines require additional energy storage systems to be utilized for time-limited off-grid operation, giving our engine-driven solutions an advantage for Microgrid and resiliency applications.

Tecochill Chillers

Our Tecochill line of chillers are the only gas-engine-driven chillers available on the market. Natural gas can also fuel absorption chillers, which use fluids to transfer heat without an engine drive. However, engine driven chillers continue to have an efficiency advantage over absorption machines. Tecochill chillers reach efficiencies well above levels achieved by similarly sized absorption systems. Low natural gas prices in the United States improve the economics of natural gas-fueled chillers while their minimal electric demand on backup power systems make them ideal for facilities requiring critical precision climate control. In 2023 we expanded our Tecochill range of products with the introduction of a hybrid air cooled chiller based on the inverter design used in the InVerde. The hybrid-drive air-cooled chiller will take simultaneous inputs from the electrical grid and the natural gas engine so that it can operate with the lowest cost and/or greenhouse gas footprint at any time based on changing conditions.

Research & Development

Our long and rich research and development tradition and sustained programs have allowed us to cultivate deep engineering expertise. We have strong core technical knowledge that is critical to product support and continuous product improvement efforts. Our TecoDrive engine, permanent magnet generator, cogeneration and chiller products, InVerde, pumps, Ultera emissions control system, and our hybrid-drive air-cooled chiller were all created and optimized in-house with support from third-parties.

We continue to seek alliances with utilities, government agencies, universities, research facilities, and manufacturers. We have succeeded in developing new technologies and products in collaboration with several entities, including:

- Sacramento Municipal Utility District has provided test sites to us since 2010.
- Southern California Gas Company and San Diego Gas & Electric Company, each a Sempra Energy subsidiary, have granted us research and development contracts since 2004.
- Department of Energy's Lawrence Berkeley National Laboratory, with whom we have had research and development contracts since 2005, including ongoing Microgrid development work related to the InVerde.
- Eastern Municipal Water District in Southern California has co-sponsored demonstration projects to retrofit both a natural-gas powered municipal water pump engine and a biofuel powered pumping station engine with the Ultera low emissions technology since 2012.
- Consortium for Electric Reliability Technology Solutions executed research and development contracts with us, and has provided a test site to us since 2005.
- California Energy Commission with whom we had a research and development contract from 2004 until March 2013.
- The AVL California Technology Center performed a support role in research and development contracts as well as internal research and development on our Ultera emission control system from August 2009 to November 2011. In addition, the Center supported our research on emissions from gasoline vehicles from January of 2016 through October 2017. AVL researchers collaborated with our engineers on several peer reviewed papers published by technology association SAE International in 2017 and 2018.

Certain components of our InVerde product were developed through a grant from the California Energy Commission. This grant includes a requirement that we pay royalties on all sales of all products related to the grant, which obligation expired in 2022. As of December 31, 2023, royalties accrued in accordance with this grant agreement were less than $10,000 on an annual basis.

We also continue to leverage our resources with government and industry funding, which has yielded a number of successful developments, including the Ultera low-emissions technology, sponsored by the California Energy Commission and Southern California Gas Company. Pursuant to the terms of the grants from the California Energy Commission, the California Energy Commission has a royalty-free, perpetual, non-exclusive license to these technologies for government purposes.

Our current internal R&D efforts are focused on the hybrid-drive air-cooled chiller that utilizes the basic inverter design used in the InVerde e+. Management believes that this chiller will address a significant market segment that is currently not addressed by our existing Tecochill product. For the years ended December 31, 2023 and 2022, we spent $840,011 and $732,873, respectively, on research and development activities.

Intellectual Property

Currently, we hold twelve United States patents for our technologies:

- 10,774,720: "NOx Reduction Using a Dual-Stage Catalyst System with Intercooling in Vehicle Gasoline Engines under Real Driving Condition." This patent, granted in September 2020, improves the removal of Non-Methane Organic Gases (NMOG) and Carbon Monoxide (CO) from vehicle emissions. The improved performance, consisting of up to 90% reductions in NMOG and CO results from increased oxidation of NMOG and CO due to a lower temperature environment in the second stage catalyst.
- 10,774,724: "Dual Stage Internal Combustion Engine Aftertreatment System Using Exhaust Gas Intercooling and Charger Driven Air Ejector." This patent, granted in September 2020, relates to the use of turbo

compressors and exhaust gas intercoolers in turbocharged engines to reduce the complexity and cost of Ultera emissions reduction systems.

- 9,995,195: “Emissions control systems and methods for vehicles.” This patent, granted in June 2018, is a method for vehicle cold start to enhance the removal of CO and hydrocarbons emissions, which are extremely problematic for cold engines. Air is injected in the exhaust between the engine’s close-coupled catalyst and underbody catalyst. Once the engine is warmed (> 500 F exhaust) this air stream is shut off. This method synergizes well with the Ultera system by utilizing the injection air feed for an alternative purpose during engine start.
- 9,956,526: “Poison-Resistant Catalyst and Systems Containing Same.” This patent, granted in May 2018, relates to a special catalyst formulation that is resistant to contaminant induced corrosion in conditions like those of the Ultera second stage. These poisons or contaminants are most commonly sulfur compounds.
- 9,702,306: “Internal Combustion Engine Controller.” This patent granted in July of 2017 relates to the unique control methodology used in the InVerde e+ CHP unit that maximizes engine fuel economy under variable speed operation.
- 9,470,126: "Assembly and method for reducing ammonia in exhaust of internal combustion engines." This patent, granted in October 2016, is related to the Ultera emission control system applicable to all our products.
- 9,856,767: “Systems and methods for reducing emissions in exhaust of vehicles and producing electricity." This patent, filed in November 2015 and published in March 2016, relates to the development of the Ultera emission control system for vehicle applications.
- 9,121,326: “Assembly and method for reducing nitrogen oxides, carbon monoxide and hydrocarbons in exhausts of internal combustion engines.” This patent, granted in September 2015, is related to the Ultera emission control system applicable to all our products.
- 9,651,534: "Assembly and Method for reducing nitrogen oxides, carbon monoxide, hydrocarbons and hydrocarbon gas in exhausts of internal combustion engines and producing and electrical output." This patent granted in April 2017, is related to the Ultera emission control system applicable to all our products.
- 8,578,704: “Assembly and method for reducing nitrogen oxides, carbon monoxide, and hydrocarbons in exhausts of internal combustion engines.” This patent, granted in November 2013, is for the Ultera emission control system applicable to all our products.
- 7,243,017: “Method for controlling internal combustion engine emissions.” This patent, granted in July 2007, applies to the specific algorithms used in our engine controller for metering fuel usage to obtain the correct combustion mixture and is technology used by most of our engines.
- 7,239,034: “Engine driven power inverter system with cogeneration.” This patent, granted in July 2007, pertains to the utilization of an engine-driven CHP module combined with an inverter and applies to our InVerde product specifically.

Our patents expire between 2024 and 2037.

In addition, we have licensed specific rights to Microgrid software algorithms developed by University of Wisconsin researchers for which we pay royalties to the assignee, The Wisconsin Alumni Research Foundation (WARF). Pursuant to U.S. Patent 7,116,010, titled “Control of small distributed energy resources”, granted in 2006 and expires on March 27, 2024. Our exclusive rights are for engine-driven systems utilizing natural gas or diesel fuel in the application of power generation where the per-unit output is less than 500 kW. The software allows our products to be integrated as a Microgrid, where multiple InVerde units can be seamlessly isolated from the main utility grid in the event of an outage and re-connected to it afterward. The licensed software allows us to implement such a Microgrid with minimal control devices and associated complexity and cost. We consider the Microgrid software algorithm licensed from WARF to be a key feature of our InVerde product, and one that would be difficult to duplicate outside the patent. We pay WARF a royalty for each cogeneration module sold using the licensed technology. Such royalty payments have been in the range of $5,000 to $15,000 on an annual basis through the year ended December 31, 2023. In addition, WARF reserved the right to grant non-profit research institutions and governmental agencies non-exclusive licenses to practice and use, for non-commercial research purposes, the technology developed by us that is based on the licensed software.

We consider our patents and licensed intellectual property to be important in the operation of our business. The expiration, termination, or invalidity of one or more of these patents may have a material adverse effect on our business.

One other company has developed a product that seeks to compete with our inverter-based InVerde, although it does not offer all of the same benefits and features offered by our InVerde products. We anticipate that an inverter-based product with at least some of the features offered by our InVerde products will be introduced by others, but we believe that our competitors will face serious challenges in duplicating the InVerde. Product development time and costs would likely be significant, and we expect that our patent for the inverter-based CHP system, U.S. Patent 7,239,034, provides significant protections for key features.

In 2013, we purchased rights to designs and technology, including patents granted or pending for our permanent magnet generators. A key component of our InVerde module uses this acquired technology.

Our patents for the Ultera low-emissions control technology applies to all our gas engine-driven products and may have applications to other rich-burn spark-ignited internal combustion engines. We have been granted patents for this technology in Europe, Australia, Brazil, Canada, Japan, Mexico, Korea and Singapore.

Copyrights

Our control software is protected by copyright laws or through an exclusive license agreement.

Trademarks

We have registered the brand names of our equipment and logos used on our equipment. These registered and pending trademarks include Tecogen, Tecochill, Tecopower, Ultera, InVerde, InVerde e+ and the associated logos. We will continue to trademark our product names and symbols.

We rely on treatment of our technology as trade secrets through confidentiality agreements, which our employees and vendors are required to sign. Also, we rely on non-disclosure agreements with others that have or may have access to confidential information to protect our trade secrets and proprietary knowledge.

Sourcing & Manufacturing

We are focused on continuously strengthening our manufacturing processes and increasing operational efficiencies. Many of the components used in the manufacture of our highly-efficient clean energy equipment are readily fabricated from commonly available raw materials or are standard available parts sourced from multiple suppliers. We believe that adequate supplies exist to meet our near to medium term manufacturing needs. We have an on-going focus on developing and implementing new systems to simplify our manufacturing processes, product sourcing methods, and our supply chain.

We have a combined total of approximately 27,000 square feet of manufacturing and warehouse space running on a single 5-day per week shift at our Waltham, Massachusetts facility. We believe we have sufficient spare capacity to meet near to medium term demand without incurring additional fixed costs. The lease for our headquarters located in Waltham, Massachusetts was extended on March 1, 2024 and expires on April 30, 2024.

On March 31, 2023, we entered into two lease agreements for two adjoining buildings, located in Billerica, Massachusetts, containing approximately 26,412 square feet of manufacturing, storage and office space to serve as our headquarters and manufacturing facilities. We have a total of approximately 21,000 square feet of manufacturing and warehouse space at the Billerica, Massachusetts facility. The lease agreements which commenced on January 1, 2024, provide for initial lease terms of five (5) years, expiring on December 31, 2028, with two successive options to renew for additional terms of five (5) years.

Government & Regulation

Several kinds of federal, state and local government regulations affect our products and services, including but not exclusive to:

- product safety certifications and interconnection requirements;
- air pollution regulations which govern the emissions allowed in engine exhaust;
- state and federal incentives for CHP technology;
- various local building and permitting codes and third-party certifications;
- electric utility pricing and related regulations; and
- federal and state laws regarding the legalization of cannabis for medicinal and recreational use.

Our markets can be positively or negatively impacted by the effects of governmental and regulatory matters. We are impacted not only by energy policy, laws, regulations and incentives of governments in the markets in which we sell, but also by rules, regulations and costs imposed by utilities. Utility companies or governmental entities may place barriers on the installation or interconnection of our products with the electric grid. Further, utility companies may charge additional fees to customers who install on-site power generation to reduce the electricity they take from the utility and to preserve electric capacity available from the grid for back-up or standby purposes. These types of restrictions, fees or charges could hamper the ability to install or effectively use our product or increase the cost to our potential customers for using our systems. This could make our systems less desirable, adversely impacting our revenue and profitability. In addition, utility rate reductions can make our products less competitive, causing a material adverse effect on our operations. These costs, incentives and rules are not always the same as those faced by technologies with which we compete.

Similarly, rules, regulations, laws and incentives could also provide an advantage to our distributed generation solutions as compared with competing technologies because they enable compliance in a lower cost, more efficient manner with reduced emissions and higher fuel efficiency which helps our customers combat the effects of global warming. We may benefit from increased government regulations that impose tighter emission and fuel efficiency standards. We encourage investors and potential investors to carefully consider the risks described under "Item 1A. Risk Factors" below regarding various aspects of the regulatory environment and other related risks.

Our products are well-suited to meet the needs of the rapidly emerging indoor agriculture market, including cannabis and other high volume leafy greens. To date our focus in the indoor agricultural market has primarily involved cannabis, a product with high revenue generating potential. However, we have sold to other indoor agricultural growers, and we believe that the indoor food production market will provide significant opportunities for us. The indoor agriculture market in particular has the potential to be a major driver of growth as states move to legalize the use of cannabis for medicinal purposes and recreational use. However, under the Controlled Substances Act (CSA) cannabis continues to be categorized as a Schedule I drug, so that cannabis growers continue to face significant uncertainty regarding their ability to conduct business.

First passed by Congress in 2014, the Rohracher-Farr Amendment is an amendment to the annual appropriations bill that, among other things, funds the Department of Justice. It prohibits the US Attorney General from using funds to prosecute the medical use of cannabis. It does not address recreational use. On January 4, 2018, US Attorney General Jeff Sessions rescinded the Cole memo. Written in 2013, the Cole memo had directed US Attorneys not to allocate resources to prosecute "individuals whose actions are in clear and unambiguous compliance with existing state laws" regarding the cannabis market. As of the date of the filing of this report, we are not aware of any US Attorney who has taken action against participants in the recreational cannabis market operating in accordance with state law. The uncertainty we face regarding the potential for growth from the sales to the cannabis industry is due in part to uncertainty regarding prosecutorial priorities of the current Presidential administration as well as the ability of cannabis growers to obtain funding in an environment where national bankers are not permitted to fund cannabis growth facilities.

Our Energy Production segment is subject to extensive government regulation. We are required to file for local construction permits (electrical, mechanical and the like) and utility interconnects, and are required to make various local and state filings related to environmental emissions.

In the past, many electric utility companies have raised opposition to distributed generation of energy, a critical element of our business model. Such resistance has generally taken the form of stringent standards for interconnection and the use of target rate structures as disincentives to combined generation of on-site power and heating or cooling services. A distributed generation facility's ability to obtain reliable and affordable back-up power through interconnection with the grid is essential to our business model. Utility policies and regulations in most states often do not accommodate widespread on-site generation. Barriers erected by electric utility companies and unfavorable regulations, where applicable, make our ability to connect to the electric grid at customer sites more difficult or uneconomic and is an impediment to the growth of our business. The development of our business could be adversely affected by any slowdown or reversal in the utility deregulation process or by difficulties in negotiating back-up power supply agreements with electric providers in the areas where we seek to do business.

Environmental Matters

We are regulated by federal, state and international environmental laws governing our use, transport and disposal of substances and control of emissions. In addition to governing our manufacturing and service operations, these laws often impact the development of our products, including, but not limited to, required compliance with air emissions standards applicable to internal combustion engines. We have made, and will continue to make, the necessary research and development and capital expenditures to comply with these emissions standards.

Human Capital Resources

We believe our success in delivering energy efficient, ultra clean cogeneration systems, chillers and energy production services relies on our culture, values, and the creativity and commitment of our people. We strive to maintain healthy, safe, and secure working conditions and a workplace where our employees are treated with respect and dignity. Our vision is to create an inclusive, diverse and authentic community that inspires collaboration, integrity, engagement, and innovation. We are striving to create employee experience that offers opportunity for personal and professional growth, and enables work-life balance that aligns with our core values.

Employee Health and Safety

Employee health and safety continues to be a priority in every aspect of our business. We have taken a common-sense approach to safety that helps us understand and reduce hazards in our business. Training, risk assessment, safety coaching, and employee engagement are all programs that help us consistently manage our facility and employee safety. As resources are available, we expect to continue to expand and evolve our safety programs to better meet our employee needs and workplace conditions as our business grows.

We understand the benefits of employee health and safety and continue to invest in programs, products, and resources. We also understand the environment of trust and fairness that exists when information is openly shared. We also continue to invest in products and services to meet the health and safety needs of our customers and communities.

Talent Acquisition and Development

Our values are integral to our employment process and serve as guideposts for leadership. The ultimate goal is straightforward: find great people, ask them to join, and give them a reason to stay. Reasons include fair compensation, a complete array of employee benefits to include: health, dental and life insurance; short-term and long-term disability insurance; HSA account funding; generous time off benefits; and the grant of options or awards to purchase shares of our common stock. Recently we instituted web-based training for all of our employees.

Employees

As of December 31, 2023, we employed 92 full-time employees and 1 part-time employee, including 4 sales and marketing personnel, 63 service personnel, 17 manufacturing personnel and 9 finance and administrative personnel. Nine of our New Jersey service employees are represented by a collective bargaining agreement which expires on December 31, 2025 and thereafter renews annually unless terminated by either party by written notice within sixty days prior to the expiration date.

Working Capital Requirements

Our ability to maintain sufficient working capital is highly dependent upon achieving expected operating results and cash flows. Failure to achieve the operating results could have a material adverse effect on our working capital, our ability to obtain financing, and our operations in the future.

The consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles assuming that we will continue as a going concern, which contemplates the realization of assets and the settlement of obligations in the normal course of business. As of December 31, 2023, our cash and cash equivalents were $1,351,270, compared to $1,913,969 at December 31, 2022, a decrease of $562,699. For the year ended December 31, 2023 we used $823,315 in cash from operations and generated net operating losses of $4,413,612, due to due to lower Products sales, a decrease in gross margin due to higher products material costs and the increased provision for obsolete inventory and an increase in operating expenses due primarily to increased bad debt expense and a general increased in other administrative expenses. Working capital at December 31, 2023 was $9,822,546, compared to $14,344,288 at December 31, 2022, a decrease of $4,521,742 and our accumulated deficit was $42,879,656.

As a result of the above factors, management has performed an analysis to evaluate the entity’s ability to continue as a going concern for one year after the financial statements issuance date. Management’s analysis includes forecasting future revenues, expenditures and cash flows, taking into consideration past performance as well as key initiatives recently undertaken. Our forecasts are dependent on our ability to maintain margins based on the Company's ability to close on new and expanded business, leverage existing working capital, and effectively manage expenses. New and expanded business includes the sale and shipment of newly developed hybrid-drive air-cooled chillers and the acquisition of additional maintenance contracts in February 2024 (see Note 20. "Subsequent Events"). Our backlog at December 31, 2023 was $7,388,145, which is an increase of $666,007 from the December 31, 2022 backlog. We may also be required to borrow funds under note subscription agreements with related parties (see Note 11. "Related Party Notes"). Based on management's analysis, we believe that cash flows from operations and the note agreements will be sufficient to fund operations over the next twelve months. There can, however, be no assurance we will be able to do so. Based on our analysis, the consolidated financial statements do not include any adjustments to the carrying amounts and classification of assets, liabilities, and reported expenses that may be necessary if we were unable to continue as a going concern.

Our liquidity and cash flows are discussed in "Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations."

Available Information

Our internet website address is http://www.tecogen.com. Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and other reports and filings with the SEC are available free of charge on our website as soon as reasonably practicable after the reports are filed with, or furnished to, the SEC. Information contained on our website is not incorporated into this Annual Report on Form 10-K or our other securities filings with the SEC. The SEC maintains an internet website at www.sec.gov which contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

Item 1A. Risk Factors

Our business operations, financial condition, results of operations and stock price may be affected by a number of factors. In addition to the other information in this Form 10-K, the following factors and the information contained under the heading "Cautionary Note Concerning Forward-Looking Statements" should be considered in evaluating our company and our business. The risks described below may not be the only risks we face. Additional risks that we do not yet know of, or that we currently think are immaterial, may also impair our business operations or financial results. If any of the events or circumstances described in the following risks occur, our business, financial condition and results of operations could suffer and the trading price of our common stock could decline.

Risks Relating to Our Business Strategy and Industry

We may need to raise additional financing if cash generated from our operations is insufficient.

During the year ended December 31, 2023, our revenues continued to be negatively impacted due to supply chain issues and project deferrals. The extent to which the coronavirus will continue to impact our business and our financial results will depend on future developments, which are highly uncertain and cannot be predicted. As part of our pandemic response plan, our sales, engineering, and select administrative functions may be operated remotely when necessary or appropriate while our manufacturing and service teams continues to function normally, subject to customer-initiated disruptions in service.

To the extent cash generated from operations in the future is insufficient to fund our operating requirements, we will be required to seek additional outside financing. Our inability to obtain necessary capital or financing to fund these working capital needs will adversely affect our ability to expand our operations.

If the cash generated by operations together with proceeds of funds available under our related party loans with John N. Hastopoulos, a director and principal shareholder and Earl R. Lewis, III, a director, are insufficient to fund our future operating requirements, we will need to raise additional funds through public or private equity or debt financings. Such financing may not be available to us when needed, or if available, may not be available on terms that are favorable to us and could result in significant dilution to the holdings of our stockholders. Furthermore, any such debt financing is likely to include financial and other covenants that may impede our ability to react to changes in the economy or industry. If adequate financing is not available when needed, we may be required to implement cost-cutting strategies, delay production, curtail research and development efforts, or implement other measures, which may adversely affect our results of operations and financial conditions and the price of our stock.

Based upon our operating and cash flow plan, we believe existing resources, including cash and cash flows from operations will be sufficient to meet our working capital needs for the next twelve months. If adequate financing is not available when needed, we may be required to implement cost-cutting strategies, delay production, curtail research and development efforts, or implement other measures, which may adversely affect our overall results of operations and financial condition and the price of our stock.

If we experience a period of significant growth or expansion, it could place a substantial strain on our resources.

If our cogeneration and chiller products penetrate the market rapidly, we may be unable to deliver large volumes of technically complex products or components to our customers on a timely basis and at a reasonable cost to us. We have never ramped up our manufacturing capabilities to meet significant large-scale production requirements. If we were to commit to deliver large volumes of products, we may not be able to satisfy these commitments on a timely and cost-effective basis.

Our operating history is characterized by losses and there can be no assurance we will be able to increase our sales and sustain profitability in the future.

We have historically incurred annual net losses, including a net loss of $4,598,108 in 2023. Our business is capital intensive and, because our products generally are built to order with customized configurations, the lead time to build and deliver a unit can be significant. We may be required to purchase key components long before we can deliver a unit and receive payment. Changes in customer orders or lack of demand may also impact our profitability. There can be no assurance we will be able to increase our sales and achieve and sustain profitability in the future.

We are dependent on a limited number of third-party suppliers for the supply of key components for our products.

We use third-party suppliers for components in all of our products. Our engines and generators required in our cogeneration products (other than the InVerde), and the compressor and vessel sets in our chillers, are all purchased from large multinational equipment manufacturers. The loss of one or more of our suppliers could materially and adversely affect our business if we are unable to replace them. While alternate suppliers for the manufacture of our engine, generators and compressors have been identified, should the need arise, there can be no assurance that alternate suppliers will be available and able to provide such items on acceptable terms or on a timely basis.

From time to time, shipments of components for our products can be delayed because of industry-wide or other shortages of necessary materials and components from third-party suppliers, as well as shipping delays at points of importation. A supplier's failure to supply components in a timely manner, or to supply components that meet our quality, quantity, or cost requirements, or our inability to obtain substitute sources of these components on a timely basis or on terms acceptable to us, could impair our ability to deliver our products in accordance with contractual obligations.

The amount of our backlog is subject to fluctuation due to our customers' experiencing unexpected delays in financing, permitting or modifications in specifications of the equipment.

Our total product and installation backlog as of December 31, 2023 was $7,388,145 compared to $6,722,138 as of December 31, 2022. Although we expect our customers to issue definitive purchase orders with respect to such backlog, there can be no assurance that such amounts will not be subject to modification in the event customers experience unexpected delays in obtaining permits, interconnection agreements or financing. We have experienced order delays and deferrals for our products due to business closures or the inability to obtain government issued permits to conduct product installations. Any of such events may result in customers modifying the equipment or the terms or timing of the expected installation, which may result in changes to the amount of backlog attributed to those projects.

We experience significant fluctuations in revenues from quarter to quarter on our product sales which may make period to period comparisons difficult.

We have low volume, high dollar sales for projects that are generally non-recurring, and therefore our sales have fluctuated significantly from period to period. Fluctuations cannot be predicted because they are affected by the purchasing decisions and timing requirements of our customers, which are unpredictable. Such fluctuations may make quarter to quarter and year to year comparisons difficult.

We expect significant competition for our products and services.

Many of our competitors and potential competitors are well established and have substantially greater financial, research and development, technical, manufacturing and marketing resources than we do. If these larger competitors decide to focus on the development of distributed power or cogeneration, they have the manufacturing, marketing and sales capabilities to complete research, development, and commercialization of these products more quickly and effectively than we can. There can also be no assurance that current and future competitors will not develop new or enhanced technologies or more cost-effective systems, and therefore, there can be no assurance that we will be successful in this competitive environment.

We may not achieve production cost reductions necessary to competitively price our products, which would adversely affect our sales.

We believe that we will need to reduce the unit production cost of our products over time to maintain our ability to offer competitively priced products. Our ability to achieve cost reductions will depend on our ability to develop low-cost design enhancements, to obtain necessary tooling and favorable supplier contracts, and to increase sales volumes so we can achieve economies of scale. We can make no assurance that we will be able to achieve any such production cost reductions. Our failure to do so could have a material adverse effect on our business and results of operations.

Our products involve a lengthy sales cycle and we may not anticipate sales levels appropriately, which could impair our results of operations.

The sale of our products typically involves a significant commitment of capital by customers, with the attendant delays frequently associated with large capital expenditures. For these and other reasons, the sales cycle associated with our products is typically lengthy and subject to a number of significant risks over which we have little or no control. We plan our production and inventory levels based on internal forecasts of customer demand, which is highly unpredictable and can fluctuate substantially. If sales in any period fall significantly below anticipated levels, our financial condition, results of operations and cash flow would suffer. If demand in any period increases well above anticipated levels, we may have difficulties in responding, incur greater costs to respond, or be unable to fulfill the demand in sufficient time to retain the order, which would negatively impact our operations. In addition, our operating expenses are based on anticipated sales levels, and a high percentage of our expenses are generally fixed in the short term. As a result of these factors, a small fluctuation in timing of sales can cause operating results to vary materially from period to period.

The economic viability of our projects depends on the price spread between natural gas and other fuel and electricity, and the variability of these prices creates a risk that our projects will not be economically viable and that potential customers will avoid such energy price risks.

The economic viability of our CHP products depends on the spread between natural gas fuel and electricity prices. Volatility in one component of the spread, such as the cost of natural gas and other fuels (e.g., propane or distillate oil), can be managed to some extent by means of futures contracts. However, the regional rates charged for both base load and peak electricity may decline periodically due to excess generating capacity or general economic recessions, and both the cost of natural gas and the cost of electricity for base load and peak load may be adversely affected by geopolitical disruptions such as Russian expansion into the Ukraine and political and other responses to such expansionist activity.

Our products and on-site utility service could become less competitive if electric rates were to fall substantially in the future, although, historically, electric rates have not had any sustained decline in price. Potential customers may perceive the risk of unpredictable swings in natural gas and electricity prices as a risk of investing in on-site CHP, and may decide not to purchase CHP products.

We may make acquisitions or take other corporate strategic actions that could harm our financial performance.

To expedite development of our business, including with regard to equipment installation and service functions, we anticipate investigating and potentially pursuing future acquisitions of complementary businesses. Risks associated with such acquisitions include the diversion of management attention and cash from operations to cover the costs associated with acquisitions, disruption of our existing operations, loss of key personnel in the acquired companies, dilution through the issuance of additional securities, assumptions of existing liabilities, and commitment to further increase operating expenses. If any or all of these problems actually occur, acquisitions could negatively impact our financial performance and future stock value.

Expiring customer contracts may lead to decreases in revenue and increases in expenses.

Each year, a portion of our customer contracts expire and need to be renewed or replaced. We may not be able to renew or extend contracts with existing customers or obtain replacement contracts at attractive rates or for the same term as the expiring contracts. To the extent we are unable to extend customer contracts prior to their expiration dates, energy production revenue will decline due to less energy billing. Expiring customer contracts can also lead to an increase in expenses because we are obligated to remove the equipment from the customer location at our own expense at the end of the customer contract. The investment required to obtain replacement contracts, including the manufacture and installation of the cogeneration or chiller equipment and the costs to incorporate this equipment into a facility are significant. To the extent that we do not have sufficient liquidity, our ability to add new contracts with energy production sites may be adversely impacted.

Our revenue from energy billing may be adversely impacted by increases in the price of natural gas, reductions in utility rates for electrical power, weather conditions, or by an increase in remote work and study environments, all of which could reduce our revenue.

Over the past several years electric rates have fluctuated, in some instances rates have decreased, subsequent to the vast majority of customer contract dates, causing the billable value of the electrical power generated by our systems to decrease which has an adverse effect on our results of operations. In warmer months the customers do not use as much thermal energy because they do not have as much demand for heat at their locations. Due to lower demand in warmer months, we may not be able to bill for thermal energy and in turn may have a decrease in revenue. In addition, increases in the cost of natural gas may increase the cost of power generation in comparison to the cost of power from the electric grid and may result in decreased revenue and adversely affect our results of operation.

We may be affected by global climate change or by legal, regulatory, or market responses to such change.

The growing political and scientific sentiment is that global weather patterns are being influenced by increased levels of greenhouse gases in the earth's atmosphere. This growing sentiment and the concern over climate change have led to legislative and regulatory initiatives aimed at reducing greenhouse gas emissions which warm the earth's atmosphere. These warmer weather conditions could result in a decrease in demand for our products in general. Moreover, proposals that would impose mandatory requirements on greenhouse gas emissions continue to be considered by policy makers in the United States. Laws enacted that could impact demand for the products we sell could adversely affect our business, financial condition, results of operations and cash flows. Significant increases in federal, state or municipal restrictions on emissions of carbon dioxide that may be imposed on gas-driven cogeneration and chillers could adversely affect demand for our product. Our inability to respond to such changes could adversely impact the demand for our products and our business, financial condition, results of operations or cash flows.

Our financial condition and results of operations could suffer if there is an impairment of goodwill or intangible assets.

As of December 31, 2023, our goodwill was $2,743,424, and our intangible assets were $2,436,230. We performed a goodwill impairment test at December 31, 2023 and determined that the estimated fair value of the energy production business assets and the Aegis maintenance service contracts, based on a discounted cash flow analysis, exceeded the carrying value of the assets and did not recognize goodwill impairment relating to our energy production segment or service segment for the year ended December 31, 2023. We are required to test intangible assets with indefinite lives, including goodwill, annually or, in certain instances, more frequently, and may be required to record impairment charges, which would reduce any earnings or increase any loss for the period in which the impairment was determined to have occurred. Our goodwill impairment analysis is sensitive to changes in key assumptions used in our analysis. If the assumptions used in our analysis are not realized, it is possible that an impairment charge may need to be recorded in the future. We cannot accurately predict the amount and timing of any impairment of goodwill or other intangible assets. However, any such impairment would have an adverse effect on our results of operations.

Risks Related to our Technology and Business Operations

If we are unable to maintain our technological expertise in design and manufacturing processes, we will not be able to successfully compete.

We believe that our future success will depend upon our ability to continue to develop and provide innovative products and product enhancements that meet the increasingly sophisticated needs of our customers. However, this requires that we successfully anticipate and respond to technological changes in design and manufacturing processes in a cost-effective and timely manner. The development of new, technologically advanced products and enhancements is a complex and uncertain process requiring high levels of innovation, as well as the accurate anticipation of technological and market trends. There can be no assurance that we will successfully identify new product opportunities, develop and bring new or enhanced products to market in a timely manner, successfully lower costs, and achieve market acceptance of our products, or that products and technologies developed by others will not render our products or technologies obsolete or noncompetitive.

The introduction of products embodying new technologies and the shifting of customer demands or changing industry standards could render our existing products obsolete and unmarketable. We may experience delays in releasing new products and product enhancements in the future. Material delays in introducing new products or product enhancements may cause customers to forego purchases of our products and purchase those of our competitors.

Legal, Regulatory and Compliance Risks

Our business is subject to product liability and warranty claims.

Our business exposes us to potential product liability claims, which are inherent in the manufacturing, marketing and sale of our products, and we may face substantial liability for damages resulting from the faulty design of products, manufacture of products or improper use of products by end users. We currently maintain product liability insurance, but there can be no assurance that this insurance will provide sufficient coverage in the event of a claim. Also, we cannot predict whether we will be able to maintain such coverage on acceptable terms, if at all, or that a product liability claim would not harm our business or financial condition. In addition, negative publicity in connection with the faulty design or manufacture of our products would adversely affect our ability to market and sell our products.

We sell our products with limited warranties. There can be no assurance that the provision in our financial statements for estimated product warranty expense will be sufficient. There can be no assurance that our efforts to reduce our risk through warranty disclaimers will effectively limit our liability. Any significant occurrence of warranty expense in excess of estimates could have a material adverse effect on our operating results, financial condition and cash flow. Further, we have at times undertaken programs to enhance the performance of units previously sold. These enhancements have at times been provided at no cost or below our cost. If we choose to offer such programs again in the future, such actions could result in significant costs.

Agreements with our customers may include potential liquidated damages relating to construction delays or performance guaranties.

Turnkey construction contracts to which we are a party may contain liquidated damages provisions resulting from failure to achieve agreed milestones relating to construction activity. Agreements relating to the sale of equipment or energy may include performance and other obligations that may result in payment obligations to customers.

Utilities or governmental entities could hinder our entry into and growth in the marketplace, and we may not be able to effectively sell our products.

Utilities or governmental entities on occasion have placed barriers to the installation of our products or their interconnection with the electric grid, and they may continue to do so. Utilities may charge additional fees to customers who install on-site CHP and rely on the grid for back-up power. These types of restrictions, fees, or charges could make it harder for customers to install our products or use them effectively, as well as increase costs to potential customers. This could make our systems less desirable, thereby adversely affecting our revenue and other operating results.

The reduction, elimination or expiration of government and economic incentives for applications of our equipment could reduce demand for our equipment and harm our business.

The market for cogeneration equipment depends in part on the availability and size of government and economic incentives that vary by geographic market. Because our sales to customers are typically into geographic areas with such incentives, elimination, or expiration of government subsidies and economic incentives for cogeneration equipment may negatively affect the competitiveness of equipment relative to other sources of electricity, heating, and cooling equipment, and could harm or halt the growth of the cogeneration industry and our business. For example, we are eligible for the New Jersey Smart Start Combined Heat and Power Incentive.

We may incorporate price reduction on equipment sold to customers based on the anticipated receipt of governmental economic incentive payments and apply and collect the incentives payments. If such incentives become unavailable to us our financial condition may be adversely affected.

Competing sources of electricity, heating, and cooling equipment may successfully lobby for changes in the relevant legislation in their markets that are harmful to the cogeneration industry. Reductions in, or eliminations or expirations of, governmental incentives in regions where we focus our sales efforts could result in decreased demand for and lower revenue from cogeneration equipment there, which would adversely affect us. In addition, our ability to successfully penetrate new geographic markets may depend on new geographic areas adopting and maintaining incentives to promote cogeneration, to the extent such incentives are not currently in place. Additionally, electric utility companies may establish pricing structures or interconnection requirements that could adversely affect our sales and be harmful to cogeneration.

We may be exposed to substantial liability claims if we fail to fulfill our obligations to our customers or our on-site equipment malfunctions.

We enter into contracts with large commercial and not-for-profit customers under which we assume responsibility for meeting a portion of the customers' building energy demand and equipment installation. We may be exposed to substantial liability claims if we fail to fulfill our obligations to such customers. If the equipment malfunctions, it may be costly to repair or replace. There can be no assurance that we will not be vulnerable to claims by customers and by third parties that are beyond any contractual protections that we are able to negotiate. As a result, liability claims could cause us significant financial harm.

We may be subject to litigation, which is expensive and could divert management attention.

Our share price may be volatile and in the past companies that have experienced volatility in the market price of their stock have been subject to an increased incidence of securities class action litigation. Securities litigation against us could result in substantial costs and divert our management’s attention from other business concerns, which could seriously harm our business.

Although we maintain directors’ and officers’ insurance coverage, there can be no assurances that this insurance coverage will be sufficient to cover the substantial fees and expenses of lawyers and other professional advisors relating to any future litigation, our obligations to indemnify our officers and directors who are or may become parties to such pending and future actions, or the amount of any judgments or settlements that we may be obligated to pay in connection with such actions. We may be required to make material payments in connection with the defense of or to settle such litigation or to satisfy any adverse judgment. In addition, actions that arise in the future could be excluded from coverage or, if covered, could exceed our deductibles and/or the coverage provided. In addition, an adverse outcome of litigation could cause our insurance premiums and retention amounts to increase in the future. Any of these consequences could have a material adverse effect on our business, financial condition and results of operations. For more information regarding litigation, see *"Item 3. Legal Proceedings"* and *Note 12 "Commitments and Contingencies"* in the Notes to our Consolidated Financial Statements included elsewhere herein.

Losses or unauthorized access to or releases of confidential information, including personal information, could subject us to significant reputational, financial, legal and operational consequences.

Our business requires us to use and store confidential information, including personal information, with respect to our customers and employees and also requires us to share confidential information with suppliers and other third parties. We rely on suppliers that are also exposed to ransomware and other malicious attacks that can disrupt business operations. Although we take steps to secure confidential information that is provided to or accessible by third parties working on our behalf, such measures may not always be effective and losses or unauthorized access to or releases of confidential information occur. Such incidents and other malicious attacks could materially adversely affect our business, reputation, results of operations and financial condition.

We have implemented systems and processes intended to secure our information technology systems and prevent unauthorized access to or loss of sensitive data, and mitigate the impact of unauthorized access, including through the use of encryption and authentication technologies and we continue to undertake regular reviews of our IT infrastructure and have investigated improved software and hardware cyber threat protection solutions. But these measures cannot provide absolute security, and losses or unauthorized access to or releases of confidential information occur and could materially adversely affect our business, reputation, results of operations and financial condition.

We have experienced malicious attacks and other attempts to gain unauthorized access to our systems, including the ransomware attack on our computer network which occurred on April 28, 2023 which required that we limit user access, remove the hard drives from two affected workstations from service and restore network files from systems backups. Our network returned to full operation on May 1, 2023. Since this incident, we have implemented changes to user access passwords, conducted a full audit of user accounts and implemented multi-factor authentication for network and workstation access. These attacks seek to compromise the confidentiality, integrity or availability of confidential information or disrupt normal business operations, and could, among other things, impair our ability to attract and retain customers for its products and services, impact our stock price, materially damage commercial relationships, and expose us to litigation or government investigations, which could result in penalties, fines or judgments against us. Globally, attacks are expected to continue accelerating in both frequency and sophistication with increasing use by actors of tools and techniques that are designed to circumvent controls, avoid detection, and remove or obfuscate forensic evidence, all of which hinders our ability to identify, investigate and recover from incidents. In addition, attacks against us and our customers can escalate during periods of severe diplomatic or armed conflict.

Credit and Liquidity Risks

We are exposed to credit risks with respect to some of our customers.

To the extent our customers do not advance us sufficient funds to finance our costs during the execution phase of our contracts, we are exposed to the risk that they may be unable to accept delivery or that they will be unable to make payment at the time of delivery or within agreed upon payment terms. Our bad debt expense increased to $902,432 in the year ended December 31, 2023, compared to a benefit of $70,987 in the year ended December 31, 2022, due to the write down of certain install receivables which were deemed uncollectible in the year ended December 31, 2023. Our provision for doubtful accounts receivable was $149,922 as of December 31, 2023, a decrease of $211,275 when compared to the provision for doubtful accounts as of December 31, 2022. We have experienced customer payment delays due to COVID-19, which are attributable to temporary business shutdowns, resulting in declines in revenues and cash flows from our customers and delays in project completion due to delays in government project inspections and a general slowdown in business activity and in some cases, customers ceasing business activities altogether.

We received short-term debt financing from a director and principal shareholder to fund our business and ongoing operations. If we are unable to generate sufficient funds from operations or obtain additional financing, we may not be able to repay the loan when it becomes due.

On October 9, 2023, we entered into an agreement with Mr. John Hatsopoulos, a director and principal shareholder, under which he agreed to loan us up to $1,000,000. Under this agreement, on October 10, 2023, we borrowed $500,000 from Mr. Hatsopoulos pursuant to the terms of a promissory note. The note, as amended on March 21, 2024, is due and repayable two years from the date of issuance and bears interest at 5.12% per annum payable in full at maturity. The loan is required to be repaid in the event of a change of control of the company and upon the occurrence of an event of default under the note, including upon a failure to pay when due the principal and interest when due, or the commencement of voluntary or involuntary bankruptcy or insolvency proceeding. As of December 31, 2023, we have outstanding accounts payable of $4,514,415, other accrued expenses of $2,504,629, lease obligations of $289,473, and acquisition liabilities of $845,363. If we are unable to generate sufficient funds from operations or raise additional financing, we may have insufficient funds to repay the loan to Mr.

Hatsopoulos when it becomes due unless Mr. Hatsopoulos is willing to extend the term of the loan or renegotiate the terms, of which there can be no assurance.

Risks Relating to Ownership of our Common Stock

Investment in our Common Stock is subject to price fluctuations and market volatility.

Historically, valuations of many small companies have been highly volatile. The securities of many small companies have experienced significant price and trading volume fluctuations unrelated to the operating performance or the prospects of such companies. The market price of shares of our common stock could be subject to wide fluctuations in response to many risk factors listed in this section, and others beyond our control, including:

- results and timing of our product development;
- results of the development of our competitors' products;
- regulatory actions with respect to our products or our competitors' products;
- actual or anticipated fluctuations in our financial condition and operating results;
- actual or anticipated changes in our growth rate relative to our competitors;
- actual or anticipated fluctuations in our competitors' operating results or changes in their growth rate;
- competition from existing products or new products that may emerge;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations, or capital commitments;
- issuance of new or updated research or reports by securities analysts;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- additions or departures of key management or personnel;
- disputes or other developments related to proprietary rights, including patents, litigation matters, and our ability to obtain, maintain, defend or enforce proprietary rights relating to our products and technologies;
- announcement or expectation of additional financing efforts;
- sales of our Common Stock by us, our insiders, or our other stockholders; and
- general economic and market conditions.

Furthermore, the U.S. stock markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political, and market conditions such as recessions, interest rate changes, or international currency fluctuations, may negatively impact the market price of shares of our common stock. In addition, such fluctuations could subject us to securities class action litigation, which could result in substantial costs and divert our management's attention from other business concerns, which could potentially harm our business.

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our share price and trading volume could decline.

The trading market for our shares will depend on the research and reports that securities or industry analysts publish about us or our business. There can be no assurance that analysts will cover us or provide favorable coverage. If one or more analysts downgrade our shares or change their opinion of our share price our share price may decline. In addition, if one or more analysts cease coverage of us or fails to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

Because our directors and executive officers are among our largest stockholders, they can exert influence over our business and affairs and have actual or potential interests that may differ from other stockholders or investors.

As of the date of this report, our directors and executive officers collectively beneficially own approximately 14.8% of our issued and outstanding shares. John Hatsopoulos, a director, beneficially owns approximately 12.3% of our issued and outstanding shares. Additionally, the holdings of our directors and executive officers may increase in the future upon vesting or exercise of the options or other stock awards they may hold or in the future may be granted or if they otherwise acquire additional shares in the open market or otherwise. The interests of such persons may differ from the interests of our other stockholders. As a result, in addition to their board seats and offices, such persons will have influence over corporate actions requiring shareholder approval. These matters would include the election of directors and the approval of mergers or other business combination transactions.

Such persons' stock ownership may discourage a potential acquirer from making a tender offer or otherwise attempting to acquire us, which in turn could reduce our stock price or prevent our stockholders from realizing a premium over our stock price.

Current stock holdings may be diluted if we make future equity issuances or if outstanding options are exercised for shares of our common stock.

"Dilution" refers to the reduction in the voting effect and proportionate ownership interest of a given number of shares of common stock as the total number of shares increases. Our issuance of additional stock, convertible preferred stock, or convertible debt may result in dilution to the interests of shareholders and may also result in the reduction of your stock price. The sale of a substantial number of shares into the market, or even the perception that sales could occur, could depress the price of our common stock. Also, the exercise of options may result in additional dilution.

The holders of outstanding options, warrants and convertible securities or derivatives, if any, have the opportunity to profit from a rise in the market price of our shares, if any, without assuming the risk of ownership, with a resulting dilution in the interests of other stockholders. We may find it more difficult to raise additional equity capital if it should be needed for our business while the options, warrants and convertible securities are outstanding.

Future sales of our shares by our existing stockholders may cause our stock price to fall.

The market price of our shares could decline as a result of sales by our existing stockholders of our shares in the market or the perception that these sales could occur. These sales might also make it more difficult for us to conduct an equity or equity-based financing at a time and price that we deem appropriate and thus inhibit our ability to raise additional capital when it is needed.

Because we have not and do not intend to pay cash dividends, our stockholders receive no current income from holding our stock.

We have paid no cash dividends on our capital stock to date and we currently intend to retain our future earnings, if any, to fund the development and growth of our business. We currently expect to retain earnings for use in the operation and expansion of our business, and therefore do not anticipate paying any cash dividends in the foreseeable future. As a result, capital appreciation, if any, of our Common Stock could be the sole source of gain for our stockholders for the foreseeable future.

We incur substantial costs to operate as a public reporting company.

We incur substantial legal, financial, accounting and other costs and expenses to operate as a public reporting company. We believe that these costs are a disproportionately larger percentage of our revenues than they are for many larger companies. In addition, the rules and regulations of the SEC impose significant requirements on public companies, including ongoing disclosure obligations and mandatory corporate governance practices. Our senior management and other personnel need to devote a substantial amount of time to ensure ongoing compliance with these requirements. Our common stock is currently quoted on the OTC Markets Group Inc.'s OTCQX Best Market tier. Under the OTC Markets Group Inc.'s OTCQX continued qualification requirements, we are required to have a minimum bid price of $0.10 per share as of the close of business for at least one of every 30 consecutive calendar days, a market capitalization of at least $5 million for at least one of every 30 consecutive calendar days, and at least two market makers. Also, we must be current in our SEC reporting obligations. If we seek to list our stock for trading on a national securities exchange or be quoted on the Nasdaq Stock Market, we will be subject to additional disclosure and governance obligations. There can be no assurance that we will continue to meet all of the public company requirements to which we are subject on a timely basis, or at all, or that our compliance costs will not continue to be material.

Because our common stock is not traded on a national securities exchange, our stock has limited liquidity and our ability to raise capital is impaired.

On June 19, 2020, we voluntarily delisted our common stock from Nasdaq and transitioned the quotation of our shares to OTC Markets Group Inc.'s OTCQX Best Market. Our common stock has been quoted on the OTC Markets Group Inc.'s OTCQX Best Market since June 19, 2020 under the symbol "TGEN". We believe that trading "over the counter" has limited our stock's liquidity and may impair our ability to raise additional capital. Also, and as a result, relatively small trades in our stock could have a disproportionate effect on our stock price.

Certain provisions of our charter and bylaws may discourage mergers and other transactions.

Certain provisions of our certificate of incorporation and bylaws may make it more difficult for someone to acquire control of the company. These provisions may make it more difficult for stockholders to take certain corporate actions and could delay or prevent someone from acquiring our business. These provisions could limit the price that certain investors might be willing to pay for shares of our common stock. The ability to issue "blank check" preferred stock is a traditional anti-takeover measure. This provision may be beneficial to our management and the board of directors in a hostile tender offer and may have an adverse impact on stockholders who may want to participate in such tender offer, or who may want to replace some or all of the members of the board of directors.

Our board of directors may issue shares of preferred stock without stockholder approval.

Our certificate of incorporation authorizes the issuance of up to 10,000,000 shares of preferred stock. Accordingly, our board of directors may, without shareholder approval, issue one or more new series of preferred stock with rights which could adversely affect the voting power or other rights of the holders of outstanding shares of our common stock. In addition, the issuance of shares of preferred stock may have the effect of rendering more difficult or discouraging, an acquisition or change of control of the company. Although we do not have any current plans to issue any shares of preferred stock, we may do so in the future.

In order to comply with public reporting requirements, we must continue to strengthen our financial systems and internal controls, and failure to do so could adversely affect our ability to provide timely and accurate financial statements.

Refinement of our internal controls and procedures will be required as we manage future growth and operate effectively as a public company. Such refinement of our internal controls, as well as compliance with the Sarbanes-Oxley Act of 2002 and related requirements, is costly and puts a significant burden on management. We cannot assure you that measures already taken, or any future measures, will enable us to provide accurate and timely financial reports, particularly if we are unable to hire additional personnel in our accounting and financial department, or if we lose personnel in this area. Any failure to improve our disclosure controls or other problems with our financial systems or internal controls could result in delays or inaccuracies in reporting financial information, or non-compliance with SEC reporting and other regulatory requirements, any of which could adversely affect our business and stock price.

Investor confidence in the price of our stock may be adversely affected if we are unable to comply with Section 404 of the Sarbanes-Oxley Act of 2002. As of the end of the period covered by this report, our principal executive officers and our principal financial officer have concluded there is a material weakness in our disclosure controls and procedures and our internal control over financial reporting, which could harm our operating results or cause us to fail to meet our reporting obligations.

Our Chief Executive Officer and Chief Financial Officer ("certifying officers") are responsible for establishing and maintaining our disclosure controls and procedures (as defined in Exchange Act Rule 13a-15(e) and 15d-15(e)). The certifying officers designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under their supervision, to ensure that information required to be disclosed by us in the reports that we file or submit under the Securities Exchange Act is recorded, processed, summarized and reported, within the time periods specified by the SEC's rules and forms, and is made known to management (including the certifying officer) by others within the company, including its subsidiaries. We regularly evaluate the effectiveness of our disclosure controls and procedures and report our conclusions about the effectiveness of the disclosure controls quarterly in our Forms 10-Q and annually in our Forms 10-K. In completing such reporting, we disclose, as appropriate, any significant change in our internal control over financial reporting that occurred during our most recent fiscal period that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

As a public company, we are subject to the rules adopted by the SEC pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, which require us to include in our annual report on Form 10-K our management's report on, and assessment of the effectiveness of, our internal control over financial reporting ("management's report"). If we fail to achieve and maintain the adequacy of our disclosure control or internal control over financial reporting, there is a risk that we will not comply with all of the requirements imposed by Section 404. Moreover, effective internal control over financial reporting, particularly that relating to revenue recognition, is necessary for us to produce reliable financial reports and is important in helping to prevent financial fraud. Any of these possible outcomes could result in an adverse reaction in the financial marketplace due to a loss in investor confidence in the reliability of our financial statements, which ultimately could harm our business and could negatively impact the market price of our common stock. Investor confidence and the price of our common stock may be adversely affected if we are unable to comply with Section 404 of the Sarbanes-Oxley Act of 2002.

As of the end of the period covered by this Annual Report, December 31, 2023, our principal executive officer and principal financial officer performed an evaluation of our disclosure controls and procedures and concluded that our controls were not effective to provide reasonable assurance that information required to be disclosed by us in reports that we file under the Securities Exchange Act, is recorded, processed, summarized and reported when required. Management conducted an evaluation of our internal control over financial reporting and based on this evaluation, management concluded that the company's internal control over financial reporting was not effective as of December 31, 2023. We have a small number of employees dealing with general controls over information technology security and user access. This constitutes a material weakness in financial reporting. Any failure to implement effective internal controls could harm our operating results or cause us to fail to meet our reporting obligations. Inadequate internal controls could also cause investors to lose confidence in our reported financial information, which could have a negative effect on the trading price of our common stock and may require us to incur additional costs to improve our internal control system.

General Business Risks

Our intellectual property may not be adequately protected.

We seek to protect our intellectual property rights through patents, trademarks, copyrights, trade secret laws, confidentiality agreements, and licensing arrangements, but we cannot ensure that we will be able to adequately protect our technology from misappropriation or infringement. We cannot ensure that our existing intellectual property rights will not be invalidated, circumvented, challenged, or rendered unenforceable.

Our competitors may successfully challenge the validity of our patents, design non-infringing products, or deliberately infringe our patents. There can be no assurance that other companies are not investigating or developing other similar technologies. In addition, our intellectual property rights may not provide a competitive advantage to us or ensure that our products and technology will be adequately covered by our patents and other intellectual property. Any of these factors or the expiration, termination, or invalidity of one or more of our patents may have a material adverse effect on our business.

Others may assert that our technology infringes their intellectual property rights.

We may be subject to infringement claims from time to time. The defense of any claims of infringement made against us by third parties could involve significant legal costs and require our management to divert time from our business operations. If we are unsuccessful in defending any claims of infringement, we may be forced to obtain licenses or to pay additional royalties to continue to use our technology. We may not be able to obtain any necessary licenses on commercially reasonable terms or at all. If we fail to obtain necessary licenses or other rights, or if these licenses are costly, our operating results would suffer either from reductions in revenues through our inability to serve customers or from increases in costs to license third-party technologies.

Our business and financial performance may be adversely affected by information systems interruptions, cybersecurity attacks or other disruptions which could have a material adverse effect on our business and results from operations.

We depend upon information technology, infrastructure, including network, hardware and software systems to conduct our business. Despite our implementation of security measures, there are numerous and evolving risks to cybersecurity and privacy, including risks originating from intentional acts of criminal hackers, nation states and competitors, intentional and unintentional acts or omissions of customers, vendors, contractors, employees and other third parties that may result in damage, breakdown, or interruption from computer viruses, ransomware, malware, phishing, social engineering, fraudulent inducement, electronic fraud, wire fraud, human error or malfeasance, unauthorized access, natural disasters, and telecommunications and electrical failures. We directly or indirectly store, collect and transmit sensitive data, including intellectual property, confidential information, proprietary business information, customer or personal data. The secure processing of such data, maintenance, and transmission of such data is important to our operations. We face increased cybersecurity risks due to our reliance on internet technology, among other things, to monitor our installed products or systems remotely. We may not be able to anticipate all types of security threats or be able to implement security measures effective against all such threats or implement preventive measures effective against all such threats. The techniques used by cybercriminals change frequently and may not be recognized until launched and can originate from a wide variety of sources, as discussed above. Even if identified, we may not be able to adequately investigate or remediate incidents or breaches due to attacks increasingly using tools and techniques that are designed to circumvent controls, to avoid detection, and to remove or obfuscate forensic evidence. Accordingly, our data protection efforts and related security measures may not be adequate to protect against highly targeted sophisticated cyber-attacks, or other improper disclosures of confidential and/or sensitive information. Additionally, we may have access to confidential or other sensitive information of our customers or suppliers, which despite our efforts to protect, may be vulnerable to security breaches, theft, or improper disclosure any of which could have a material adverse effect on our competitive position, results of operations, cash flows or financial condition. The increase in personnel working remotely during and after the recent pandemic has increased the risk for our and our vendors and suppliers' security breaches and incidents. If a security breach or other incident results in the unauthorized access to or use, disclosure, release, or other processing of confidential or proprietary information, we could incur liability and it may be necessary to notify persons, governmental authorities, supervisory bodies, the media and other parties pursuant to privacy and security laws. Any such access, disclosure or other loss of information could result in legal claims, proceedings, liability under laws that protect the privacy of personal information of our employees or others, and any such event could disrupt our operations, damage our reputation, and cause loss of confidence in us. Our contracts with our customer and suppliers may not contain limitation of liability and there can be no assurance that limitations of liability in our contracts are sufficient to protect us from liabilities, damages, or claims related to privacy, data protection, or data security. Further, we can give no assurance that our insurance coverage will be adequate or sufficient to cover the financial, legal, business or reputational losses that may result from an interruption or breach of our systems, that such coverage will continue to be available on commercially reasonable terms or at all, or that such coverage will pay future claims.

Our success is dependent upon attracting and retaining highly qualified personnel and the loss of key personnel could significantly hurt our business.

To achieve success, we must attract and retain highly qualified technical, operational and executive employees. The loss of the services of key employees or an inability to attract, train and retain qualified and skilled employees, specifically engineering, operations, and business development personnel, could result in the loss of business or could otherwise negatively impact our ability to operate and grow our business successfully.

Our business may be impacted by political events, war, terrorism, public health issues, natural disasters and other circumstances that are not within our control.

War, terrorism, geopolitical uncertainties, public health issues, and other business interruptions have caused and could cause damage or disruption to international commerce and the global economy, and thus could have a material adverse effect on us, our suppliers, and manufacturing vendors. Our business operations are subject to interruption by natural disasters, fire, power shortages, nuclear power plant accidents, terrorist attacks, and other hostile acts, labor disputes, public health issues, and other events beyond our control. Such events could decrease demand for our products, make it difficult or impossible for us to make and deliver products to our customers, or to receive products from our manufacturers and suppliers, and create delays and inefficiencies in our supply chain. If major public health issues, including pandemics, arise, we could be adversely affected by more stringent employee travel restrictions, additional limitations in freight services, governmental actions limiting the movement of products between regions, delays in production ramps of new products, and disruptions in the operations of our manufacturing vendors and suppliers. In the event of a natural disaster, we could incur significant losses, require substantial recovery time and experience significant expenditures in order to resume operations.

We depend on a small number of customers for a substantial portion of our product revenues. The loss of one or more of these customers, or our inability to collect outstanding receivables from such customers could have a material adverse effect on our financial results.

For the years ended December 31, 2023 and December 31, 2022, no customer represented more than 10% of revenues for the respective years. There was one customer who represented 14% of the accounts receivable balance as of our December 31, 2023, and one customer who represented 15% of the accounts receivable balance as of December 31, 2022. The loss of any one or more of our major customers or our inability to collect on outstanding accounts receivable from one or more of these customers could have a material adverse effect on our business and financial condition. Our bad debt expense increased to $902,432 in the year ended December 31, 2023, compared to a benefit of $70,987 in the year ended December 31, 2022, due to the write down of certain install receivables which were deemed uncollectible in the year ended December 31, 2023. Our provision for doubtful accounts receivable decreased $211,275 to $149,922 in the year ended December 31, 2023, compared to the year ended December 31, 2022. Although we are seeking to increase and diversify our customer base and reduce our reliance upon sales to a small number of customers, we expect sales to such customers to continue to constitute a significant portion of our revenues in the near term given we actively pursue large contracts and projects. The loss of any one or more of such customers or an inability to collect such accounts receivable could have a material adverse effect our business, financial condition and results of operations.

Item 1B. Unresolved Staff Comments.

None.

Item 1C. Cybersecurity

Risk Management Strategy

Our business is dependent upon our information technology ("IT") systems, devices and networks to collect, process and store the data necessary to conduct our business and record and report our business and financial information. We recognize the importance of developing, implementing, and maintaining effective cybersecurity measures to safeguard our IT systems and protect the confidentiality, integrity, and availability of our confidential and personal data, including with respect to our customers, suppliers, and employees, as well as our intellectual property.

We maintain a cybersecurity risk management program to identify, assess, manage, mitigate, and respond to cybersecurity threats.Our cybersecurity risk management program incorporates various mechanisms to detect and monitor unusual network activity, as well as containment and incident response tools. We monitor issues that are internally discovered or externally reported that may affect our business and have processes to assess those issues for potential cybersecurity impact or risk.

We have integrated our cybersecurity risk management program into our broader enterprise risk management program. This integration is designed to make cybersecurity considerations an integral part of our decision-making processes at every level and we believe that this integration allows cybersecurity risks to be evaluated and addressed in alignment with our business objectives and operational needs. While we work to maintain our information security program and risk management efforts, there can be no assurance that such actions will be sufficient to prevent cybersecurity incidents or mitigate all potential risks to our systems, networks, and data or those of our third-party providers.

We rely on suppliers that are also exposed to ransomware and other malicious attacks that can disrupt business operations. Although we take steps to secure confidential information that is provided to or accessible by third parties, such measures may not always be effective and losses or unauthorized access to, or releases of, confidential information occur. Such incidents and other malicious attacks could materially adversely affect our business, reputation, results of operations and financial condition.

We have experienced malicious attacks and other attempts to gain unauthorized access to our systems, including a ransomware attack on our computer network which occurred on April 28, 2023. Following remediation, our network returned to full operation on May 1, 2023.

We have engaged a third-party consultant in connection with our risk management and assessment processes. Our consultant assists us in the design and implementation of our cybersecurity policies and procedures, as well as the monitoring and testing of our safeguards. In the event of an incident, our incident response plan outlines the steps to be followed from incident detection to mitigation, recovery and notification, and involves notifying senior management, our legal department, and the board of directors and/or our audit committee, if appropriate, and mitigation and remediation steps by our third-party consultant.

Governance

Our board of directors has overall responsibility for informed oversight of our risk management process, including risks from cybersecurity threats. Our board of directors is responsible for monitoring and assessing strategic risk exposure. Our executive officers are responsible for the day-to-day management of the material risks we face. Our board of directors has delegated to our audit committee its cybersecurity risk oversight processes, including oversight and mitigation of risks from cybersecurity threats.

Our audit committee receives periodic reports from management regarding our cybersecurity risks and is notified of any significant cybersecurity threat or incident.The audit committee reports to the board of directors regarding its activities, including with respect to cybersecurity matters and the occurrence of any material cybersecurity incident, if appropriate.

We have engaged a third-party consultant to manage risks associated with network protection and workstation management. Our consultant performs an annual assessment of our cybersecurity risk policies and procedures.

Item 2. Properties.

Our headquarters is located in Waltham, Massachusetts, and consists of approximately 43,000 square feet of manufacturing, storage and office space. On March 1, 2024, we extended the Waltham lease which now expires on April 30, 2024. Currently, our monthly base rent for our Waltham, Massachusetts facility is $44,254.

On March 31, 2023, we entered into two lease agreements for two adjoining buildings, located in Billerica, Massachusetts, containing approximately 26,412 square feet of manufacturing, storage and office space to serve as our headquarters and manufacturing facilities. The lease agreements provide for initial lease terms of five (5) years with two successive options to renew for additional terms of five (5) years. Both leases commence on January 1, 2024 and require payment of the base rent, real estate taxes, common maintenance expenses and aggregate deposits of $38,200. Our costs for initial improvements required to the leased premises is estimated to range between $500,000 and $750,000. The estimated straight-line monthly rent expense for the initial term of the lease is approximately $26,962 per month. In accordance with ASC 842-20-30-1, we will record the lease liability and right-of-use asset using the discount rate for the lease upon the lease commencement date, January 1, 2024. We believe that our facilities are appropriate and adequate for our current needs.

Our eleven leased service centers can be broken into two different sizes. The larger leased spaces have office space to accommodate administrative, sales and engineering personnel, and warehouse space to stock parts in support of our service contracts. As of December 31, 2023, the service centers that fit this larger category are based in Piscataway, New Jersey and

Valley Stream and Buchanan, New York to service the Metro New York City and the Mid-Atlantic region. The San Francisco Bay area and Northern California is served by such a center in Hayward, California. A portion of the corporate headquarters in Waltham, Massachusetts and the new corporate headquarters in Billerica, Massachusetts are used in this manner to service Boston and New England. The smaller service centers are parts depots or warehouses for the stocking of parts in support of our service contracts. These centers are located in Los Angeles, California; Sterling Heights, Michigan; Newark, New York, East Windsor, Connecticut; East Syracuse, New York, Toronto, Ontario and Wellesley Chapel, Florida.

Item 3. Legal Proceedings.

On November 23, 2022, we were served with a suit filed against us on August 24, 2022 in the Ontario Superior Court of Justice by The Corporation of the Town of Milton, Milton Energy Generation Solutions Inc. and Milton Hydro Distribution Inc (the "Plaintiffs"), all of whom are municipal corporations incorporated in the Province of Ontario. The plaintiffs sued for damages in the amount of CDN $1,000,000, pre-judgment and post-judgment interest, legal fees, and any further relief the court may deem, alleging breach of contract, breach of warranty, negligent misrepresentations and nuisance. Plaintiffs allege that on or about July 10, 2022, a Tecogen cogenerator installed by us at the plaintiffs facility caught fire, causing damage to the cogenerator and the plaintiff's facility. We have filed a response denying liability and are represented by Canadian counsel. For the year ended December 31, 2022, we reserved $150,000 for anticipated damages which may not be covered by our insurance and continue to maintain the reserve at December 31, 2023.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market for Our Shares

Our common stock is quoted on the OTC Markets Group’s OTCQX Best Market tier and trades under the symbol TGEN. As of March 25, 2024, there were 57 holders of record of our common stock. Any over-the-market quotations reflect inter-dealer prices, without mark-up, markdown or commission and may not necessarily represent actual transactions.

Dividends

We have never declared or paid a cash dividend on our common stock and do not anticipate paying cash dividends on our common stock in the foreseeable future. Payment of future cash dividends, if any, will be at the discretion of our board of directors and will depend on our financial condition, results of operations, contractual restrictions and covenants included under any bank or other indebtedness that we may enter into, capital requirements, business prospects and other factors that our board of directors considers relevant.

Equity Compensation Plan Information

We adopted the 2006 Stock Option and Incentive Plan (the “Plan”), under which the board of directors may grant incentive or non-qualified stock options and stock grants to key employees, directors, advisors and our consultants. The Plan was amended at various dates by the Board of Directors to increase the reserved shares of common stock issuable under the Plan to 3,838,750 as of December 31, 2023, and in June 2017 stockholders approved an amendment to extend the termination date of the Plan to January 1, 2026 and to ratify all of our option grants issued after January 1, 2016 (the “Amended Plan”).

Stock options vest based upon the terms within the individual option grants, with an acceleration of the unvested portion of such options upon a change in control event, as defined in the Amended Plan. The options are not transferable except by will or domestic relations order. The option price per share under the Amended Plan cannot be less than the fair market value of the underlying shares on the date of the grant. The number of shares remaining available for future issuance under the Amended Plan as of December 31, 2023 and 2022 was 243,818 and 146,393, respectively.

We adopted the 2022 Stock Incentive Plan (the "2022 Plan"), under which the Board of Directors may grant incentive or non-qualified stock options and stock grants to key employees, directors, advisors and consultants. We have reserved 3,800,000 shares of our common stock for issuance pursuant to awards under the 2022 Plan. The adoption of the 2022 Plan was approved by our shareholders on June 9, 2022.

Under the 2022 Plan, stock options vest based upon the terms within the individual option grants, with an acceleration of the unvested portion of such options upon a change in control event, as defined in the 2022 Plan. The options are not transferable except by will or domestic relations order. The option price per share under the 2022 Plan cannot be less than the fair market value of the underlying shares on the date of the grant. The number of shares remaining available for future issuance under the 2022 Plan as of December 31, 2023 was 3,068,750.

The following table provides information as of December 31, 2023, regarding Common Stock that may be issued under the Amended Plan and the 2022 Plan.

	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in first column)
Equity compensation plans approved by security holders	3,638,122	$ 1.49	3,312,568
Equity compensation plans not approved by security holders	—	—	—
Total	3,638,122	$ 1.49	3,312,568

Item 6. [Reserved].

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and related notes appearing elsewhere in this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report on Form 10-K, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. You should review "Item 1A. Risk Factors" of this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis. Except as required by federal securities law or other disclosure requirements applicable to us, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future. Our historical results are not necessarily indicative of the results that may be expected for any period in the future.

Overview

Tecogen designs, manufactures, markets, and maintains high efficiency, ultra-clean cogeneration products. These include natural gas engine driven combined heat and power (CHP) systems, chillers and heat pumps for multi-family residential, commercial, recreational and industrial use. We are known for products that provide customers with substantial energy savings, resiliency from utility power outages and for significantly reducing a customer's carbon footprint. Our products are sold with our patented Ultera® technology which nearly eliminates all criteria pollutants such as NOx and CO. Our systems are greater than 88% efficient compared to typical electrical grid efficiencies of 40% to 50%. As a result, our greenhouse gas (GHG) emissions are typically half that of the electrical grid. Our systems generate electricity and hot water or in the case of our Tecochill product, both chilled water and hot water. These result in savings of energy related costs of up to 60% for our customers. Our products are expected to run on Renewable Natural Gas (RNG) as it is introduced into the US gas pipeline infrastructure.

Our products are sold directly to end-users by our in-house sales team and by established sales agents and representatives. We have agreements in place with distributors and sales representatives. Our existing customers include hospitals and nursing homes, colleges and universities, health clubs and spas, hotels and motels, office and retail buildings, food and beverage processors, multi-unit residential buildings, laundries, ice rinks, swimming pools, factories, municipal buildings, military installations and indoor growing facilities. To date we have shipped over 3,200 units, some of which have been operating for almost 35 years.

Although we may, from time to time, have one or a few customers who may represent more than 10% of our product revenue for a given year, we are not dependent on the recurrence of revenue from those customers. Our product revenue is such that customers may make a large purchase once and may not ever make a purchase again. Our equipment is built to last 30 or more years. Therefore, our product revenue model is not dependent on recurring sales transactions from the same customer. Our service revenue does lend itself to recurring revenue from particular customers.

For the last two fiscal years, more than half of our revenue was generated from long-term maintenance and energy production contracts, which provides us with a predictable revenue stream, especially during the summer months. We experience a slight surge of activity from May through September as our "chiller season" is in full swing. Our O&M service revenue which has grown from year to year since 2005, with our New York City/New Jersey and New England systems experiencing the majority of the growth, was positively impacted by the Aegis maintenance agreement acquisition in 2023. Our installation service related revenue has decreased and is likely to continue to remain low due to our strategy to focus on higher margin segments of our business. Our service margins are generally predictable as we service hundreds of long-term contracts with relatively low dollar, high volume sales.

During the years ended December 31, 2023 and 2022, our revenues were negatively impacted due to customer order delays or deferrals; service delays due to customer facility closures, in some cases for extended periods; and a reduction in our energy production segment revenue due to business closures and increased remote work and learning environments.

Our product revenue is derived from the sale of the various cogeneration modules, such as the InVerde, InVerde e+, the Tecopower, and Tecochill products. In 2019, we also reintroduced our TecoFrost refrigeration line. The sales cycle varies between 6 months to a year or more. Therefore, our product revenue can be difficult to predict and the expected margin can vary. In most cases we work with consulting engineers who specify our product in new and retrofit applications.

Our cogeneration, heat pump, and chiller modules are built to order and revenue is recognized upon shipment. The lead time to build and deliver a unit depends on its customized configuration and is approximately 12 to 14 weeks for a chiller and 6 to 8 weeks for a cogeneration system or heat pump, from time of purchase order. As revenue is recognized upon shipment, our work-in-process is an important factor in understanding our financial condition in any given quarter.

Our operations are comprised of three business segments, as follows:

- Products segment - designs, manufactures and sells industrial and commercial cogeneration systems;
- Services segment - provides maintenance services for Tecogen supplied products at customer sites; and,
- Energy Production segment - sells energy in the form of electricity, heat, hot water, and cooling to our customers under long-term sales agreements.

Recent Developments

Assumption of Aegis Energy Services Maintenance Agreements

On March 15, 2023, we entered into an agreement ("Agreement") with Aegis Energy Services, LLC (“Aegis”) pursuant to which Aegis agreed to assign to us and we agreed to assume certain Aegis maintenance agreements, we agreed to purchase certain assets, and related matters (“Acquisition”). On April 1, 2023, the Acquisition closed. Under the Agreement, we agreed to acquire from Aegis and assume Aegis' rights and obligations arising on or after April 1, 2023, under maintenance agreements pursuant to which Aegis provided maintenance services for approximately 200 cogeneration systems, and acquired certain vehicles and inventory used by Aegis in connection with the performance of such maintenance services, and, following closing hired eight (8) Aegis employees to provide services with respect to such maintenance agreements. At closing, we acquired eight (8) Aegis vehicles for consideration consisting of $170,000 in cash. Also, we issued credits against outstanding accounts receivable due from Aegis in the amount of $300,000 for the acquisition of inventory that Aegis used to provide maintenance services. On February 1, 2024, Tecogen and Aegis amended the Agreement to add eighteen (18) additional maintenance contracts (the "Amendment"). The Amendment includes an undertaking by Aegis to use commercially reasonable efforts to support and assist our execution of maintenance service agreements for an additional thirty-six (36) cogeneration units sold to customers by Aegis. See Note 5. "Aegis Contract and Related Asset Acquisition" in the Notes to Consolidated Financial Statements.

Tecochill Hybrid-Drive Air-Cooled Chiller Development

During the third quarter of 2021 we began development of the Tecochill Hybrid-Drive Air-Cooled Chiller. We recognized that there were many applications where the customer wanted an easy to install roof top chiller. Using the inverter design from our InVerde e+ cogeneration module, the system can simultaneously take two inputs, one from the grid or a renewable energy source and one from our natural gas engine. This allows a customer to seek the optimum blend of operational cost savings and greenhouse gas benefits while providing added resiliency from two power sources. We introduced the Tecochill Hybrid-Drive Air-Cooled Chiller at the AHR Expo in February 2023 and received an order on February 8, 2024 for three hybrid-drive air-cooled chillers for a utility in Florida. A patent application based on this concept has been filed with the US Patent and Trademark Office.

Controlled Environment Agriculture

On July 20, 2022, we announced our intention to focus on opportunities for low carbon Controlled Environment Agriculture ("CEA"). We believe that CEA offers an exciting opportunity to apply our expertise in clean cooling, power generation, and greenhouse gas reduction to address critical issues affecting food and energy security. We propose to address this challenge by developing a highly efficient energy solution for CEA grown produce using our cogeneration products in conjunction with solar energy generation, energy storage, and other technologies.

CEA facilities enable multiple crop cycles (15 to 20 cycles) in one year compared to one or two crop cycles in conventional farming. In addition, growing produce close to the point of sale reduces food spoilage during transportation. Food crops grown in greenhouses typically have lower yields per square foot than in CEA facilities, and the push to situate facilities close to consumers in cities requires minimizing land area and maximizing yield per square foot. Yields are increased in CEA facilities by supplementing or replacing natural light with grow lights in a climate-controlled environment - which requires significant energy use.

In recent years our cogeneration equipment has been used in numerous cannabis cultivation facilities because our systems significantly reduce operating costs, reduce the facility GHG footprint and offer resiliency to grid outages. Our experience providing clean energy solutions to cannabis cultivation facilities has given us significant insight into requirements relating to energy-intensive indoor agriculture applications that we expect to be transferable to CEA facilities for food production.

Critical Accounting Estimates

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make judgments, assumptions and estimates that affect the reported amounts of assets, liabilities, sales and expenses, and related disclosure of contingent assets and liabilities. These judgments, assumptions and estimates are made or applied within the context of accounting policies related to the nature of the transaction. Note 2. "Summary of Significant Accounting Policies" of the Notes to our Consolidated Financial Statements describes the significant accounting policies used in the preparation of the consolidated financial statements.

Certain aspects of certain accounting policies require management to make difficult, subjective or complex judgments that could have a material effect on our financial condition and results of operations. These aspects of these accounting policies are considered critical accounting policies. These policies may require management to make assumptions about matters that are highly uncertain at the time of the estimate or employ an estimate where alternative estimates could have also been employed, and may involve estimates that are reasonably likely to change with the passage of time. Estimates and assumptions about future events and their effects cannot be determined with certainty. We base our estimates on historical experience and on various other assumptions believed to be applicable and reasonable under the circumstances. These estimates may change as new events occur, as additional information is obtained and as our operating environment changes. These changes have historically been minor and have been included in the consolidated financial statements as soon as they became known. In addition, management is periodically faced with uncertainties, the outcomes of which are not within its control and will not be known for prolonged periods of time. These uncertainties are discussed in "Item 1A," "Risk Factors" above.

Management believes that the following are critical accounting estimates:

Revenue Recognition

Revenue is recognized when performance obligations under the terms of a contract with our customer are satisfied. This generally occurs with the transfer of control of our products, services and energy production. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services or energy to customers.

Determination of contract consideration allocatable to multiple performance obligations within a single contract requires employing stand-alone selling prices which may be based on observable selling prices, estimated selling prices or as a residual. We use an observable selling price to determine standalone selling prices where available and either a combination of an adjusted market assessment approach, an expected cost plus a margin approach, and/or a residual approach to determine the standalone selling prices for separate performance obligations as a basis for allocating contract consideration when an observable selling price is not available.

Accounts Receivable

Accounts receivable are stated at the amount management expects to collect from outstanding balances. The allowance for credit losses is estimated based on historical experience, aging of the receivable, the counterparty's ability to pay, condition of general economy and industry, and combined with management's estimate of current conditions, reasonable and supportable forecasts of future losses to determine estimated credit losses in our evaluation of outstanding accounts receivable at the end of the year. The allowance for credit losses reflects managements evaluation of our outstanding accounts receivable at the end of the year and our best estimate of probable losses inherent in the accounts receivable balance. Accounts receivable deemed uncollectible are charged against the allowance for credit losses when identified.

Inventory

Raw materials, work in process, and finished goods inventories are stated at the lower of cost, as determined by the average cost method, or net realizable value. We periodically review inventory quantities on hand for excess and/or obsolete inventory based primarily on historical usage, as well as based on estimated forecast of product demand. Any reserves that result from this review are charged to cost of sales.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost. Depreciation is provided using the straight-line method over the estimated useful life of the asset, which range from three to fifteen years. Leasehold improvements are amortized using the straight-line method over the lesser of the estimated useful lives of the assets or the term of the related leases. Expenditures for maintenance and repairs are expensed, while renewals and betterments that materially extend the life of an asset are capitalized.

We review our property, plant and equipment for potential impairment whenever events or changes in business circumstances indicate that the carrying value of the assets may not be fully recoverable or that the useful lives of the assets are no longer appropriate. We evaluate the recoverability of our long-lived assets when impairment is indicated by comparing the net book value of the asset group to the estimated future undiscounted cash flows attributable to such assets. If the sum of the projected undiscounted cash flows (excluding interest charges) is less than the carrying value of the assets, the assets will be written down to the estimated fair value and such loss is recognized in income from continuing operations in the period in which the determination is made. If impairment is indicated, the asset is written down to its estimated fair value.

Business Combinations

In accordance with applicable accounting standards, we estimate the fair value of assets acquired and liabilities assumed as of the acquisition date of each business combination. Any excess purchase price over the fair value of the net tangible and intangible assets acquired is allocated to goodwill. We may make certain estimates and assumptions when determining the fair values of assets acquired and liabilities assumed, including intangible assets. Critical estimates in valuing certain intangible assets include but are not limited to future expected cash flows from energy production sites or customer maintenance contracts, estimated operating costs, as well as discount rates. At the acquisition date, we will also record acquisition related liabilities, if applicable, for any contingent consideration or deferred payments to the seller. Contingent consideration is recorded at fair value on the acquisition date based on our expectation of achieving the contractually defined revenue targets. The fair value of the contingent consideration liabilities is remeasured each reporting period after the acquisition date and any changes in the estimated fair value are reflected as gains or losses in general and administrative expense in the consolidated statement of operations. Contingent consideration liabilities and deferred payments to sellers are recorded as current liabilities and other long-term liabilities in the consolidated balance sheets based on the expected timing of settlement.

Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates. Any changes to provisional amounts identified during the measurement period are recognized in the reporting period in which the adjustment amounts are determined. Transaction costs associated with business combinations are expensed as incurred.

Contract Assets and Liabilities

The favorable contract asset and unfavorable contract liability included in the intangible assets and liabilities of the consolidated balance sheets represent the fair value of customer energy production contracts (both positive for favorable contracts and negative for unfavorable contracts) which were acquired by us.

The determination of fair value requires development of an estimate of the price at which an orderly transaction to sell the asset or to transfer the liability would take place between market participants at the measurement date under current market conditions. Contracts are considered to be assets or liabilities by virtue of the rights and obligations inherent in the contract terms. Typically, contracts with terms considered to be at market are considered to have no fair value as, in order to be entitled to the rights under the contract, performance must occur for which a market rate of return is earned due to the at market terms. The fair value of a contract is primarily a measurement of its off-market terms. The obligation to perform under a contract with terms that are unfavorable to market results in a liability to the extent its terms are off market. The resulting liability is an estimate of the price that would need to be paid to a willing market participant to assume the obligations under the contract in order for them to receive a market rate of return for their remaining performance obligation under the contract. The exact opposite holds true in instances where the terms of a contract are considered to be favorable to market. In that case an asset would exist as an estimate of the price that would be received from a willing market participant in order to be entitled to the rights under the contract.

In determining the estimate of fair value of customer energy production contracts, the measure of market, and thus the baseline to measure the amount related to any of the off-market terms or conditions with respect to the contracts, was considered best determined, given the nature of the services provided under the contracts, by utilizing a benchmark level of margin, in this case 35% of revenue which is consistent with the average return on revenue of US investor owned public utilities.

Goodwill

Goodwill is not amortized; however, it is reviewed for impairment annually in the fourth quarter and/or when circumstances or other events indicate that impairment may have occurred. ASC 350 “Intangibles—Goodwill and Other” (ASC 350) permits entities to make a qualitative assessment of whether it is more likely than not that a reporting unit’s fair value is less than its carrying amount before applying the two-step goodwill impairment test. Circumstances that are considered as part of the qualitative assessment and could trigger the two-step impairment test include, but are not limited to: a significant adverse change in the business climate; a significant adverse legal judgment; adverse cash flow trends; an adverse action or assessment by a government agency; unanticipated competition; decline in our stock price; and a significant restructuring charge within a reporting unit. We define reporting units at the business segment level. For purposes of testing goodwill for impairment, goodwill has been allocated to our reporting units to the extent it relates to each reporting unit.

During 2018, we adopted the provisions of ASU 2017-04 which simplified goodwill impairment testing by eliminating the requirement to determine the implied value of goodwill where a quantitative analysis indicates that the carrying value of the reporting unit exceeds its fair value.

At a minimum, we perform a quantitative goodwill impairment test in the fourth quarter of the year. In the fourth quarter of 2023, we performed a quantitative goodwill impairment test for our energy production reporting unit acquired in 2017. We used a discounted cash flow approach to develop the estimated fair value of that reporting unit. Management judgment is required in developing the assumptions for the discounted cash flow model. An impairment would be recorded if the carrying amount of a reporting unit including goodwill exceeded the estimated fair value. Based on the aforementioned analysis, the carrying amount of that reporting unit, including goodwill, exceeded the estimated fair value and there was no impairment at December 31, 2023. See Note 6. "Sale of Energy Producing Assets and Goodwill Impairment".

The impairment analysis recognizes the shortening of remaining contract terms with customers without replacement and without further growth, as well as less than expected cost savings, offset by profitability from our initiatives to optimize the long-term profitability of our various site operations and a price peak of the Company's stock on the date of the business combination to which the goodwill relates (see also Note 6."Sale of Energy Producing Assets and Goodwill Impairment").

The discount rate, profitability assumptions, and terminal growth rate of the Energy Production unit were the material assumptions utilized in the discounted cash flow model used to estimate its fair value. The discount rate reflects an estimate of our weighted-average cost of capital.

The discounted cash flow analysis requires estimates, assumptions and judgments about future events. Our analysis uses our internally generated long-range plan. The long-range plan reflects management's judgment and assumptions about future events.

We believe the assumptions used in our goodwill impairment analysis are appropriate and result in a reasonable estimate of the fair value of the reporting unit. However, given the economic environment and the uncertainties regarding the impact on our business, there can be no assurance that our estimates and assumptions, made for purposes of our goodwill impairment testing, will prove to be an accurate prediction of the future. If our assumptions regarding future performance are not achieved, we may be required to record additional goodwill impairment charges in future periods.

Results of Operations

Year Ended December 31, 2023 Compared to Year Ended December 31, 2022

The following table sets forth for the periods indicated, the percentages of the net sales represented by certain items reflected in our statements of operations for the years ended December 31, 2023 and 2022:

	Years ended December 31,	
	2023	2022
Revenues	100.0 %	100.0 %
Cost of Sales	59.4	55.7
Gross Profit	40.6	44.3
Operating expenses:		
General and administrative	47.3	43.6
Selling	7.7	7.2
Research and development	3.3	2.9
Gain on sale of assets	(0.1)	(0.2)
Long-lived asset impairment	—	—
Total operating expenses	58.1	53.7
Loss from operations	(17.6)	(9.4)
Total other expense, net	(0.3)	(0.1)
Consolidated net loss	(18.0)	(9.6)
Income attributable to the noncontrolling interest	(0.3)	(0.2)
Net loss attributable to Tecogen Inc.	(18.3) %	(9.8) %

The following table presents revenue by segment and the change from the prior year for the years ended December 31, 2023 and 2022:

	Years Ended			
Revenues	**December 31, 2023**	**December 31, 2022**	**Increase (Decrease) $**	**Increase (Decrease) %**
Product:				
Cogeneration	$ 2,761,667	$ 5,279,569	$ (2,517,902)	(47.7) %
Chillers	5,303,978	5,034,633	269,345	5.3 %
Engineered Accessories	794,301	841,897	(47,596)	(5.7) %
Total product revenue	8,859,946	11,156,099	(2,296,153)	(20.6) %
Services	14,523,054	12,060,661	2,462,393	20.4 %
Energy production	1,756,419	1,785,854	(29,435)	(1.6) %
Total Revenue	$ 25,139,419	$ 25,002,614	$ 136,805	0.5 %

Revenues

Revenues in 2023 were $25,139,419 compared to $25,002,614 in 2022, an increase of $136,805 or 0.5% due to increased Services revenues which were offset by decreased Products revenues.

Products

Product revenues in 2023 were $8,859,946 compared to $11,156,099 in 2022, a decrease of $2,296,153 or 20.6%. The revenue decrease in 2023 compared to 2022 is due primarily to a decrease in cogeneration sales of $2,517,902, due to decreased unit volume and a $47,596 decrease in sales of engineered accessories, which are partially offset by an increase in chiller sales of $269,345. Our product mix, as well as product revenue, can vary significantly from period to period as our products are high dollar, low volume sales in which revenue is recognized upon shipment.

Services

Revenues derived from our service centers, including installation activities, in 2023 were $14,523,054 compared to $12,060,661 for the same period in 2022, an increase of $2,462,393 or 20.4%. The increase in revenue in 2023 is due primarily to the addition of $1,884,891 in revenue from the acquired Aegis maintenance contracts and a $577,502 or 4.8%, increase in service contract revenues from existing contracts.

Our service operation revenues grow with the sales of installed systems, since the majority of our product sales are accompanied by a service contract or time and materials agreements. As a result, our "fleet" of units being serviced by our service department grows with product sales.

Energy Production

Energy production revenues for the year ended December 31, 2023 were $1,756,419 compared to $1,785,854 for 2022, a decrease of $29,435, or 1.6%.

Cost of Sales

Cost of sales in 2023 was $14,937,801 compared to $13,935,803 in 2022, an increase of $1,001,998 or 7.2%. The increase in cost of sales is due to increased Services revenue volume, the impact of inflation on our material costs, an increase in the provision for obsolete inventory and increased product warranty costs. Our overall gross margin was 40.6% in 2023 compared to 44.3% in 2022, a decrease of 3.7%.

Products

Costs of sales for products in 2023 was $5,923,096 compared to $7,413,320 in 2022, a decrease of $1,490,224, or 20.1%, due to decreased product revenue volume, partially offset by increased provisions for obsolete inventory, higher material costs and increased product warranty costs. Our products gross margin was 33.1% in 2023 compared to 33.5% in 2022, a decrease of 0.4%, due primarily to the impact of inflation on our material costs and an increase in the provision for obsolete inventory.

Services

Cost of sales for services in 2023 was $7,909,202 compared to $5,525,493 in 2022, an increase of $2,383,709, or 43.1%, due primarily to increased labor and material costs as a consequence of acquiring the Aegis customer maintenance contracts, increased material usage at existing sites and an increase in the provision for obsolete inventory. Our services gross margin was 45.5% in 2023 compared to 54.2% in 2022, a decrease of 8.7%, due to increased labor and material costs incurred to replace engines at certain sites and an increase in the provision for obsolete inventory.

Energy Production

Cost of sales for energy production for the year ended December 31, 2023 was $1,105,503 compared to $996,990 in 2022, an increase of $108,513. Energy production gross margin was 37.1% in 2023 compared to 44.2% in 2022, a decrease of 7.1%, primarily due to increased fuel and maintenance costs.

Operating Expenses

Operating expenses increased in 2023 to $14,615,230 compared to $13,415,952 in 2022, an increase of $1,199,278 or 8.9%.

	Years Ended		Increase (Decrease)	
	December 31, 2023	December 31, 2022	$	%
Operating Expenses				
General and administrative	11,880,389	$ 10,909,251	$ 971,138	8.9 %
Selling	1,931,037	1,811,085	119,952	6.6 %
Research and development	840,011	732,873	107,138	14.6 %
Gain on sale of assets	(36,207)	(41,931)	5,724	(13.7)%
Long-lived asset impairment	—	4,674	(4,674)	(100.0)%
Total	$ 14,615,230	$ 13,415,952	$ 1,199,278	8.9 %

General and administrative expenses increased $971,138 to $11,880,389 in the year ended December 31, 2023 compared to $10,909,251 in 2022 due primarily to a $974,420 increase in bad debt expense, due mainly to the write down of certain install receivables which were deemed uncollectible, a $139,364 increase in amortization and depreciation, due to the Aegis acquisition, a $164,415 increase in business insurance, partially offset by a $83,758 decrease in stock-based compensation, a $68,470 decrease in franchise taxes and the $150,000 litigation provision recorded in 2022.

Selling expenses increased in the year ended December 31, 2023 to $1,931,037 compared to $1,811,085 in 2022, an increase of $119,952 due primarily to a $101,826 increase in trade show expense.

Research and development expenses increased in the year ended December 31, 2023 to $840,011 compared to $732,873, an increase of $107,138 due to costs incurred to develop the hybrid-drive air-cooled chiller, which included a $72,700 increase in payroll cost and a $29,250 increase in consulting costs.

Gains on the sale of assets was $36,207 in 2023 compared to a gain on the sale of assets of $41,931 in 2022.

Impairment of long-lived assets decreased $4,674 in the year ended December 31, 2023 compared to 2022.

Loss from Operations

Loss from operations for the year ended December 31, 2023 was $4,413,612 compared to a loss of $2,349,141 in 2022, an increase in the loss from operations of $2,064,471. The increase in the net loss from operations is primarily due to lower Products sales, a $865,193 decrease in gross margin due to higher products material costs and the increased provision for obsolete inventory and a $1,199,278 increase in operating expenses.

Other Income (Expense), net

Other expense, net, for the year ended December 31, 2023 was $77,053 compared to income of $32,219 for the same period in 2022, a decrease of $44,834, due to an increase in interest and other expense of $61,003 compared to $34,713 in 2022, and by a decrease in unrealized income on marketable securities of $18,749, which represents the market value fluctuation of marketable equity securities as discussed in Note 16. "Fair Value Measurements".

Provision for State Income Taxes

The provision for state income taxes for the years ended December 31, 2023 and 2022 was $32,491 and $16,352, respectively, and represents estimated income tax payments, net of refunds, to various states.

Noncontrolling Interest

We have income and losses attributable to the noncontrolling interest we have in American DG Energy's 51% owned subsidiary, ADGNY, LLC. The noncontrolling interest share of ADGNY profits and losses was income of $74,952 for the year ended December 31, 2023 and income of $50,215 in 2022.

Net Loss Attributable to Tecogen Inc

Net loss for the year ended December 31, 2023 was $4,598,108 compared to a net loss of $2,447,927 for the comparable period in 2022. The increase in net loss in 2023 is primarily due to lower Products sales, a $865,193 decrease in gross margin due to higher products material costs and the increased provision for obsolete inventory and a $1,199,278 increase in operating expenses.

Net Income (Loss) Per Share

Net loss per share for the year ended December 31, 2023 was a loss of $0.19 compared to a loss of $0.10 per share for the same period in 2022. The basic and diluted weighted average shares outstanding for the year ended December 31, 2023 were 24,850,261 and 24,850,261, respectively. For the year ended December 31, 2022, basic and diluted shares were 24,850,261 and 24,850,261, respectively.

Liquidity and Capital Resources

The following table presents a summary of our net cash flows from operating, investing, and financing activities:

	Years End	
Cash Provided by (Used in)	**December 31, 2023**	**December 31, 2022**
Operating activities	$ (823,315)	$ (1,351,929)
Investing activities	(244,889)	(348,365)
Financing activities	505,505	—
Change in cash and cash equivalents	$ (562,699)	$ (1,700,294)

Consolidated working capital at December 31, 2023 was $9,822,546, compared to $14,344,288 at December 31, 2022, a decrease of $4,521,742 or 31.5%. Included in working capital were cash and cash equivalents of $1,351,270 at December 31, 2023, compared to $1,913,969 at December 31, 2022, a decrease of $562,699 or 29.4%. The decrease in consolidated working capital is primarily due to the increase in our net loss and increased liabilities recognized due to the Aegis contract acquisition.

For the year ended December 31, 2023 we used $823,315 in cash from operations compared to $1,351,929 in cash used from operations in 2022, a decrease of $528,614 in net cash used by operating activities. Our accounts receivable balance increased by $81,195 at December 31, 2023 compared to December 31, 2022 and our unbilled revenues decreased by $56,994 in at December 31, 2023 compared to December 31, 2022. Our inventory increased by $82,525 as of December 31, 2023 compared to December 31, 2022 and other non-current assets decreased by $265,725 as of December 31, 2023 as compared to December 31, 2022.

Accounts payable increased by $1,161,416 from December 31, 2022 to December 31, 2023 due to increased aging of our payables to conserve liquidity. Accrued expenses from operations increased by $128,869 as of December 31, 2023 compared to December 31, 2022 due to higher operating expenses. Deferred revenues increased by $543,842 as of December 31, 2023 as compared to December 31, 2022, due to Aegis contract customer deposits collected in 2023 .

For the year ended December 31, 2023 we used $244,889, in cash from investing activities, consisting of $170,000 of cash to acquire certain assets as part of the Aegis acquisition, used $46,851 of cash for purchases of property and equipment, and distributed $62,693 to the 49% non-controlling interest holders of American DG New York LLC.

Cash flows from financing activities in 2023 were $505,505, consisting of borrowings under our related party note with John N. Hatsopoulos (see Note 11."Related Party Notes"). During 2022, there were no cash flows from financing activities.

Our total product and installation backlog as of December 31, 2023 was $7,388,145 compared to $6,722,138 as of December 31, 2022. Backlog does not include maintenance contract service revenues or energy contract revenues.

At December 31, 2023 and 2022, we had cash and cash equivalents of $1,351,270 and $1,913,969, a decrease of $562,699 or 29.4%. During the year ended December 31, 2023, our revenues were negatively impacted due to customer order delays or deferrals; service delays due to customer facility closures, in some cases for extended periods and a reduction in our energy production revenues, due to business closures and increased remote work and learning environments.

Based on our current operating plan, we believe existing resources, including cash and cash flows from operations will be sufficient to meet our working capital requirements for the next twelve months. In order to grow our business and fund the development of our hybrid-drive air-cooled chiller and the relocation of our primary facility, we expect that our cash requirements will increase and we may need to raise additional capital through a debt or equity financing to meet our need for capital to fund operations and future growth.

On October 9, 2023, we entered into an agreement with each of John N. Hatsopoulos, a director and principal shareholder of registrant, and Earl R. Lewis, III, a director, pursuant to which Mr. Hatsopoulos agreed to provide financing to us of up to $1 million, and Mr. Lewis agreed to provide financing to us of $500,000, and potentially an additional $500,000 at his discretion. On October 10, 2023, we issued a promissory note and borrowed $500,000 from Mr. Hatsopoulos. The note, as amended on March 21, 2024, is due and repayable two years from the date of issuance and bears interest at 5.12% per annum payable in full at maturity. The loan is required to be repaid in the event of a change of control of the company and upon the occurrence of an event of default under the note, including upon a failure to pay when due the principal and interest when due, or the commencement of voluntary or involuntary bankruptcy or insolvency proceeding. The proceeds of the loans are expected to be used for general working capital purposes.

Contractual Obligations and Commitments

We are obligated under operating leases for our Waltham, Massachusetts headquarters through March 31, 2024, our new Billerica, Massachusetts headquarters through December 31, 2029 and our eleven leased service centers through January 2031. Future minimum lease commitments under non-cancellable operating leases as of December 31, 2023, were $772,593. See "Leases". Effective as of January 1, 2024, the future minimum lease commitments for the Billerica, Massachusetts location were $1,325,614.

We are also obligated under finance leases for five vehicles through December 31, 2028. Future minimum finance lease payments as of December 31, 2023, were $200,187.

Seasonality

We expect that the majority of our heating systems sales will be operational for the winter and the majority of our chilling systems sales will be operational for the summer. Our cogeneration sales are not generally affected by the seasons. Our service team does experience higher demand in the warmer months when cooling is required. Chiller units for space conditioning applications are generally shut down in the winter and started up again in the spring. This chiller "busy season" for the service team generally runs from May through the end of September. Chillers in indoor cultivation and other process cooling applications run year round.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Disclosure in response to this item is not required of a smaller reporting company.

Item 8. Financial Statements and Supplementary Data.

The information required by this item is incorporated from Item 15 and pages F-1 through F-25 of this Annual Report on Form 10-K.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Management's Evaluation of Disclosure Controls and Procedures:

Our disclosure controls and procedures are designed to provide reasonable assurance that the control system's objectives will be met. Our management, including our Chief Executive Officer and Principal Financial Officer, after evaluating the effectiveness of our disclosure controls and procedures as of December 31, 2023 ("Evaluation Date"), has concluded that as of the Evaluation Date, our disclosure controls and procedures were not effective due to the material weakness in financial reporting relating to a small number of employees dealing with general controls over information technology. Our management has decided that the expense associated with continued implementation of new systems is justified and continues to implement systems to put the proper control procedures in place to remediate this weakness.

For these purposes, the term disclosure controls and procedures of an issuer means controls and other procedures of an issuer that are designed to ensure that information required to be disclosed by the issuer in the reports that it files or submits under Section 13(a) or 15(d) of the Securities Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by an issuer in the reports that it files or submits under Section 13(a) or 15(d) of the Securities Exchange Act is accumulated and communicated to the issuer's management, including its principal executive and principal accounting officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Management's Annual Report on Internal Control over Financial Reporting:

Our management is responsible for establishing and maintaining adequate internal controls over financial reporting as defined in Rules 13a-15(f) under the Securities Exchange Act of 1934, as amended.

Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States of America. Our internal controls over financial reporting include those policies and procedures that:

- pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the Company;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. generally accepted accounting principles;
- provide reasonable assurance that receipts and expenditures of the Company are being made only in accordance with authorizations of management and directors of the Company; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the Company's assets that could have a material effect on the consolidated financial statements.

Because of its inherent limitations, internal control over financial reporting, no matter how well designed, may not prevent or detect misstatements. Accordingly, even effective internal control over financial reporting can provide only reasonable assurance with respect to financial statement preparation. Also, the assessment of the effectiveness of internal control over financial reporting was made as of a specific date. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management, including our Chief Executive Officer and Principal Financial Officer, conducted an evaluation of our internal control over financial reporting based on the framework and criteria established in Internal Control—Integrated Framework, issued by the Committee of Sponsoring Organizations of the Treadway Commission. This evaluation included review of the documentation of controls, evaluation of the design effectiveness of controls, testing of the operating effectiveness of controls and a conclusion regarding this evaluation. Due to the small number of employees dealing with general controls over information technology security and user access, management believes this constitutes a material weakness in financial reporting. Based on this evaluation, management concluded that our internal control over financial reporting was not effective as of December 31, 2023.

Our management, including our Chief Executive Officer and Principal Financial Officer, does not expect that our disclosure controls or our internal control over financial reporting will prevent or detect all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. The design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Further, because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within the Company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns can occur because of a simple error or mistake. Controls can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the controls. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions. Projections of any evaluation of controls effectiveness to future periods are subject to risks. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures.

This annual report does not include an attestation report of our registered independent public accounting firm regarding internal control over financial reporting. Management's report was not subject to attestation by our registered independent public accounting firm pursuant to rules of the Securities and Exchange Commission that permit us to provide only management's report in this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

We implemented a company-wide ERP system in 2019. We continue to make progress in remediating internal control weaknesses. There has been no change to our internal control over financial reporting (as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act) during the fourth quarter of the fiscal year ended December 31, 2023 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

Proposed Reverse Stock Split

On October 9, 2023, our board of directors authorized us to seek shareholder approval for an amendment to our Amended and Restated Certificate of Incorporation ("certificate of incorporation") that would enable us to effect a combination of our outstanding shares of common stock into a lesser number of shares, or a reverse stock split. We intend to seek stockholder approval at our Annual Meeting of Stockholders on June 6, 2024, for three alternative amendments to our certificate of incorporation to effect the reverse stock split at the alternative ratios of 1 for 4, 1 for 5, or 1 for 6. The determination of the ratio, implementation, and timing of any reverse stock split will be subject to further approval by our board of directors following receipt of shareholder approval at the annual meeting of our shareholders.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspection.

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this Item is incorporated by reference to our 2024 definitive proxy statement to be filed with the SEC within 120 days following the registrant's fiscal year ended December 31, 2023.

Item 11. Executive Compensation.

The information required by this Item is incorporated by reference to our 2024 definitive proxy statement to be filed with the SEC within 120 days following the registrant's fiscal year ended December 31, 2023.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this Item is incorporated by reference to our 2024 definitive proxy statement to be filed with the SEC within 120 days following the registrant's fiscal year ended December 31, 2023.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this Item is incorporated by reference to our 2024 definitive proxy statement to be filed with the SEC within 120 days following the registrant's fiscal year ended December 31, 2023.

Item 14. Principal Accountant Fees and Services.

The information required by this Item is incorporated by reference to our 2024 definitive proxy statement to be filed with the SEC within 120 days following the registrant's fiscal year ended December 31, 2023.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

The following are filed as part of this Annual Report on Form 10-K.

(a) Index to Financial Statements and Financial Statement Schedules

Report of Independent Registered Public Accounting Firm

Consolidated Balance Sheets as of December 31, 2023 and 2022

Consolidated Statements of Operations for the years ended December 31, 2023 and 2022

Consolidated Statements of Stockholders' Equity for the years ended December 31, 2023 and 2022

Consolidated Statements of Cash Flows for the years ended December 31, 2023 and 2022

Notes to Audited Consolidated Financial Statements

All other schedules for which provision is made in the applicable accounting regulations of the SEC are not required under the related instructions, or are inapplicable, and therefore have been omitted.

(b) Exhibits

The exhibits are listed in the Exhibit Index attached hereto and incorporated by reference herein.

Item 16. Form 10-K Summary.

The Company has determined not to include a summary of the information permitted by Item 16 of the Form 10-K.

EXHIBIT INDEX

Exhibit Number	Description
2.1	Agreement and Plan of Merger, dated as of November 1, 2016, by and among Tecogen Inc, American DG Energy Inc. and ADGE.Tecogen Merger Sub Inc. incorporated herein by reference to Exhibit 2.1 to the registrant's Current Report on Form 8-K filed with the SEC on November 2, 2016.
2.2	Amendment 1 to the Agreement and Plan of Merger, dated as of March 23, 2017, by and among Tecogen Inc., American DG Energy Inc., and ADGE.Tecogen Merger Sub Inc. incorporated herein by reference to Exhibit 2.2 to the registrant's Current Report on Form 8-K filed with the SEC on March 24, 2017.
3.1	Amended and Restated Certificate of Incorporation incorporated herein by reference to Exhibit 3.1 to Amendment No. 3 to the registrant's Registration Statement on Form S-1 (Registration No. 333-193791) filed with the SEC on June 27, 2014.
3.2	Amended and Restated Bylaws incorporated herein by reference to Exhibit 3.2 Amendment No. 3 to the registrant's Registration Statement on Form S-1 (Registration No. 333-193791) filed with the SEC on June 27, 2014.
10.1	Specimen Common Stock Certificate of Tecogen Inc. incorporated herein by reference to Exhibit 4. to the registrant's Amendment No. 3 to the registrant's Registration Statement on Form S-1 (Registration No. 333-193791) filed with the SEC on June 27, 2014.
10.2+	Form of Stock Option Agreement incorporated by reference to exhibit 4.3 to Amendment No. 3 to the registrant's Registration Statement on Form S-1 (Registration No. 333-193791) filed with the SEC on June 27, 2014.
10.3	Description of Registrant's Securities incorporated herein by reference to Exhibit 4.4 to the registrant's Annual Report on Form 10-K for the year ended December 31 2019, filed with the SEC on March 12, 2020.
10.4	Form of Non-Qualified Stock Option Award Agreement (Employee Form) under the registrant's 2022 Stock Incentive Plan filed with the registrant's Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.5	Form of Incentive Stock Option Award Agreement under the registrant's 2022 Stock Incentive Plan filed with the registrant's Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.6	Form of Restricted Stock Award Agreement under registrant's 2022 Stock Incentive Plan filed with the registrant's Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.7	Form of Non-Qualified Stock Option Award Agreement (Non-Employee Director Form) under the registrant's 2022 Stock Incentive Plan filed with the registrant's Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.8+	Tecogen Inc. 2006 Stock Incentive Plan, as amended and restated on November 1, 2016 incorporated herein by reference to Exhibit 10.1 to the registrant's Annual Report on Form 10-K, for the year ended December 31, 2017, filed with the SEC on March 21, 2018.
10.9	Lease Agreement between Atlantic-Waltham Investment II, LLC, and Tecogen Inc., dated May 14, 2008 incorporated herein by reference to Exhibit 10.7 to the registrant's Amendment No. 3 to its Registration Statement on Form S-1 (Registration No. 333-193791), filed with the SEC on June 27, 2014.
10.10	Second Amendment to Lease Agreement between Atlantic-Waltham Investment II, LLC, and Tecogen Inc., dated January 16, 2013 incorporated herein by reference to Exhibit 10.2 to the registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014, filed with the SEC on May 15, 2014.
10.11#	Exclusive License Agreement between Tecogen Inc. and the Wisconsin Alumni Research Foundation, dated February 5, 2007 incorporated herein by reference to Exhibit 10.13 to Amendment No. 3 to the registrant's Registration Statement on Form S-1 (Registration No. 333-193791), filed with the SEC on June 27, 2014.
10.12	Facilities and Support Services Agreement between American DG Energy Inc. and Tecogen Inc., dated August 8, 2014, incorporated herein by reference to Exhibit 10.1 to American DG Energy Inc.'s Quarterly Report on Form 10-Q (No. 001-34493) filed with the SEC on August 14, 2014.
10.13	First Amendment to the Facilities and Support Services Agreement between American DG Energy Inc. and Tecogen Inc., dated August 7, 2015, incorporated herein by reference to Exhibit 10.1 to American DG Energy Inc.'s Current Report on Form 8-K (No. 001-34493) filed with the SEC on August 13, 2015.
10.14+	Advisory Agreement, dated January 3, 2018, between Tecogen Inc. and John N. Hatsopoulos incorporated herein by reference to Exhibit 10.1 to the registrant's Current Report on Form 8-K filed with the SEC on January 8, 2018.
10.15	Guaranty Agreement by registrant in favor of CogenOne LLC and SDCL TG Cogen LLC, dated December 14, 2018, incorporated herein by reference to Exhibit 10.49 to the registrant's Current Report on Form 8-K filed with the SEC on March 8, 2019.
10.16	Membership Interest Purchase Agreement by and among SDCL TG Cogen LLC, American DG Energy Inc., and registrant, dated as of March 5, 2019, incorporated herein by reference to Exhibit 10.50 to the registrant's Current Report on Form 8-K filed with the SEC on March 8, 2019.

10.17	Guaranty Agreement by registrant in favor of CogenTwo LLC and SDCL TG Cogen LLC, dated March 5, 2019, incorporated herein by reference to Exhibit 10.51 to the registrant's Current Report on Form 8-K filed with the SEC on March 8, 2019.
10.18	Billing and Asset Management Agreement by and among CogenOne LLC and the registrant, as amended and restated as of March 5, 2019, incorporated herein by reference to Exhibit 10.52 to the registrant's Current Report on Form 8-K filed with the SEC on March 8, 2019.
10.19	Amended and Restated Billing and Asset Management Agreement by and among CogenTwo LLC and the registrant. dated March 5, 2019, incorporated herein by reference to Exhibit 10.53 to the registrant's Current Report on Form 8-K filed with the SEC on March 8, 2019.
10.20	Letter Agreement dated July 22, 2019, amending Advisory Agreement, dated January 3, 2018, between registrant and John N. Hatsopoulos incorporated herein by reference to Exhibit 10.1 to the registrant's Current Report on Form 8-K filed with the SEC on July 24, 2019.
10.21+	Tecogen Change in Control Severance Benefit Plan, dated July 9, 2020, incorporated herein by reference to Exhibit 99.01 to the registrant's Current Report on Form 8-K filed with the SEC on July 21, 2020.
10.22	Post-Effective Amendment No. 1 to Form S-3 on Form S-1 Registration Statement Under the Securities Act of 1933, filed with the SEC on March 12, 2021, incorporated herein by reference.
10.23+	Tecogen Inc. 2022 Stock Incentive Plan adopted as of March 8, 2022 incorporated herein by reference to Exhibit 10.1 to the registrant's Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.24	Tecogen Inc. Policy Regarding Compensation of Non-Employee Directors filed with the Current Report on Form 8-K filed with the SEC on March 9, 2022.
10.25	Agreement Regarding the Assignment of Certain Maintenance Agreements, the Purchase and Sale of Certain Assets, and Related Matters with Aegis Energy Services LLC, incorporated by reference to Exhibit 99.01 to the registrant's Current Report on Form 8-K filed with the SEC on March 16, 2023.
10.26	Note Subscription Agreement dated October 9, 2023 by John H. Hatsopoulos, incorporated herein by reference to Exhibit 99.01 to the registrant's Current Report on Form 8-K filed with the SEC on October 10, 2023.
10.27	Note Subscription Agreement dated October 9, 2023 by John H. Hatsopoulos, incorporated herein by reference to Exhibit 99.01 to theregistrant's Current Report on Form 8-K filed with the SEC on October 10, 2023.
10.28	Amendment to the Agreement Regarding Assignment of Certain Maintenance Agreements dated as of March 15, 2023 with Aegis Energy Services, LLC, incorporated by reference to Exhibit 99.01 to the registrant's Current Report of Form 8-K filed with the SEC on February 2, 2024.
10.29*	Letter Agreement to the Lease Agreement between King First West Owner LLC, successor-in-interest to Atlantic-Waltham Investment II, LLC and Tecogen Inc., dated March 1, 2024.
10.30*	Letter Agreement to the Note Subscription Agreement by John H. Hatsopoulos, dated March 21, 2024.
21.1	List of subsidiaries incorporated by reference to Exhibit 21.1 to the registrants Post-Effective Amendment No. 1 to Form S-3 on Form S-1 Registration Statement Under the Securities Act of 1933, filed with the SEC on March 12, 2021.
23.1*	Consent of Wolf & Company, P.C.
24.1*	Power of Attorney (included on Signature pages of this Annual Report on Form 10-K)
31.1*	Certification of Chief Executive Officer And Chief Financial Officer pursuant to Rule 13a-14(a) as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1*	Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. 1350 adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase
101.DEF*	XBRL Taxonomy Extension Definition Linkbase
101.LAB*	XBRL Taxonomy Extension Label Linkbase
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase

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* Filed herewith.

\# Confidential Treatment has been granted for portions of this document. The confidential portions were omitted and filed separately, on a confidential basis, with the Securities a Exchange Commission.

\+ Management contract or compensatory plan or agreement.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

TECOGEN INC.
(Registrant)

Dated: March 22, 2024

By: /s/ Abinand Rangesh
Chief Executive and Financial Officer
(Principal Executive and Financial Officer)

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Abinand Rangesh, with the power of substitution and re-substitution, as his or her attorney-in-fact and agent, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K for the year ended December 31, 2023, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming that said attorney-in-fact and agent, or his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Angelina M. Galiteva Angelina M. Galiteva	Director, Chairperson of the Board	March 25, 2024
/s/ John N. Hatsopoulos John N. Hatsopoulos	Lead Director	March 25, 2024
/s/ Abinand Rangesh Abinand Rangesh	Director and Chief Executive and Financial Officer (Principal Executive and Financial Officer)	March 25, 2024
/s/ Ahmed F. Ghoniem Ahmed F. Ghoniem	Director	March 25, 2024
/s/ Earl R. Lewis III Earl R. Lewis III	Director	March 25, 2024
/s/ Susan Hirsch Susan Hirsch	Director	March 25, 2024
/s/ John M. Albertine John M. Albertine	Director	March 25, 2024

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Tecogen Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Tecogen Inc. (the "Company") as of December 31, 2023 and 2022, the related consolidated statements of operations, stockholders' equity, and cash flows, for the years then ended, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2023 and 2022, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing separate opinions on the critical audit matter or on the accounts or disclosures to which it relates.

Contingent consideration and customer contracts

Description of the Matter

As discussed in Notes 5 and 8 to the financial statements, the Company entered into an agreement during the year ended December 31, 2023 to assume certain maintenance agreements and purchase certain assets. The Company's acquisition accounting for the agreement as a business combination required management to estimate the fair value of contingent consideration and customer contracts. The valuation methodologies applied by management include significant unobservable inputs and assumptions based on management judgments.

How We Addressed the Matter in Our Audit

Our audit procedures relating to the valuation of the contingent consideration and customer contracts included, but were not limited to, reading the executed agreement to understand contractual terms and evaluating the methods and significant assumptions used by the Company in its valuation calculations. We obtained the valuation calculations, performed tests of mathematical accuracy and tests over the completeness and accuracy of underlying data supporting significant assumptions and inputs for consistency with contractual terms. We also engaged a valuation specialist to assist in our assessment of methodologies applied by the Company as well as the significant inputs and assumptions critical to the conclusions in the valuations, such as existing contract run-out and renewals, forecasted revenues and cash flows and discount rates applied.

/s/ WOLF & COMPANY, P.C.
PCAOB ID 392
We have served as the Company's auditor since 2014.
Boston, Massachusetts
March 25, 2024

CONSOLIDATED BALANCE SHEETS

As of December 31, 2023 and 2022

ASSETS	2023	2022
Current assets:		
Cash and cash equivalents	$ 1,351,270	$ 1,913,969
Accounts receivable, net	6,735,336	6,714,122
Employee retention credit receivable	46,148	713,269
Unbilled revenue	1,258,532	1,805,330
Inventory, net	10,553,419	10,482,729
Prepaid and other current assets	360,639	401,189
Total current assets	20,305,344	22,030,608
Property, plant and equipment, net	1,162,577	1,407,720
Right of use assets	943,283	1,245,549
Intangible assets, net	2,436,230	997,594
Goodwill	2,743,424	2,406,156
Other assets	201,771	165,230
TOTAL ASSETS	$ 27,792,629	$ 28,252,857
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Related party notes	$ 505,505	$ —
Accounts payable	4,514,415	3,261,952
Accrued expenses	2,504,629	2,384,447
Deferred revenue, current	1,647,206	1,115,627
Lease obligations, current	289,473	687,589
Acquisition liabilities, current	845,363	—
Unfavorable contract liabilities, current	176,207	236,705
Total current liabilities	10,482,798	7,686,320
Long-term liabilities:		
Deferred revenue, net of current portion	369,611	371,823
Lease obligations, net of current portion	683,307	623,452
Acquisition liabilities, net of current portion	1,181,779	—
Unfavorable contract liability, net of current portion	422,839	583,512
Total liabilities	13,140,334	9,265,107
Commitments and contingencies (Note 12)		
Stockholders' equity:		
Tecogen Inc. shareholders' equity:		
Common stock, $0.001 par value; 100,000,000 shares authorized; 24,850,261 and 24,850,261 issued and outstanding at December 31, 2023 and 2022, respectively	24,850	24,850
Additional paid-in capital	57,601,402	57,351,008
Accumulated deficit	(42,879,656)	(38,281,548)
Total Tecogen Inc. stockholders' equity	14,746,596	19,094,310
Noncontrolling interest	(94,301)	(106,560)
Total stockholders' equity	14,652,295	18,987,750
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$ 27,792,629	$ 28,252,857

The accompanying notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENTS OF OPERATIONS
For the Years Ended December 31, 2023 and 2022

	2023	2022
Revenues		
Products	$ 8,859,946	$ 11,156,099
Services	14,523,054	12,060,661
Energy production	1,756,419	1,785,854
Total revenues	25,139,419	25,002,614
Cost of sales		
Products	5,923,096	7,413,320
Services	7,909,202	5,525,493
Energy production	1,105,503	996,990
Total cost of sales	14,937,801	13,935,803
Gross profit	10,201,618	11,066,811
Operating expenses:		
General and administrative	11,880,389	10,909,251
Selling	1,931,037	1,811,085
Research and development	840,011	732,873
Gain on sale of assets	(36,207)	(41,931)
Long-lived asset impairment	—	4,674
Total operating expenses	14,615,230	13,415,952
Loss from operations	(4,413,612)	(2,349,141)
Other income (expense)		
Interest and other income (expense)	(61,003)	(34,713)
Interest expense	(16,050)	(16,255)
Unrealized gain on marketable securities	—	18,749
Total other expense, net	(77,053)	(32,219)
Loss before income taxes	(4,490,665)	(2,381,360)
State income tax provision	32,491	16,352
Consolidated net loss	(4,523,156)	(2,397,712)
Income attributable to the noncontrolling interest	(74,952)	(50,215)
Net loss attributable to Tecogen Inc.	$ (4,598,108)	$ (2,447,927)
Net loss per share - basic	$ (0.19)	$ (0.10)
Weighted average shares outstanding - basic	24,850,261	24,850,261
Net loss per share - diluted	$ (0.19)	$ (0.10)
Weighted average shares outstanding - diluted	24,850,261	24,850,261

The accompanying notes are an integral part of these consolidated financial statements.

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CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
For the Years Ended December 31, 2023 and 2022

	Common Stock Shares	Common Stock $.001 Par Value	Additional Paid-In Capital	Accumulated Deficit	Noncontrolling Interest	Total
Balance at December 31, 2021	24,850,261	$ 24,850	$ 57,016,859	$ (35,833,621)	$ (79,939)	$ 21,128,149
Distributions to noncontrolling interest	—	—	—	—	(76,836)	(76,836
Stock-based compensation	—	—	334,149	—	—	334,149
Net income (loss)	—	—	—	(2,447,927)	50,215	(2,397,712
Balance at December 31, 2022	24,850,261	24,850	57,351,008	(38,281,548)	(106,560)	18,987,750
Distributions to noncontrolling interest	—	—	—	—	(62,693)	(62,693
Stock-based compensation	—	—	250,394	—	—	250,394
Net income (loss)	—	—	—	(4,598,108)	74,952	(4,523,156
Balance at December 31, 2023	24,850,261	$ 24,850	$ 57,601,402	$ (42,879,656)	$ (94,301)	$ 14,652,295

The accompanying notes are an integral part of these consolidated financial statements.

CONSOLIDATED STATEMENTS OF CASH FLOWS
For the Years Ended December 31, 2023 and 2022

	2023	2022
CASH FLOWS FROM OPERATING ACTIVITIES:		
Consolidated loss	$ (4,523,156)	$ (2,397,712)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation, accretion and amortization, net	567,712	428,348
Long-lived asset impairment	—	4,674
Gain on sale of assets	(36,207)	(41,931)
Provision for doubtful accounts receivable	902,432	(70,987)
Provision for litigation	—	150,000
Provision for inventory reserve	402,883	107,000
Unrealized gain on investment securities	—	(18,749)
Stock-based compensation	250,394	334,149
Changes in operating assets and liabilities:		
(Increase) decrease in:		
Accounts receivable	(81,195)	2,401,904
Inventory, net	(82,525)	(2,824,740)
Unbilled revenue	56,994	1,452,860
Prepaid expenses and other current assets	40,550	177,612
Other non-current assets	265,725	625,320
Increase (decrease) in:		
Accounts payable	1,161,416	(246,401)
Accrued expenses	128,869	(109,282)
Deferred revenue	543,842	(678,758)
Other current liabilities	(421,049)	(645,236)
Net cash used in operating activities	(823,315)	(1,351,929)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchases of property and equipment	(46,851)	(314,879)
Proceeds on sale of property and equipment	34,655	72,655
Purchases of intangible assets	—	(29,505)
Payment for business acquisition	(170,000)	—
Distributions to noncontrolling interest	(62,693)	(76,836)
Net used in investing activities	(244,889)	(348,565)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from related party note	505,505	—
Net cash provided by financing activities	505,505	—
Change in cash and cash equivalents	(562,699)	(1,700,494)
Cash and cash equivalents, beginning of the year	1,913,969	3,614,463
Cash and cash equivalents, end of the year	$ 1,351,270	$ 1,913,969

Supplemental disclosure of cash flow information:

	2023	2022
Cash paid for interest	$ 10,926	$ 14,597
Cash paid for taxes	$ 32,491	$ 16,352
Non-cash investing activities		
Vehicles acquired under finance lease	$ 200,187	$ —
Aegis acquisition:		—
Accounts receivable credit	300,000	—
Accounts payable assumed	91,048	—
Contingent consideration	1,256,656	—
Total fair value of non-cash consideration	1,647,704	—

The accompanying notes are an integral part of these consolidated financial statements.

Note 1. Nature of Business and Operations

Tecogen Inc. (together with its subsidiaries "we", "our", "us" or "Tecogen"), a Delaware Corporation, was incorporated on September 15, 2000, and acquired the assets and liabilities of the Tecogen Products division of Thermo Power Corporation. We produce commercial and industrial, natural-gas-fueled engine-driven, combined heat and power (CHP) products that reduce energy costs, decrease greenhouse gas emissions and alleviate congestion on the national power grid. Our products supply electric power or mechanical power for cooling, while heat from the engine is recovered and purposefully used at a facility. The majority of our customers are located in regions with the highest utility rates, typically California, the Midwest and the Northeast.

Our operations are comprised of three business segments. Our Products segment designs, manufactures and sells industrial and commercial cogeneration systems as described above. Our Services segment provides operation and maintenance services to customers for our products. Our Energy Production segment sells energy in the form of electricity, heat, hot water and cooling to our customers under long-term sales agreements.

Liquidity, Going Concern and Management's Plans

The consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles assuming that we will continue as a going concern, which contemplates the realization of assets and the settlement of obligations in the normal course of business. As of December 31, 2023, our cash and cash equivalents were $1,351,270, compared to $1,913,969 at December 31, 2022, a decrease of $562,699. For the year ended December 31, 2023 we used $823,315 in cash from operations and generated net operating losses of $4,413,612, due to due to lower Products sales, a decrease in gross margin due to higher products material costs and the increased provision for obsolete inventory and an increase in operating expenses due primarily to increased bad debt expense and a general increased in other administrative expenses. Working capital at December 31, 2023 was $9,822,546, compared to $14,344,288 at December 31, 2022, a decrease of $4,521,742 and our accumulated deficit was $42,879,656.

As a result of the above factors, management has performed an analysis to evaluate the entity's ability to continue as a going concern for one year after the financial statements issuance date. Management's analysis includes forecasting future revenues, expenditures and cash flows, taking into consideration past performance as well as key initiatives recently undertaken. Our forecasts are dependent on our ability to maintain margins based on the Company's ability to close on new and expanded business, leverage existing working capital, and effectively manage expenses. New and expanded business includes the sale and shipment of newly developed hybrid-drive air-cooled chillers and the acquisition of additional maintenance contracts in February 2024 (see Note 20. "Subsequent Events"). Our backlog at December 31, 2023 was $7,388,145, which is an increase of $666,007 from the December 31, 2022 backlog. We may also be required to borrow funds under note subscription agreements with related parties (see Note 11. "Related Party Notes"). Based on management's analysis, we believe that cash flows from operations and the note agreements will be sufficient to fund operations over the next twelve months. There can, however, be no assurance we will be able to do so. Based on our analysis, the consolidated financial statements do not include any adjustments to the carrying amounts and classification of assets, liabilities, and reported expenses that may be necessary if we were unable to continue as a going concern.

Note 2. Summary of Significant Accounting Policies

Principles of Consolidation and Basis of Presentation

The financial statements have been prepared in accordance with accounting standards set by the Financial Accounting Standards Board, or FASB. The FASB sets generally accepted accounting principles, or GAAP, to ensure financial condition, results of operations, and cash flows are consistently reported. References to GAAP issued by the FASB in these footnotes are to the FASB Accounting Standards Codification, or ASC. We adopted the presentation requirements for noncontrolling interests required by ASC 810 Consolidation. Under ASC 810, earnings or losses attributed to the noncontrolling interests are reported as part of the consolidated earnings and not a separate component of income or expense.

The accompanying consolidated financial statements include our accounts and the accounts of the entities in which we have a controlling financial interest. Those entities include our wholly-owned subsidiary, American DG Energy Inc. ("ADGE"), Tecogen CHP Solutions, Inc., and a joint venture, American DG New York, LLC, or ADGNY, in which ADGE holds a 51.0% interest. As the controlling partner, all major decisions in respect of ADGNY are made by ADGE in accordance with the joint venture agreement. The interests in the individual underlying energy system projects in ADGNY vary between ADGE and its joint venture partner. The noncontrolling interest and distributions are determined based on economic ownership. The economic ownership is calculated by the amount invested by us and the noncontrolling partner in each site. Each quarter, we calculate a year-to-date profit/loss for each site that is part of ADGNY and the noncontrolling interest percent of economic ownership in each site is applied to determine the noncontrolling interest share in the profit/loss. The same methodology is used to determine quarterly distributions of available cash to the noncontrolling interest partner. On our balance sheet, noncontrolling interest represents the joint venture partner's investment in ADGNY, plus its share of after-tax profits less any cash distributions. ADGE owned a controlling 51.0% legal and economic interest in ADGNY as of December 31, 2023.

Investments in partnerships and companies in which we do not have a controlling financial interest but where we have significant influence, if any, are accounted for under the equity method.

Noncontrolling interests in the net assets and operations of ADGNY are reflected in the caption "Noncontrolling interest" in the accompanying consolidated financial statements. All intercompany transactions have been eliminated.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Employee Retention Credit

On March 27, 2020, the Coronavirus Aid, Relief, and Economic Security Act ("CARES Act") was signed into law providing numerous tax provisions and other stimulus measures, including an employee retention credit ("ERC"), which is a refundable tax credit against certain employment taxes. The Taxpayer Certainty and Disaster Tax Relief Act of 2020 and the American Rescue Plan Act of 2021 extended and expanded the availability of the ERC.

We qualified for the ERC in the first, second and third quarters of 2021 because our gross receipts decreased by more than 20% from the first, second and third quarters of 2019. As a result of averaging 100 or fewer full-time employees in 2019, all wages paid to employees in the first, second and third quarters of 2021, excluding the wages that were applied to the Paycheck Protection Loan Second Draw, were eligible for the ERC. Wages used towards PPP loan forgiveness cannot be used as qualified wages for purposes of the ERC.

During the three months ended June 30, 2021, we recorded an ERC benefit for the first and second quarters of 2021 of $713,269 and, in the three months ended September 30, 2021 we recorded an ERC benefit for the third quarter of 2021 of $562,752, respectively, in other income (expense), net in the our condensed consolidated statements of operations. A current receivable in the amount of $46,148 is included in our condensed consolidated balance sheet as of December 31, 2023. We have collected all of the other ERC benefits.

Concentration of Credit Risk

Financial instruments that expose us to concentrations of credit risk consist primarily of cash and cash equivalents and accounts receivable. We maintain our cash balances in bank accounts, which at times may exceed the Federal Deposit Insurance Corporation's general deposit insurance limits. The amount on deposit at December 31, 2023 and 2022 which exceeded the $250,000 federally insured limit were approximately $1,009,094 and $1,393,823, respectively. We have not experienced any losses in such accounts and thus believe that we are not exposed to any significant credit risk on cash.

There was no customer who represented 10% of revenues for the years ended December 31, 2023 and December 31, 2022. There was one customer who represented 14% of the accounts receivable balance as of December 31, 2023, and one customers who represented 15% of the accounts receivable balance as of December 31, 2022.

Cash and Cash Equivalents

We consider all highly liquid instruments with an original maturity date of three months or less when purchased to be cash and cash equivalents. We have cash balances in certain financial institutions in amounts which occasionally exceed current federal deposit insurance limits. The financial stability of these institutions is continually reviewed by senior management. We believe that we are not exposed to any significant credit risk on cash and cash equivalents.

Accounts Receivable

On January 1, 2023, we adopted ASU 2016-13, *Financial Instruments, Credit Losses (Topic 326)*. Accounts receivable are stated at the amount management expects to collect from outstanding balances. The allowance for credit losses is estimated based on historical experience, aging of the receivable, the counterparty's ability to pay, condition of general economy and industry, and combined with management's estimate of current conditions, reasonable and supportable forecasts of future losses to determine estimated credit losses in our evaluation of outstanding accounts receivable at the end of the year. . The allowance for credit losses reflects managements evaluation of our outstanding accounts receivable at the end of the year and our best estimate of probable losses inherent in the accounts receivable balance. Accounts receivable deemed uncollectible are charged against the allowance for credit losses when identified. Our bad debt expense increased to $902,432 in the year ended December 31, 2023, compared to a benefit of $70,987 in the year ended December 31, 2022, due to the write down of certain install receivables which were deemed uncollectible in the year ended December 31, 2023. At December 31, 2023 and 2022, the allowance for credit losses was $149,922 and $361,197, respectively.

Inventory

Raw materials, work in process, and finished goods inventories are stated at the lower of cost, as determined by the average cost method, or net realizable value. We periodically review inventory quantities on hand for excess and/or obsolete inventory based primarily on historical usage, as well as based on estimated forecast of product demand and anticipated usage. Any reserves that result from this review are charged to cost of sales.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost. Depreciation is provided using the straight-line method over the estimated useful life of the asset, which range from three to fifteen years. Leasehold improvements are amortized using the straight-line method over the lesser of the estimated useful lives of the assets or the term of the related leases. Expenditures for maintenance and repairs are expensed, while renewals and betterments that materially extend the life of an asset are capitalized.

We review our property, plant and equipment for potential impairment whenever events or changes in business circumstances indicate that the carrying value of the assets may not be fully recoverable or that the useful lives of the assets are no longer appropriate. We evaluate the recoverability of our long-lived assets when impairment is indicated by comparing the net book value of the asset group to the estimated future undiscounted cash flows attributable to such assets. If the sum of the projected undiscounted cash flows (excluding interest charges) is less than the carrying value of the assets, the assets will be written down to the estimated fair value and such loss is recognized in income from continuing operations in the period in which the determination is made. If impairment is indicated, the asset is written down to its estimated fair value.

Intangible Assets

Intangible assets subject to amortization include costs incurred by us to acquire product certifications, certain patent costs, developed technologies, and customer contracts. These costs are amortized on a straight-line basis over the estimated economic life of the intangible asset. Indefinite life intangible assets such as trademarks are recorded at cost and not amortized.

The favorable contract asset which relates to existing ADGE customer contracts is more fully described in Note 8. "Intangible Assets and Liabilities other than Goodwill". Customer contracts are more fully described in Note 5. "Aegis Contract and Related Asset Acquisition".

Impairment of Long-lived Assets

Long-lived assets, including intangible assets and property, plant and equipment, are evaluated for impairment whenever events or changes in circumstances have indicated that an asset may not be recoverable and are grouped with other assets to the lowest level for which identifiable cash flows are largely independent of the cash flows of other groups of assets and liabilities. If the sum of the projected undiscounted cash flows (excluding interest charges) is less than the carrying value of the assets, the assets will be written down to the estimated fair value and such loss is recognized in income from continuing operations in the period in which the determination is made. Management determined that an impairment of $4,674 of long-lived assets existed as of December 31, 2022, respectively.

For the year ended December 31, 2022, we recorded impairment of long-lived assets as follows:

Year Ended		**December 31, 2022**
Energy production asset impairment (1)	$	156,655
Energy production reversal of unfavorable contract liability (2)		(151,981)
Long-lived asset impairment	$	4,674
(1) - See Note 9 "Property, Plant and Equipment"		
(2) - See Note 8 "Intangible Assets and Liabilities Other Than Goodwill"		

Business Combinations

In accordance with applicable accounting standards, we estimate the fair value of assets acquired and liabilities assumed as of the acquisition date of each business combination. Any excess purchase price over the fair value of the net tangible and intangible assets acquired is allocated to goodwill. We may make certain estimates and assumptions when determining the fair values of assets acquired and liabilities assumed, including intangible assets. Critical estimates in valuing certain intangible assets include but are not limited to future expected cash flows from energy production sites or customer maintenance contracts, estimated operating costs, as well as discount rates. At the acquisition date, we will also record acquisition related liabilities, if applicable, for any contingent consideration or deferred payments to the seller. Contingent consideration is recorded at fair value on the acquisition date based on our expectation of achieving the contractually defined revenue targets. The fair value of the contingent consideration liabilities is remeasured each reporting period after the acquisition date and any changes in the estimated fair value are reflected as gains or losses in general and administrative expense in the consolidated statement of operations. Contingent consideration liabilities and deferred payments to sellers are recorded as current liabilities and other long-term liabilities in the consolidated balance sheets based on the expected timing of settlement.

Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates. Any changes to provisional amounts identified during the measurement period are recognized in the reporting period in which the adjustment amounts are determined. Transaction costs associated with business combinations are expensed as incurred.

Goodwill

Goodwill is the excess of the fair value of consideration paid for businesses over the fair value of the identifiable net assets acquired. Impairment testing for goodwill is performed annually, generally in the fourth fiscal quarter, or more frequently if impairment indicators are present.

To determine if goodwill is potentially impaired, we have the option to perform a qualitative assessment. However, we may elect to bypass the qualitative assessment and perform an impairment test even if no indications of a potential impairment exist. The impairment test for goodwill is performed at the reporting unit level and compares the fair value of the reporting unit (calculated using a discounted cash flow method) to its carrying value, including goodwill. The discount rate represents our estimate of the weighted-average cost of capital, or expected return, that a marketplace participant would have required as of the valuation date. If the carrying value exceeds the fair value, an impairment charge is recorded for the excess carrying value over fair value, limited to the total amount of goodwill of that reporting unit. Our assessment in 2023 indicated that the carrying value of our energy production reporting unit and the Aegis maintenance contracts did not exceed their fair value and therefore goodwill was not impaired. (see Note 10."Goodwill").

We adopted the provisions of ASU 2017-04, during 2018, which simplified the impairment testing process by eliminating the requirement to determine the implied fair value of goodwill. We test goodwill for impairment on either a qualitative basis under certain conditions, or a quantitative basis. On a quantitative basis, fair value of the reporting units is primarily determined using a probability weighted discounted cash flow analysis.

Leases

On January 1, 2019, we adopted the guidance under ASU No. 2016-02, "Leases" ("ASC 842"). ASC 842 requires lessees to recognize most leases on their balance sheets as a right-of-use ("ROU") asset with a corresponding lease liability. ROU assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Lease ROU assets and liabilities are recognized at lease commencement date based on the present value of lease payments over the expected lease term. See Note 14."Leases".

Income (loss) per Common Share

We compute basic income (loss) per share by dividing net income (loss) for the period by the weighted-average number of shares of common stock outstanding during the period. We compute our diluted earnings per common share using the treasury stock method. For purposes of calculating diluted earnings per share, we consider our shares issuable in connection with the convertible debentures, stock options and warrants to be dilutive common stock equivalents when the exercise/conversion price is less than the average market price of our common stock for the period.

Segment Information

Our operations are comprised of three business segments. Our Products segment designs, manufactures and sells industrial and commercial cogeneration systems as described above. Our Services segment installs and maintains our cogeneration systems. Our Energy Production segment sells energy in the form of electricity, heat, hot water and cooling to our customers under long-term sales agreements.

Income Taxes

We use the asset and liability method of accounting for income taxes. The current or deferred tax consequences of transactions are measured by applying the provisions of enacted tax laws to determine the amount of taxes payable currently or in future years. Deferred tax assets and liabilities are determined based on the difference between the financial statement and tax bases of assets and liabilities and expected future tax consequences of events that have been included in the financial statements or tax returns using enacted tax rates in effect for the years in which the differences are expected to reverse. Under this method, a valuation allowance is used to offset deferred taxes if, based upon the available evidence, it is more likely than not that some or all of the deferred tax assets may not be realized. Management evaluates the recoverability of deferred taxes and the adequacy of the valuation allowance annually.

We have adopted the provisions of the accounting standards relative to accounting for uncertainties in tax positions. These provisions provide guidance on the recognition, derecognition and measurement of potential tax benefits associated with tax positions. We elected to recognize interest and penalties related to income tax matters as a component of income tax expense in the statements of operations. We have analyzed our current tax return compliance positions and determined that no uncertain tax positions have been taken that would require recognition.

With few exceptions, we are no longer subject to possible income tax examinations by federal, state or local taxing authorities for tax years before 2020, with the exception of loss carryforwards in the event they are utilized in future years. Our tax returns are open to adjustment from 2002 forward, as a result of the fact that the we have loss carryforwards from those years, which may be adjusted in the year those losses are utilized.

Fair Value of Financial Instruments

Our financial instruments are cash and cash equivalents, accounts receivable, available-for-sale securities and accounts payable. The recorded values of cash and cash equivalents, accounts receivable and accounts payable approximate their fair values based on their short-term nature. See Note 16. "Fair Value Measurements".

Revenue Recognition

Revenue is recognized when performance obligations under the terms of a contract with our customer are satisfied; generally, this occurs with the transfer of control of our products, services and energy production. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services or energy to customers.

Shipping and handling fees billed to customers in a sales transaction are recorded in revenue and shipping and handling costs incurred are recorded in general and administrative expenses. For the years ended December 31, 2023 and 2022, $427,880 and $563,482 of shipping and handling costs were included in general and administrative expenses in the accompanying consolidated statements of operations, respectively. We elected to exclude from revenue any value-add sales and other taxes which we collect concurrent with revenue-producing activities. These accounting policy elections are consistent with the manner in which we have historically recorded shipping and handling fees and taxes. Incremental costs incurred by us in obtaining a contract with a customer are negligible, if any, and are expensed ratably in proportion to the related revenue recognized.

Advertising Costs

We expense the costs of advertising as incurred. For the years ended December 31, 2023 and 2022, advertising expense was approximately $79,000 and $51,000, respectively.

Research and Development Costs

Research and development expenditures are expensed as incurred. Our total research and development expenditures were approximately $840,000 and $733,000 for the years ended December 31, 2023 and 2022, respectively.

Stock-Based Compensation

Stock-based compensation cost is measured at the grant date, based on the estimated fair value of the award, and is recognized as an expense in the statements of operations over the requisite service period.

The determination of the fair value of share-based payment awards is affected by our stock price. For the awards issued prior to our being publicly traded, we considered the sales price of the Common Stock in private placements to unrelated third parties as a measure of the fair value of its Common Stock.

We utilize actual forfeitures when calculating the expense for the period. Stock-based compensation expense recognized is based on awards that are ultimately expected to vest. We evaluate the assumptions used to value awards regularly and if factors change and different assumptions are employed, stock-based compensation expense may differ significantly from what has been recorded in the past. If there are any modifications or cancellations of the underlying unvested securities, we may be required to accelerate, increase or cancel any remaining unearned stock-based compensation expense.

See Note 15."Stockholders' Equity" for a summary of the restricted stock and stock option activity under our stock-based employee compensation plan for the years ended December 31, 2023 and 2022.

Disaggregated Revenue

In general, our business segmentation are aligned according to the nature and economic characteristics of our products and customer relationships and provides meaningful disaggregation of each business segment's results of operations.

The following table further disaggregates our revenue by major source by segment for the years ended December 31, 2023 and 2022.

	Years Ended	
	December 31, 2023	December 31, 2022
Products:		
Cogeneration	$ 2,761,667	$ 5,279,569
Chiller	5,303,978	5,034,633
Engineered Accessories	794,301	841,897
Total Products Revenue	8,859,946	11,156,099
Services	14,523,054	12,060,661
Energy production	1,756,419	1,785,854
Total revenue	$ 25,139,419	$ 25,002,614

Products Segment

Products. Our Product revenues include cogeneration systems that supply electricity and hot water, chillers that provide air-conditioning and hot water and engineered accessories, which consist of ancillary products and parts necessary to install a cogeneration unit including integration into the customers' existing electrical and mechanical systems. We refer to the package of engineered accessories and engineering and design services necessary for the customers' installation of a cogeneration unit as light installation services.

We transfer control and generally recognize a sale when we ship a product from our manufacturing facility at which point the customer takes ownership of the product. Payment terms on product sales are generally 30 days.

We recognize revenue in certain circumstances before delivery to the customer has occurred (commonly referred to as bill and hold transactions). We recognize revenue related to such transactions once, among other things, the customer has made a written fixed commitment to purchase the product(s) under normal billing and credit terms, the customer has requested the product(s) be held for future delivery as scheduled and designated by them, risk of ownership has been assumed by the customer, and the product(s) are tagged as sold and segregated for storage awaiting further direction from the customer. Due to the infrequent nature and duration of bill and hold arrangements, the value associated with custodial storage services is deemed immaterial in the context of the contract and in total, and accordingly, none of the transaction price is allocated to such service.

Depending on the product and terms of the arrangement, we may defer the recognition of a portion of the transaction price received because we have to satisfy a future obligation (e.g., product start-up service). Amounts allocated to product start-up services are recognized as revenue when the start-up service has been completed. We use an observable selling price to determine standalone selling prices where available and either a combination of an adjusted market assessment approach, an expected cost plus a margin approach, and/or a residual approach to determine the standalone selling prices for separate performance obligations as a basis for allocating contract consideration when an observable selling price is not available. Amounts received but not recognized pending completion of performance are recognized as contract liabilities and are recorded as deferred revenue along with deposits by customers.

Services Segment

Maintenance Services. Maintenance services are provided under either long-term maintenance contracts or time and material maintenance contracts. Revenue under time and material maintenance contracts is recognized when the maintenance service is completed. Revenue under long-term maintenance contracts is recognized either ratably over the term of the contract where the contract price is fixed or when the periodic maintenance activities are completed and the invoiced cost to the customer is based on run hours or kilowatts produced in a given period. We use an output method to measure progress towards completion of our performance obligation which results in the recognition of revenue on the basis of a direct measurement of the value to the customer of the services transferred to date relative to the remaining services promised under the contract. We use the practical expedient at ASC 606-10-55-18 of recognizing revenue in an amount equal to the amount we have the right to invoice the customer under the contract.

Our acquisition of the Aegis maintenance contracts and related business closed on March 15, 2023 and since April 1, 2023, revenues resulting from the Aegis acquisition have been included in our revenue from the Services segment.. Payment terms for maintenance services are generally 30 days.

Installation Services. Prior to January 1, 2023, we provided installation services which included all necessary engineering and design, labor, subcontract labor and service to install a cogeneration unit including integration into the customers' existing electrical and mechanical systems. Since January 1, 2023, we have not provided material installation services and do not expect to provide material installation services going forward.

Energy Production Segment

Energy Production. Revenue from energy contracts is recognized when electricity, heat, hot and/or chilled water is produced by our owned on-site cogeneration systems. Each month we bill the customer and recognize revenue for the various forms of energy delivered, based on meter readings which capture the quantity of the various forms of energy delivered in a given month, under a contractually defined formula which takes into account the current month's cost of energy from the local power utility.

As the various forms of energy delivered by us under energy production contracts are simultaneously delivered and consumed by the customer, our performance obligation under these contracts is considered to be satisfied over time. We use an output method to measure progress towards completion of our performance obligation which results in the recognition of revenue on the basis of a direct measurement of the value to the customer of the services transferred to date relative to the remaining services promised under the contract. We use the practical expedient at ASC 606-10-55-18 of recognizing revenue in an amount equal to that amount to which we have the right to invoice the customer under the contract. Payment terms on invoices under these contracts are generally 30 days.

Contract Balances

The timing of revenue recognition, billings and cash collections result in billed accounts receivable, unbilled revenue (contract assets) and deferred revenue, consisting of customer deposits and billings in excess of revenue recognized (contract liabilities) on the consolidated balance sheets.

We did not recognize any revenue during the year ended December 31, 2023 that was included in unbilled revenue as of December 31, 2023. Approximately $16,428 of revenue was billed in this period that had been recognized in previous periods.

Revenue recognized during the year ended December 31, 2023 that was included in deferred revenue at the beginning of the period was $837,571.

Remaining Performance Obligations

Remaining performance obligations related to ASC 606 represent the aggregate transaction price allocated to performance obligations with an original contract term greater than one year, excluding certain maintenance contracts and all energy production contracts where a direct measurement of the value to the customer is used as a method of measuring progress towards completion of our performance obligation. Exclusion of these remaining performance obligations is due in part to the inability to quantify values based on unknown future levels of delivery and in some cases rates used to bill customers. Remaining performance obligations therefore consist of unsatisfied or partially satisfied performance obligations related to fixed price maintenance contracts and installation contracts.

As of December 31, 2023, the aggregate amount of the transaction price allocated to remaining unsatisfied performance obligations was approximately $2,016,817. We expect to recognize revenue of approximately 95% of the remaining performance obligations over the next 24 months, 13% recognized in the first 12 months and 82% recognized over the subsequent 12 months, and the remainder recognized thereafter.

Significant New Accounting Standards Adopted this Period

New accounting standards adopted in the year ended December 31, 2023.

Financial Instruments, Credit Losses (Topic 326). In June 2016, the Financial Accounting Standards Board issued ASU No. 2016-13, *Financial Instruments, Credit Losses (Topic 326)*, which was subsequently amended by ASUs 2018-19, 2019-04, 2019-05, 2019-11, and 2020-03. Topic 326 replaces the existing incurred loss impairment model with a methodology that incorporates all expected credit loss estimates, resulting in more timely recognition of losses. Under Topic 326, we are required to measure all expected credit losses for financial assets held at the reporting date based on historical experience, current conditions, and reasonable and supportable forecasts that affect the collectability of the reported financial assets. It also requires credit losses related to available-for-sale debt securities to be recorded through an allowance for credit losses. We adopted Topic 326 on January 1, 2023 on a modified retrospective basis. The adoption did not have a material effect on our consolidated financial statements.

Recently Issued Accounting Pronouncements

Segment Reporting (Topic 280) - Improvements to Reportable Segment Disclosures. In November 2023, the Financial Accounting Standards Board issued ASU 2023-07, *Segment Reporting (Topic 280) - Improvements to Reportable Segment Disclosures*. The new standard requires enhanced disclosures about a public entity's reportable segments including more detailed information about a reportable segment's expenses. The amendments in this update apply to all public entities that are required to report segment information, and include those entities that have a single reportable segment. The amendments in this update are effective for fiscal years beginning after December 15, 2023, and interim periods within fiscal years beginning after December 15, 2024. Early adoption is permitted. We are currently evaluating the impact on our consolidated financial statements and related disclosures.

Income Taxes (Topic 740) - Improvements to Income Tax Disclosures. In December 2023, the Financial Accounting Standards Board issued ASU 2023-09,*Income Taxes (Topic 740) - Improvements to Income Tax Disclosures*. ASU 2023-09 provides more transparency about income tax information through improvements to income tax disclosures primarily related to the rate reconciliation and income taxes paid information. The amendments in this update are effective for annual periods beginning after December 15, 2024. Early adoption is permitted. We are is currently evaluating the impact on our consolidated financial statements and related disclosures.

Note 3. Income (loss) per Common Share:

Basic and diluted loss per common share for the years endedDecember 31, 2023 and 2022, respectively, was as follows:

	Years Ended	
	December 31, 2023	December 31, 2022
Numerator:		
Net loss attributable to stockholders	$ (4,598,108)	$ (2,447,927)
Denominator:		
Weighted average shares outstanding - Basic	24,850,261	24,850,261
Effect of dilutive securities:		
Stock options	—	—
Weighted average shares outstanding - Diluted	24,850,261	24,850,261
Basic loss per share	$ (0.19)	$ (0.10)
Diluted loss per share	$ (0.19)	$ (0.10)
Anti-dilutive shares underlying stock options outstanding	1,757,676	915,201

Note 4. Acquisition of American DG Energy Inc.

On May 18, 2017, we completed our acquisition, by means of a stock-for-stock merger, of100% of the outstanding common shares of American DG Energy Inc. (“American DG Energy" or "ADGE”), a company which installed, owned, operated and maintained complete distributed generation of electricity systems, or DG systems or energy systems, and other complementary systems at customer sites and sells electricity, hot water, heat and cooling energy under long-term contracts at prices guaranteed to the customer to be below conventional utility rates, by means of a merger of one of our wholly owned subsidiaries with and into ADGE such that ADGE became a wholly owned subsidiary of Tecogen. We acquired ADGE to, among other reasons, expand our product offerings and benefit directly from the long-term contracted revenue streams generated by these installations. We gained control of ADGE on May 18, 2017 by issuing shares of our Common Stock to the prior stockholders of ADGE.

Goodwill of $13.3 million arising from the acquisition is primarily attributable to the going concern element of ADGE’s business, including its assembled workforce and the long-term contractual nature of its business, as well as expected cost synergies from the merger related primarily to the elimination of administrative overhead and duplicative personnel. None of the goodwill recognized is expected to be deductible for income tax purposes.

The favorable contract asset and the unfavorable contract liability, both of which relate to existing customer contracts, and the estimated amortization are more fully described in Note 8. "Intangible Assets and Liabilities other than Goodwill".

Note 5. Aegis Contract and Related Asset Acquisition

On March 15, 2023, we entered into an agreement ("Agreement") with Aegis Energy Services, LLC (“Aegis”) pursuant to which Aegis agreed to assign to us and we agreed to assume certain Aegis maintenance agreements, we agreed to purchase certain assets from Aegis, and related matters (“Acquisition”). On April 1, 2023, the Acquisition closed. Under the Agreement, we agreed to acquire from Aegis and assume Aegis’ rights and obligations arising on or after April 1, 2023, under maintenance agreements pursuant to which Aegis provided maintenance services to third parties for approximately 200 cogeneration systems and we agreed to acquire from Aegis certain vehicles and inventory used by Aegis in connection with the performance of its maintenance services. At closing, we acquired eight (8) Aegis vehicles for consideration consisting of $170,000 in cash. Also, we issued credits against outstanding accounts receivable due from Aegis in the amount of $300,000 for the acquisition of inventory that Aegis used to provide maintenance services. At closing, we hired eight (8) Aegis employees who, following the closing, have agreed to continue to provide maintenance services relating to the cogeneration systems covered by the maintenance agreements assumed pursuant to the Agreement. Following the closing and for a period of up to seven (7) years, we agreed to pay Aegis a percentage of the revenue collected for maintenance services provided pursuant to the maintenance agreements acquired from Aegis. Further, prior to December 31, 2023, we have the right to acquire and assume additional Aegis' maintenance agreements for cogeneration systems on substantially similar terms and conditions. The Agreement contained certain indemnification provisions and agreements on the part of Aegis and for each party to cooperate with each other and provide certain transitional assistance. We acquired the Aegis maintenance agreements to expand our Service portfolio and to benefit from the long-term contract revenue stream generated by these agreements.

On February 1, 2024, Tecogen and Aegis amended the Agreement to add eighteen (18) additional maintenance contracts (the "Amendment"). The Amendment includes an undertaking by Aegis to use commercially reasonable efforts to support and assist our execution of maintenance service agreements for an additional thirty-six (36) cogeneration units sold to customers by Aegis.

We have determined that the assignment and assumption of the Aegis maintenance agreements, in combination with the related asset acquisition and the retention of the former Aegis employees, constitutes a business and should be accounted for as a business combination under the acquisition method. As of the acquisition date, we recognized, separately from goodwill, the identifiable assets acquired and the liabilities assumed, at fair value.

We have included the financial results of the Aegis maintenance agreements in our consolidated financial statements from April 1, 2023, the closing or acquisition date.

The following table summarizes the consideration paid for the Aegis acquisition and the fair value of assets acquired and contract-related liabilities assumed as the acquisition date:

Consideration Paid:		
Cash	$	170,000
Accounts receivable credit issued		300,000
Account payable due to Aegis		91,048
Contingent consideration		1,256,656
Total fair value of consideration transferred		1,817,704
Identifiable assets acquired and liabilities assumed:		
Assets acquired		
Property, plant and equipment		170,000
Inventory		391,048
Identifiable intangible asset - customer contracts		1,772,659
		2,333,707
Acquired contract-related liabilities assumed		
Deferred maintenance reserve		(853,271)
Net identifiable assets acquired		1,480,436
Excess of cost over fair value of net assets acquired (Goodwill)	$	337,268

The amounts initially recognized for inventory, identifiable intangible assets, contingent consideration and deferred maintenance reserves we provisional pending completion of the necessary valuations and analysis. ASC 805 establishes a measurement period to provide companies with a reasonable amount of time to obtain the information necessary to identify and measure various items in a business combination and cannot extend beyond one year from the acquisition date. As of December 31, 2023, we have completed our analysis and valuation are have recorded the following adjustments to the initial valuations:

- decreased accounts payable assumed and inventory acquired by $20,130, which had no impact on goodwill balance;

- decreased contingent consideration by $185,805 due to assigned sites which had ceased operations, as of our prior to the acquisition date, and due to customers who declined the assignment of the maintenance contract. We also amended our discount rate assumption which reduced future cash flows;
- increased identifiable intangible assets by $181,333 due to the addition of contract run out periods; and,
- the excess of cost over fair value of net assets acquired decreased $385,723.

The fair value of the identifiable intangible asset was estimated using the income approach. The excess cash flow was discounted to present value using an appropriate rate of return to estimate the market value of the customer identifiable intangible asset and the risks associated with the future revenue forecasts due to potential changes in customer energy requirements or changes in the economic viability of these CHP sites which depend on the spread between natural gas fuel and electricity prices, all of which are not within our control. Key assumptions to value the customer identifiable intangible asset included the discount rate of 15%, profitability assumptions, revenue assumptions, and anticipated existing contract run out were the material assumptions utilized in the discounted cash flow model used to estimate fair value. The discount rate reflects an estimate of our weighted-average cost of capital.

On the date of acquisition, the fair value of the contingent consideration and the deferred maintenance reserve were calculated under the income approach using a weighted average cost of capital of 15%, discounting the future cash flows to present value and are subsequently remeasured to fair value at each reporting date until the fair value contingencies are resolved. Fair value adjustments which may be determined at subsequent reporting dates will be recorded in our consolidated statements of operations and will not impact the goodwill balance. At December 31, 2023, we remeasured the contingent consideration and deferred maintenance reserves, however no adjustment was recorded given the probability of achieving the revenue estimates and deferred maintenance costs were consistent with our initial valuation.

The contingent consideration is payable within forty-five (45) days following the end of each calendar quarter through the earlier of the expiration or termination of the relevant maintenance agreements, or the seventh (7th) anniversary of the acquisition date. The consideration is equal to the product of the revenues collected in a calendar quarter multiplied by an applicable percentage. The agreement stipulates quarterly aggregate revenue targets and an applicable percentage, and provides for a higher applicable percentage if revenues exceed the target revenues. The applicable percentage ranges from 5% to 10% over the agreement term. The deferred maintenance reserve represents costs, which are expected to be incurred over a three-year period from the date of acquisition, to repair customer equipment that had not been properly maintained prior to our acquisition of the maintenance service agreements.

Revenues and gross profit from the Aegis maintenance contracts since the acquisition date were $1,884,891 and $1,167,225, respectively, for the year December 31, 2023 and are included in our Services segment. For the year December 31, 2023, the contingent consideration payable to Aegis amounted to $94,245, of which $61,275 was paid in 2023 and the balance was paid in mid-February 2024. We unable to provide the pro forma information required under ASC 805-10-50-2(h) as the disclosure is impracticable since the required pre-acquisition historical information could not be obtained from the acquiree.

The purchase price of the acquisition was allocated to the tangible and intangible assets acquired and liabilities assumed and recognized at their fair value based on widely accepted valuation techniques in accordance with ASC 820, "Fair Value Measurement," as of the acquisition date. The process for estimating fair value requires the use of significant assumptions and estimates of future cash flows and developing appropriate discount rates. The excess of the purchase price over fair value of the net identified assets acquired and liabilities assumed was recorded as goodwill. Goodwill is primarily attributable to the going concern element of the Aegis business, including its assembled workforce and the long-term nature of the customer maintenance agreements, as well as anticipated cost synergies due primarily to the elimination of administrative overhead. Goodwill resulting from the Aegis acquisition is not expected to be deductible for income tax purposes.

Acquisition-related costs which consisted on recurring internal resources were de minimus and such costs were expensed as incurred (ASC 805-50-30-1).

The following table summarizes the contract-related liabilities assumed as of December 31, 2023:

		December 31, 2023
Acquisition liabilities, current		
Contingent consideration	$	200,639
Deferred maintenance reserve		644,724
		845,363
Acquisition liabilities, long-term		
Contingent consideration		994,743
Deferred maintenance reserve		187,036
	$	1,181,779

Note 6 . Sale of Energy Producing Assets and Goodwill Impairment

During the first quarter of 2019, we sold certain energy producing assets, including the associated energy production contracts for total consideration of $7 million.

In connection with the asset sales, we entered into agreements with the purchaser to maintain and operate the assets over the remaining periods of the associated energy production contracts (through August 2033 and January 2034, respectively) in exchange for monthly fees for both maintenance and operation. These agreements contain provisions whereby we have guaranteed to the purchaser a minimum level or threshold of cash flows from the associated energy production contracts. Actual results are compared to the minimum threshold bi-annually and we reimburse any shortfall to the purchaser. To the extent actual results are in excess of the minimum threshold, we are entitled to fifty percent of such excess under the agreements. We received excess payments in both the years ended December 31, 2023 and 2022. For the year ended December 31, 2023, we recognized $25,633 of revenue representing our share of the excess cash flows under the energy production contacts, the current receivable which is included in our consolidated balance sheet as of December 31, 2023.

The foregoing agreements also contain provisions whereby we have agreed to make whole the purchaser in the event the counterparty to the energy production contract(s) defaults on or otherwise terminates before the stated expiration of the energy production contract. Should we be required to make whole the purchaser under such provisions, we would be entitled to seek recovery from the counterparty to the energy production contract(s) under a similar provision contained in those contracts in respect of early termination. We did not recognize any counterparty contract default costs in the years ended December 31, 2023 and 2022.

We are also responsible under the agreements for site decommissioning costs, if any, in excess of certain threshold amounts by site. Decommissioning of site assets is performed when, if and as requested by the counterparty to the energy production contract upon termination of the energy production contract. We did not recognize any site decommissioning costs in the years ended December 31, 2023 and 2022 .

Note 7. Inventory, net

Inventory at December 31, 2023 and 2022 consisted of the following.

		2023		2022
Raw materials, net		8,803,054		9,001,491
Work-in-process		798,522		498,139
Finished goods, net		951,843		983,099
	$	10,553,419	$	10,482,729

Note 8. Intangible Assets and Liabilities Other Than Goodwill

During the year ended December 31, 2022 we capitalized $11,615 of product certification costs and $17,890 of patent-related costs. Also included in intangible assets are legal costs incurred by us to obtain patents for our intellectual property. These patents, once they are placed in service, are amortized on a straight-line basis over the estimated economic life of the associated product, which ranges from approximately 7-10 years. We did not capitalize any cost incurred for product certification costs, patent-related costs or trademarks during the year ended December 31, 2023.

Intangible assets and liabilities at December 31, 2023 and 2022 consist of the following:

	December 31, 2023			December 31, 2022		
Intangible assets	**Cost**	**Accumulated Amortization**	**Net**	**Cost**	**Accumulated Amortization**	**Net**
Product certifications	$ 777,465	$ (658,676)	$ 118,789	$ 777,465	$ (584,863)	$ 192,602
Patents	888,910	(496,807)	392,103	888,910	(405,140)	483,770
Developed technology	240,000	(172,000)	68,000	240,000	(156,000)	84,000
Trademarks	26,896	—	26,896	26,896	—	26,896
In process R&D	263,936	(103,689)	160,247	263,936	(65,984)	197,952
Favorable contract assets	384,465	(376,139)	8,326	384,465	(372,091)	12,374
Customer contract	$ 1,772,659	$ (110,791)	1,661,868	$ —	$ —	—
	$ 4,354,331	$ (1,918,102)	$ 2,436,229	$ 2,581,672	$ (1,584,078)	$ 997,594
Intangible liability						
Unfavorable contract liability	$ 2,618,168	$ (2,019,122)	$ 599,046	$ 2,618,168	$ (1,797,951)	$ 820,217

The aggregate amortization expense related to intangible assets and liabilities exclusive of unfavorable contract related intangibles was $333,676 and $201,043 during the years ended December 31, 2023 and 2022, respectively. The net credit to cost of sales related to the amortization of the contract related intangible asset and liability for the years ended December 31, 2023 and 2022 was $220,823 and $274,112, respectively.

Contract Asset and Liability

The favorable contract asset and unfavorable contract liability in the foregoing table represent the fair value of ADGE's customer contracts (both positive for favorable contracts and negative for unfavorable contracts) which were acquired by us on May 18, 2017 (see Note 4. "Acquisition of American DG Energy Inc."). The customer contract asset includes the maintenance agreements contracts acquired by us on April 1, 2023 as part of the Aegis acquisition (See Note 5. "Aegis Contract and Related Asset Acquisition".

During the year ended December 31, 2022, we determined that certain of the ADGE customer contracts terminated due to the customers failure to perform their obligations pursuant to the contractual agreements and accordingly reversed $151,981 of unfavorable contract liability related to these contacts. The adjustments are included in the consolidated statement of operations for the year ended December 31, 2022, as non-cash benefits within long-lived asset impairment.

Amortization of intangibles including contract related amounts is calculated using the straight line method over the remaining useful life or contract term, which range from approximately 1-11 years, and is charged against cost of sales in the accompanying consolidated statement of operations. Aggregate future amortization over the next five years is estimated to be as follows:

	Non-contract related intangibles	Contract related intangibles	Total
2024	$ 194,675	$ (28,485)	$ 166,190
2025	169,265	34,272	203,537
2026	163,383	82,490	245,873
2027	162,150	90,131	252,281
2028	17,720	96,140	113,860
Thereafter	40,272	788,274	828,546
	$ 747,465	$ 1,062,822	$ 1,810,287

Note 9. Property, Plant and Equipment, net

Property, plant and equipment at December 31, 2023 and 2022 consisted of the following:

	Estimated Useful Life (in Years)	2023	2022
Energy systems	10 - 15 years	$ 2,810,232	$ 2,810,232
Machinery and equipment	5 - 7 years	1,744,596	1,624,885
Furniture and fixtures	5 years	212,963	196,007
Computer software	3 - 5 years	192,865	192,865
Leasehold improvements	*	466,789	466,789
		5,427,445	5,290,778
Less - accumulated depreciation and amortization		(4,264,868)	(3,883,058)
Net property, plant and equipment		$ 1,162,577	$ 1,407,720

* Lesser of estimated useful life of asset or lease term

Depreciation and amortization expense on property and equipment for the years ended December 31, 2023 and 2022 was $454,859 and $501,418, respectively. During the year ended December 31, 2023, we received proceeds of $34,655 from the disposition of certain assets and reversed $8,687 of accrued decomissioning costs from a former ADG energy site, realizing a gain of $6,207. During the year ended December 31, 2022 , we received proceeds of $72,655 from the disposition of certain assets, realizing a gain of $41,931.

During the year ended December 31, 2022, we determined that three of the ADGE customer contracts terminated due to the customers failure to perform their obligations pursuant to the contractual agreements and deemed the assets related to the contracts at these sites to be impaired. We recorded a non-cash impairment of $156,655 which is included in the consolidated statement of operations for the year ended December 31, 2022, within long-lived asset impairment.

During the year ended December 31, 2023 there were no ADGE contract terminations.

Note 10. Goodwill

Changes in the carrying amount of goodwill by reportable segment during the years ended December 31, 2023 and 2022 was as follows:

	Products	Services	Energy Production	Total
Balance at December 31, 2021	$ 40,870	$ —	$ 2,365,286	$ 2,406,156
Impairment	—	—	—	—
Balance at December 31, 2022	40,870	—	2,365,286	2,406,156
Impairment	—	—	—	—
Acquired	—	337,268	—	337,268
Balance at December 31, 2023	$ 40,870	$ 337,268	$ 2,365,286	$ 2,743,424

We performed a goodwill impairment test at December 31, 2023 and determined that the estimated fair value of the of the assets, based on a discounted cash flow analysis, exceeded the carrying value of the assets and did not record a goodwill impairment for the year 2023.

See Note 6. "Sale of Energy Producing Assets and Goodwill Impairment" and Note 5. "Aegis Contract and Related Asset Acquisition" for further discussion.

Note 11. Related Party Notes

On October 9, 2023, we entered into note subscription agreements with each of John N. Hatsopoulos, a director and principal shareholder of registrant, and Earl R. Lewis, III, a director of registrant, pursuant to which Mr. Hatsopoulos agreed to provide financing to us of up to $1 million, and Mr. Lewis agreed to provide financing to us of $500,000, and potentially, an additional $500,000 at his discretion. We have the right to determine the amount of the loans at the time of a draw down, subject to the conditions in our agreements with each of Mr. Hatsopoulos and Mr. Lewis discussed below. The loans and terms of the loan agreements were unanimously approved by our board of directors.

The loans bear interest on the outstanding principal at the Internal Revenue Service's Applicable Federal Rate to be determined at the time we issue a promissory note in connection with a loan drawdown. The principal amount and accrued interest of each loan is repayable one year from the date of issuance of the applicable promissory note. A note may be prepaid by us at any time. The principal amount of each loan and accrued interest is subject to mandatory prepayment in the event of a change of control of the registrant. The promissory notes are subject to customary events of default and are transferable provided the conditions to transfer set forth in the promissory notes are satisfied by the noteholder. The proceeds of the loans are expected to be used for general working capital purposes.

On October 10, 2023, we issued a promissory note and borrowed $500,000 from Mr. Hatsopoulos. The loan bears interest at 5.12% per annum. At December 31, 2023 our obligation to Mr. Hatsopoulos under the promissory note, inclusive of $5,505 of accrued and unpaid interest, was $505,505. On March 21, 2024, John H. Hatsopoulos amended the terms of the promissory note, dated October 10, 2023, extending the maturity date by one year, making the maturity date October 10, 2025 and agreeing to accept payment in cash or Tecogen Inc. common stock.

Note 12. Commitments and Contingencies

Operating Lease Obligations

We lease office space and warehouse facilities under various lease agreements which expire through January 2031. Total rent expense for the years ended December 31, 2023 and 2022 amounted to $812,515 and $811,664, respectively. See Note 14. "Leases" for further discussion.

Finance Lease Obligations

We lease motor vehicles under a master vehicle lease agreement, effective December 19, 2023, which expire through December 2028. See Note 14. "Leases" for further discussion.

Legal Matters

On November 23, 2022, we were served with a suit filed against us on August 24, 2022 in the Ontario Superior Court of Justice by The Corporation of the Town of Milton, Milton Energy Generation Solutions Inc. and Milton Hydro Distribution Inc (the "Plaintiffs"), all of whom are municipal corporations incorporated in the Province of Ontario. The plaintiffs sued for damages in the amount of CDN $1,000,000, pre-judgment and post-judgment interest, legal fees, and any further relief the court may deem, alleging breach of contract, breach of warranty, negligent misrepresentations and nuisance. Plaintiffs allege that on or about July 10, 2022, a Tecogen cogenerator installed by us at the plaintiffs facility caught fire, causing damage to the cogenerator and the plaintiff's facility. We have filed a response denying liability and are being represented by Canadian counsel. For the year ended December 31, 2022, we reserved $150,000 for anticipated damages which may not be covered by our insurance and continue to maintain the reserve at December 31, 2023.

Guarantees

In connection with the sale of energy producing assets, we made certain guarantees to the purchaser as discussed in Note 5. "Sale of Energy Producing Assets and Goodwill Impairment." Based upon an analysis of these energy producing assets expected future performance, as of December 31, 2023 we do not expect to make any material payments under the guarantee.

Change in Control Severance Benefit Plan

On July 9, 2020, our compensation committee of the board of directors adopted the Tecogen Inc. Change in Control Severance Benefit Plan ("Plan"). The Plan provides for up to 12 months of severance benefits for certain of our key management employees who are selected as plan participants by the plan administrator and who have executed a Change in Control Severance Benefit Plan Participation Notice. On July 9, 2020, Robert A. Panora, our President and Chief Operating Officer, and John K. Whiting, IV, our General Counsel and Secretary, were each designated as participants in the Plan.

Under the Plan, upon the occurrence of certain termination events following a change in control of the Company, the executive participants would receive cash severance payments equal to 12 months' salary and bonus payments, continuation of certain health benefits, the acceleration of bonus awards, and immediate vesting of outstanding unvested options (including performance options) to acquire our common stock. The severance payments are required to be paid in a single lump sum. The Plan has a term ofthree years and will automatically extend for successive additional one-year terms unless we provide written notice at leastsix months in advance of a then current term.

An executive will be entitled to severance under the Plan only if there has been a “Change in Control” of the Company and the termination of employment or service occurs during the period that isthree months prior to and 18 months following a change in control of the Company. Also, a participant's employment with the Company may be terminated by a participant for “Good Reason” or be an “Involuntary Termination Without Cause” by the Company, as those terms are defined in the Plan. In order to be eligible to receive severance benefits under the Plan, an executive must comply with the terms of the Plan, including the release of claims in favor of the Company and certain confidentiality, non-compete, non-solicitation, and non-disparagement covenants during and following termination of employment. The Plan will be administered by the compensation committee of the board of directors (or by the full board of directors or such other committee as the board may designate).

Note 13. Product Warranty

We reserve an estimate of our exposure to warranty claims based on both current and historical product sales data and warranty costs incurred. The majority of our products are sold with a one-year warranty. We assesses the adequacy of our recorded warranty liability periodically and adjust the reserve as necessary. The warranty liability is included in accrued expenses on the accompanying consolidated balance sheets.

Changes in our warranty reserve were as follows:

Warranty reserve, December 31, 2021	$	164,800
Warranty provision for units sold		208,730
Costs of warranty incurred		(235,730)
Warranty reserve, December 31, 2022		137,800
Warranty provision for units sold		286,391
Costs of warranty incurred		(282,191)
Warranty reserve, December 31, 2023	$	142,000

Note 14. Leases

Our leases principally consist of operating leases related to our corporate office, field offices, and our research, manufacturing, and storage facilities. Effective December 19, 2023, we entered into a master finance lease agreement for motor vehicles.

At inception, we determine if an arrangement constitutes a lease and whether that lease meets the classification criteria of a finance or operating lease. Some of our lease agreements contain lease components (e.g. minimum rent payments) and non-lease components (e.g. maintenance, labor charges, etc.). We account for each component separately based on the estimated standalone price of each component.

Operating Leases

Operating leases are included in Right-of-use assets, Lease obligations, current and Long-term liabilities - Lease obligations, net of current portion, on the condensed consolidated balance sheets. These assets and liabilities are recognized at the commencement date based on the present value of remaining lease payments over the lease term and using an incremental borrowing rate consistent with the lease terms or implicit rates, when readily determinable. For those leases where it is reasonably certain at the commencement date that we will exercise the option to extend the lease, then the lease term will include the lease extension term. Short-term operating leases, which have an initial term of 12 months or less, are not recorded on the balance sheet.

Lease expense for operating leases, which principally consists of fixed payments for base rent, is recognized on a straight-line basis over the lease term. Operating lease expense for the years ended December 31, 2023 and 2022 was $812,515 and $811,664, respectively. Lease expense for finance leases, consisting of fixed payments for base rent and initial costs for the year ended December 31, 2023 was $2,338.

Supplemental information related to operating leases for the years ended December 31, 2023 and 2022 was as follows:

	December 31, 2023		December 31, 2022	
Cash paid for amounts included in the measurement of operating lease liabilities	$	743,849	$	733,284
Right-of-use assets obtained in exchange for operating lease liabilities	$	148,093	$	—
Weighted-average remaining lease term - operating leases		4.6 Years		3.6 Years
Weighted-average discount rate - operating leases		6.4 %		6.0 %

Finance Leases

Finance leases are included in Right-of-use assets, Lease obligations, current and Long-term liabilities - Lease obligations, net of current portion, on the condensed consolidated balance sheets. These assets and liabilities are recognized at the commencement date based on the present value of remaining lease payments over the lease term and using an incremental borrowing rate consistent with the lease terms or implicit rates, when readily determinable. For those leases where it is reasonably certain at the commencement date that we will exercise the option to extend the lease, then the lease term will include the lease extension term. Short-term operating leases, which have an initial term of 12 months or less, are not recorded on the balance sheet.

Supplemental information for finance leases for the year ended December 31, 2023 is as follows:

	December 31, 2023	
Right-of-use assets obtained in exchange for finance lease liabilities	$	200,187
Weighted-average remaining lease term - finance leases		5.0 years
Weighted-average discount rate - finance leases		10.4 %

Supplemental balance sheet information related to operating leases for the years ended December 31, 2023 and 2022 was as follows:

	December 31, 2023		December 31, 2022	
Operating leases				
Right-of-use assets	$	743,096	$	1,245,549
Operating lease liability, current	$	248,933	$	687,589
Operating lease liability, long-term		523,660		623,452
Total operating lease liability	$	772,593	$	1,311,041

Supplemental balance sheet information related to finance leases for the year ended December 31, 2023 is as follows:

	December 31, 2023	
Finance leases		
Right-of-use assets - motor vehicles	$	200,187
Finance lease liability, current	$	40,540
Finance lease liability, long-term		159,647
Total finance lease liability	$	200,187

Future minimum lease commitments under non-cancellable operating and finance leases as of December 31, 2023 were as follows:

	Operating Leases	Finance Leases	Total
2024	$ 292,168	$ 58,931	$ 351,099
2025	158,593	48,931	207,524
2026	147,606	48,931	196,537
2027	88,825	48,931	137,756
2028	87,137	48,931	136,068
Thereafter	117,004	—	117,004
Total lease payments	891,333	254,655	1,145,988
Less: imputed interest	118,740	54,468	173,208
Total	$ 772,593	$ 200,187	$ 972,780

Operating Lease - Commencement date January 1, 2024

On March 31, 2023, we entered into two lease agreements for two adjoining buildings, located in Billerica, Massachusetts, containing approximately 26,412 square feet of manufacturing, storage and office space to serve as our headquarters and manufacturing facilities. The lease agreements provide for initial lease terms of five (5) years with two successive options to renew for additional terms of five (5) years. Both leases commence on January 1, 2024 and require payment of the base rent, real estate taxes, common maintenance expenses and aggregate deposits of $38,200. Our costs for initial improvements required to the leased premises is estimated to range between $500,000 and $750,000. The estimated straight-line monthly rent expense for the initial term of the lease is approximately $26,962 per month. In accordance with ASC 842-20-30-1, we will record the lease liability and right-of-use asset using the discount rate for the lease upon the lease commencement date, January 1, 2024.

Future minimum lease commitments under the two lease agreements which commenced on January 1, 2024 were as follows:

	Operating Leases
2024	$ 310,341
2025	316,944
2026	323,547
2027	330,150
2028	336,753
Total lease payments	1,617,735

Note 15. Stockholders' Equity

Common Stock

The holders of our Common Stock have the right to vote their interest on a per share basis. At December 31, 2023 and 2022, there were 24,850,261 shares of our Common Stock outstanding.

Preferred Stock

On February 13, 2013, we authorized 10 million shares of preferred stock. As of December 31, 2023, no preferred shares were issued or outstanding.

Stock-Based Compensation

We adopted the 2006 Stock Option and Incentive Plan (the "Plan"), under which the board of directors may grant incentive or non-qualified stock options and stock grants to key employees, directors, advisors and our consultants. The Plan was amended at various dates by the Board of Directors to increase the reserved shares of common stock issuable under the Plan to 3,838,750 as of December 31, 2023, and in June 2017 stockholders approved an amendment to extend the termination date of the Plan to January 1, 2026 and to ratify all of our option grants issued after January 1, 2016 (the "Amended Plan").

Stock options vest based upon the terms within the individual option grants, with an acceleration of the unvested portion of such options upon a change in control event, as defined in the Amended Plan. The options are not transferable except by will or domestic relations order. The option price per share under the Amended Plan cannot be less than the fair market value of the underlying shares on the date of the grant. The number of shares remaining available for future issuance under the Amended Plan as of December 31, 2023 and 2022 was 243,818 and 146,393, respectively.

In 2023, there were no option grants issued under the Plan.

In 2022, we granted nonqualified options to purchase an aggregate of 761,650 shares of common stock at $1.10 per share and $1.20 per share to certain officers and employees. These options have a vesting schedule of four years and expire in ten years. The fair value of the options issued in 2023 was $321,910. The weighted-average grant date fair value of stock options granted during 2022 was $0.42 per share.

We adopted the 2022 Stock Incentive Plan (the "2022 Plan"), under which the Board of Directors may grant incentive or non-qualified stock options and stock grants to key employees, directors, advisors and consultants. We have reserved 3,800,000 shares of our common stock for issuance pursuant to awards under the 2022 Plan. The adoption of the 2022 Plan was approved by our shareholders on June 9, 2022.

Under the 2022 Plan, stock options vest based upon the terms within the individual option grants, with an acceleration of the unvested portion of such options upon a change in control event, as defined in the 2022 Plan. The options are not transferable except by will or domestic relations order. The option price per share under the 2022 Plan cannot be less than the fair market value of the underlying shares on the date of the grant.

During the year ended December 31, 2023, we granted nonqualified options under the 2022 Plan to purchase an aggregate of 575,000 shares of common stock at prices between $0.88 per share and $1.10 per share to certain directors, officers and employees These options have a vesting schedule of two or four years and expire in ten years. The fair value of the options issued in 2023 was $244,625. The weighted-average grant date fair value of stock options granted during 2023 was $0.43 per share.

During the year ended December 31, 2022, we granted nonqualified options under the 2022 Plan to purchase an aggregate of 275,000 shares of common stock at prices between $1.00 per share and $1.41 per share to certain directors. These options have a vesting schedule of four years and expire in ten years. The fair value of the options issued in 2022 was $145,600. The weighted-average grant date fair value of stock options granted during 2022 was $0.53 per share

The number of shares remaining available for future issuance under the 2022 Plan as of December 31, 2023 was 3,068,750.

In 2023 and 2022, there were no options exercised.

Stock option activity for the year ended December 31, 2023 was as follows:

Common Stock Options	Number of Options	Exercise Price Per Share	Weighted Average Exercise Price	Weighted Average Remaining Life	Aggregate Intrinsic Value
Outstanding, December 31, 2022	3,204,297	$ 0.71 — $ 10.33	$ 1.61	7.30 years	$ 882,074
Granted	575,000	$ 0.88 — $ 1.10	$ 0.93		
Exercised	—	—			
Canceled and forfeited	(141,175)	$ 0.71 — $ 4.50	$ 1.81		
Outstanding, December 31, 2023	3,638,122	$ 0.71 — $ 10.33	$ 1.49	6.70 years	$ 127,811
Exercisable, December 31, 2023	1,953,197		$ 1.95		$ 77,961
Vested and expected to vest, December 31, 2023	3,385,353		$ 1.53		$ 120,333

We used a forfeiture rate of 15% to calculate the expected to vest shares in the table above. We use the Black-Scholes option pricing model to determine the fair value of stock options granted. Use of a valuation model requires management to make certain assumptions with respect to selected model inputs. Expected volatility was calculated based on the average volatility of four comparable publicly traded companies. The average expected life was estimated using the simplified method to determine the expected life based on the vesting period and contractual terms, since we do not have the necessary historical exercise data to determine an expected life for stock options. We use a single weighted-average expected life to value option awards and recognize compensation on a straight-line basis over the requisite service period for each separately vesting portion of the awards. The risk-free interest rate is based on U.S. Treasury zero-coupon issues with a remaining term which approximates the expected life assumed at the date of grant.

The weighted average assumptions used in the Black-Scholes option pricing model for options granted in 2023 and 2022 are as follows:

Stock option award assumptions:	2023	2022
Expected dividend yield	—%	—%
Expected life	6.25 years	6.25 years
Risk-free interest rate	4.70%	2.17%
Expected volatility	38.49%	36.24%

During the years ended December 31, 2023 and 2022, we recognized stock-based compensation expense of $250,394 and $334,149, respectively, related to the issuance of stock options. No tax benefit was recognized related to the stock-based compensation expense recorded during either of the years. At December 31, 2023 and 2022, the total compensation cost related to unvested stock option awards not yet recognized is $451,298 and $500,059, respectively. The unvested stock compensation at December 31, 2023 will be recognized over a weighted average period of 2.77 years.

Note 16. Fair Value Measurements

The fair value topic of the FASB Accounting Standards Codification defines fair value as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. The accounting guidance also establishes a fair value hierarchy which requires an entity to maximize the use of observable inputs, where available, and minimize the use of unobservable inputs when measuring fair value. There are three levels of inputs that may be used to measure fair value:

Level 1 - Unadjusted quoted prices in active markets for identical assets or liabilities. We currently do not have any Level 1 financial assets or liabilities.

Level 2 - Observable inputs other than quoted prices included in Level 1. Level 2 inputs include quoted prices for identical assets or liabilities in non-active markets, quoted prices for similar assets or liabilities in active markets and inputs other than quoted prices that are observable for substantially the full term of the asset or liability.

Level 3 - Unobservable inputs reflecting management’s own assumptions about the input used in pricing the asset or liability.

The following table presents the asset reported in the consolidated balance sheet measured at its fair value on a recurring basis as of December 31, 2023 and 2022 by level within the fair value hierarchy:

	Total	Quoted prices in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3	Unrealized gain (loss)
December 31, 2023					
Recurring fair value measurements					
Available-for-sale equity securities					
EuroSite Power Inc.	$ 93,744	$ —	$ 93,744	$ —	$ —
Total recurring fair value measurements	$ 93,744	$ —	$ 93,744	$ —	$ —
December 31, 2022					
Recurring fair value measurements					
Available-for-sale equity securities					
EuroSite Power Inc.	$ 93,744	$ —	$ 93,744	$ —	$ 18,749
Total recurring fair value measurements	$ 93,744	$ —	$ 93,744	$ —	$ 18,749

We utilize a Level 2 category fair value measurement to value our investment in EuroSite Power Inc. as an available-for-sale security at period end. That measurement is equal to the quoted market closing price at period end. Since this security is not actively traded we are classifying as Level 2.

The following table summarizes changes in Level 2 assets which are comprised of marketable equity securities for the years ended December 31, 2023 and 2022:

Fair value at December 31, 2021	$ 74,995
Unrealized gain	18,749
Fair value at December 31, 2022	$ 93,744
Fair value at December 31, 2022	$ 93,744
Unrealized gain	—
Fair value at December 31, 2023	$ 93,744

The following table presents the liability reported in the consolidated balance sheet measured at its fair value on a recurring basis as of December 31, 2023 and 2022 by level within the fair value hierarchy:

	Total	Quoted prices in active markets for identical assets Level 1	Significant other observable inputs Level 2	Significant unobservable inputs Level 3	Total gains (losses)
December 31, 2023					
Recurring fair value measurements					
Contingent contract consideration					
Current	$ 200,639	$ —	$ —	$ 200,639	$ —
Long-term	994,743	—	—	994,743	—
Total recurring fair value measurements	$ 1,195,382	$ —	$ —	$ 1,195,382	$ —

We utilize a Level 3 category fair value measurement to value the contingent consideration liability at period end since there are no quoted prices for this liabilities in non-active markets, there are no quoted prices for similar liabilities in active markets and there are no inputs that are observable for substantially the full term of the the liability. The contingent consideration calculation requires management to make estimates and assumptions that affect the reported amount of the liability.The contingent consideration is payable each calendar quarter through the earlier of the expiration or termination of the relevant maintenance agreements, or the seventh (7th) anniversary of the acquisition date. The consideration is equal to the product of the revenues collected in a calendar quarter multiplied by an applicable percentage. The agreement stipulates quarterly aggregate revenue targets and an applicable percentage, and provides for a higher applicable percentage if revenues exceed the target revenues. The applicable percentage ranges from 5% to 10% over the agreement term. On the date of acquisition, the fair value of the contingent consideration was calculated using a weighted average cost of capital of 15%, discounting the future cash flows to present value.

Note 17. Retirement Plans

We have a defined contribution retirement plan (the “Plan”), which qualifies under Section 401(k) of the Internal Revenue Code (IRC). Under the Plan, employees meeting certain requirements may elect to contribute a percentage of their salary up to the maximum allowed by the IRC. We matched a variable amount based on participant contributions up to a maximum of 4.5% of each participant’s salary until May 2020 when we discontinued the matching of employee contributions for those employees not covered under a collective bargaining agreement. Effective July 1, 2023, we reinstituted the employer match based on participant contributions which are capped at a maximum of $250 per quarter and $1,000 per fiscal year. We contributed approximately $65,705 and $39,664 in matching contributions to the Plan in 2023 and 2022, respectively.

Note 18. Segments

As of December 31, 2023, we were organized into three operating segments through which senior management evaluates our business. These segments, as described in more detail in Note 1. "Nature of Business and Operations", are organized around the products and services provided to customers and represent our reportable segments. Prior to the acquisition of ADGE (see Note 4. "Acquisition of American DG Energy Inc."), our operations consisted of a single segment. The following table presents information by reportable segment for the years ended December 31, 2023 and 2022:

	Products	Services	Energy Production	Corporate, other and elimination (1)	Total
Year ended December 31, 2023					
Revenue - external customers	$ 8,859,946	$ 14,523,054	$ 1,756,419	$ —	$ 25,139,419
Intersegment revenue	—	306,652	—	(306,652)	—
Total revenue	$ 8,859,946	$ 14,829,706	$ 1,756,419	$ (306,652)	$ 25,139,419
Gross profit	$ 2,936,850	$ 6,613,852	$ 650,916	$ —	$ 10,201,618
Identifiable assets	$ 8,990,275	$ 12,802,651	$ 3,269,013	$ 2,730,690	$ 27,792,629
Year ended December 31, 2022					
Revenue - external customers	$ 11,156,099	$ 12,060,661	$ 1,785,854	$ —	$ 25,002,614
Intersegment revenue	—	310,816	—	(310,816)	—
Total revenue	$ 11,156,099	$ 12,371,477	$ 1,785,854	$ (310,816)	$ 25,002,614
Gross profit	$ 3,742,779	$ 6,535,168	$ 788,864	$ —	$ 11,066,811
Identifiable assets	$ 10,434,727	$ 9,854,279	$ 3,744,913	$ 4,218,938	$ 28,252,857

(1) Corporate, intersegment revenue, other and elimination includes various corporate assets.

Note 19. Income Taxes

A reconciliation of the federal statutory income tax provision to our actual provision for the years ended December 31, 2023 and 2022 is as follows:

		2023		2022
Pre-tax book income (loss)	$	(4,490,665)	$	(2,381,360)
Expected tax at 21%		(943,040)		(500,086)
Permanent differences:				
Mark to market		—		(3,937)
Intangible amortization		(46,373)		(89,480)
Other		6,474		2,404
State taxes:				
Current		32,491		16,352
Deferred		(264,759)		(162,688)
Other items:				
Federal research and development credits		(84,592)		(7,647)
Deferred tax past year true-up's		(63,440)		(46,786)
Change in valuation allowance		980,342		668,326
Capitalized research and development expenses		334,120		174,674
Other		81,268		(34,780)
Income tax provision	$	32,491	$	16,352

The components of net deferred tax assets recognized in the accompanying consolidated balance sheets at December 31, 2023 and 2022 are as follows:

		2023		2022
Net operating loss carryforwards	$	10,840,000	$	9,812,000
R&D and ITC credit carryforwards		403,000		310,000
Accrued expenses and other		381,000		317,000
Intangibles		486,000		342,000
Leases		8,000		17,000
Accounts receivable		39,000		96,000
Stock options		450,000		386,000
Inventory		427,000		366,000
Property, plant and equipment		650,000		705,000
Other		323,000		342,000
Deferred tax assets		14,007,000		12,693,000
Valuation allowance		(14,007,000)		(12,693,000)
Deferred tax assets, net	$	—	$	—

At December 31, 2023, we had approximately $38,710,000 of Federal net operating loss carryforwards ("NOL") of which $1,547,000 expired as of December 31, 2023, $22,393,000 expire beginning in 2024 through 2039 and $16,317,000 have an indefinite carryforward. In addition, we have $27,190,000 of state net operating losses, expiring at various dates starting in 2024 through 2042.

The Tax Cuts and Jobs Act was enacted on December 22, 2017. A significant provision of the act was to reduce the statutory Federal tax rate from 34% to 21%. During 2023, our valuation allowance increased by $1,314,000. This increase is affected by the absorption of deferred tax attributes associated with its acquisition of American DG Energy, Inc. along with permanent book to tax differences and provision to return adjustments.

In accordance with the provisions of the Income Taxes topic of the Codification, we have evaluated the positive and negative evidence bearing upon the realizability of our deferred tax assets, which are comprised principally of net operating losses. Management has determined that it is more likely than not that we will not recognize the benefits of federal and state deferred tax assets and, as a result, a full valuation allowance has been established for 2022 and 2023, respectively.

Utilization of the NOL and research and development credit carryforwards are subject to a substantial annual limitation due to ownership changes, as provided by Section 382 of the Internal Revenue Code of 1986, as well as similar state provisions. Ownership changes may limit the amount of NOL and tax credit carryforwards that can be utilized to offset future taxable income and tax, respectively. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain shareholders or public groups in the stock of a corporation by more than 50 percentage points over a three-year period.

We acquired American DG Energy, Inc. during 2017, by acquiring 100 percent of the company's stock. Accordingly, utilization of their consolidated and/or separately computed NOL and/or tax credit carryforwards will be subject to an annual limitation under Internal Revenue Code Section 382. Any such limitation may result in expiration of a portion of the NOL or tax credit carryforwards before utilization. The extent of the limitation, and related allocation and impact upon the NOL and credit carryforwards has been determined to be $391,940 per year for a 20 year period at the ADGE level. However, we have sufficient pre-merger NOLs to offset anticipated taxable income for the taxable year ended December 31, 2023 and do not expected to be limited in NOL utilization for the period.

A full valuation allowance has been provided against our loss carryforwards and, if an adjustment is required under Section 382, it would be offset by a corresponding adjustment to the valuation allowance. Thus, there would be no impact to the balance sheet or statement of operations if an adjustment were required.

We have not recorded any amounts for unrecognized tax benefits as of December 31, 2023 or 2022.

We file tax returns as prescribed by the tax laws of the jurisdiction in which we operate. In the normal course of business, we are subject to examination by federal and state jurisdictions, where applicable. There are currently no pending tax examinations. Our tax returns from tax year 2020 are still open for examination for both federal and state jurisdictions.

Note 20. Subsequent Events

We have evaluated events through the date of this filing, and, except as described below, have determined that no material subsequent events occurred that would require recognition in the consolidated financial statements or disclosure in the notes thereto for the period ended December 31, 2023.

On February 1, 2024, Tecogen and Aegis amended the March 15, 2023 agreement ("Agreement") with Aegis Energy Services, LLC (“Aegis”) to add eighteen (18) additional maintenance contracts (the "Amendment"). The Amendment includes an undertaking by Aegis to use commercially reasonable efforts to support and assist our execution of maintenance service agreements for an additional thirty-six (36) cogeneration units sold to customers by Aegis. See Note 5."Aegis Contract and Related Asset Acquisition" of the Notes to the Consolidated Financial Statements.

On March 21, 2024, John H. Hatsopoulos amended the terms of the Promissory Note, dated October 10, 2023, extending the maturity date by one year, making the maturity date October 10, 2025 and agreeing to accept payment in cash or Tecogen Inc. common stock.

King First West Owner LLC
c/o King Street Properties
800 Boylston Street, Suite 2400
Boston, MA 02199

As of March 1, 2024

Tecogen Inc.
45 First Avenue
Waltham, Massachusetts 02451

Re: Commercial/Industrial Lease dated May 14, 2008, as amended by a First Amendment to Lease dated October 1, 2008 and a Second Amendment to Lease dated January 16, 2013 (collectively, the "Lease") by and between King First West Owner LLC, a Delaware limited liability company, successor-in-interest to Atlantic-Waltham Realty, LLC ("Lessor") and Tecogen Inc., a Delaware corporation ("Lessee") for certain premises ("Leased Premises") located in the building known as 45 First Avenue, Waltham, Massachusetts

Ladies and Gentlemen:

Reference is hereby made to the Lease. All capitalized words and phrases used in this letter agreement and not otherwise defined herein shall have the meanings ascribed to them in the Lease.

This letter agreement shall confirm that Landlord and Tenant hereby agree to extend the Lease Term for an additional period commencing on April 1, 2024 and expiring on April 30, 2024 ("Second Extension Term"). The leasing of the Leased Premises for the Second Extension Term shall be in accordance with and subject to all of the terms and conditions set forth in the Lease. Annual Base (Fixed) Rent during the Second Extension Term shall be $44,899.17 per month.

Except as modified herein, all of the other terms, covenants and conditions of the Lease shall remain in full force and effect. This letter agreement may be executed by electronic signature, which shall be considered as an original signature for all purposes and shall have the same force and effect as an original signature.

Very truly yours,

KING FIRST WEST OWNER LLC,
a Delaware limited liability company

By: ____________
Name: Tyson Reynoso
Tile: Authorized Signatory

ACCEPTED AND AGREED:
TECOGEN INC., a Delaware corporation

By: ____________
Name: Abinand Rangesh
Title: CEO

John N. Hatsopoulos

March 21, 2024

Mr. Abinand Rangesh, CEO
Tecogen Inc.
45 First Ave.
Waltham, MA 02451

Re: Extension or Conversion of Tecogen Promissory Note

Dear Abinand:

This letter confirms my agreement to:

(1) extend the maturity date of the Tecogen Inc. Promissory Note in my favor dated October 10, 2023 in the original principal amount of $500,000 (the "Promissory Note") by one year, making the maturity date October 10, 2025; and

(2) accept payment in cash or in Tecogen Inc. common stock as payment in full of Tecogen's payment obligation under the Promissory Note. Payment in shares would consist of the nearest whole number of shares determined by dividing (i) the outstanding principal and interest on the Promissory Note at the time of conversion of the debt to equity, by (ii) the average closing price per share for Tecogen common stock during the thirty-day period prior to the date of conversion.

Sincerely,

John N. Hatsopoulos

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statements (Nos. 333-265799, 333-218244 and 333-187928) on Form S-8, the Registration Statements (Nos. 333-199634, 333-205147 and 333-212433) on Form S-3 and the Post-Effective Amendment No. 2 on Form S-3 (Registration No. 333-212433) on Form S-1 of Tecogen Inc. ("the Company") of our report dated March 25, 2024, relating to the consolidated financial statements of the Company, appearing in this Annual Report on Form 10-K for the year ended December 31, 2023.

/s/ Wolf & Company, P.C.
Boston, Massachusetts
March 25, 2024

EXHIBIT 31.1

TECOGEN INC.
CERTIFICATION REQUIRED BY EXCHANGE ACT RULES 13a-14(a) and 15d-14(a),
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Abinand Rangesh, certify that:

1. I have reviewed this Annual Report on Form 10-K of Tecogen Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting.

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 25, 2024

/s/ Abinand Rangesh
Abinand Rangesh
Chief Executive and Financial Officer

EXHIBIT 32.1

TECOGEN INC.
CERTIFICATION REQUIRED BY EXCHANGE ACT RULES 13a-14(b) and 15d-14(b),
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Abinand Rangesh, Chief Executive and Financial Officer, of Tecogen Inc., or the Company, certify, pursuant to Section 1350, Chapter 63 of Title 18, United States Code that, to his knowledge:

1. The Annual Report on Form 10-K of the Company for the year ended December 31, 2023 (the “Report”) fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78 m or 78o(d)); and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 25, 2024

/s/ Abinand Rangesh
Abinand Rangesh
Chief Executive and Financial Officer