

Tecogen Inc. (TGEN)

Company Report – November 19, 2016

Tecogen Inc. designs, manufactures and sells industrial and commercial CHP (Combined Heat & Power), or cogeneration, systems that produce combinations of electricity, hot water, and air conditioning. It's a well-established Company, as it has already shipped over 2,300 units, some of which have been operating for almost 25 years.

During the third quarter, ended September 30, 2016, Tecogen generated net income of \$207,868 compared to a loss of \$948,842 in the third quarter of 2015. The first positive net income in the Company's public history. The outstanding performance was achieved by a solid revenue increase, combined with strict cost control, which resulted in gross margin rising to 41.9%.

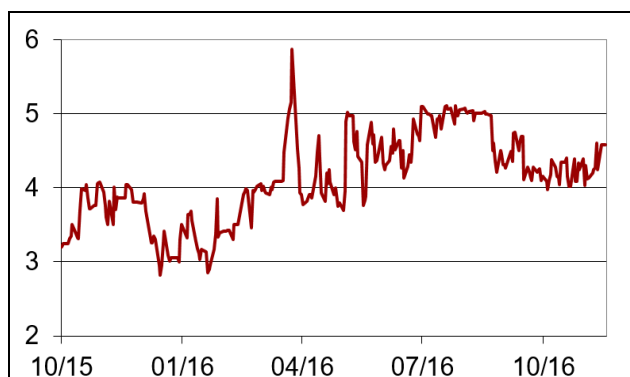
Becoming profitable is always a major turning point at a company. It's no different at Tecogen. But let's be clear, despite its significantly improved financial results, the Company has only started scratching the surface of the huge clean energy market.

We see tremendous potential for Tecogen as its management believes it will be profitable going forward, while its growth opportunities come to fruition.

Based on the intrinsic value of Tecogen's shares derived from our model, we reiterate our buy recommendation for Tecogen Inc. with a price target of \$9.72, which is 123% above today's stock price.



- ❑ It goes without saying that continued positive developments at ULTRATEK could be a massive game changer for Tecogen. Phase II test results will officially be announced early next year in a peer reviewed paper, but management has already indicated that they are positive.
- ❑ Moreover, the development of Ultera for the propane-powered fork truck market is an exciting opportunity to extend the technology into new platforms and verticals. Note that approximately 70,000 propane powered fork lift are sold annually in the United States alone.
- ❑ The acquisition of American DG Energy will create a company with approximately half of total revenues from long-term contracted sources, a stable funding source for ongoing growth initiatives.



Market Data	
Price	\$4.35
Sector	Technology
52-Week Price Range	\$2.46 - \$6.50
Shares Issued (m)	19.95
Market Cap (m)	\$86.78
Listings	TGEN (NASDAQ)
Website	www.tecogen.com

THE COMPANY

Tecogen designs, manufactures and sells industrial and commercial cogeneration systems that produce combinations of electricity, hot water, and air conditioning using engines that have been specially adapted to run on natural gas. This technology is called cogeneration, or Combined Heat and Power (CHP).

Cogeneration systems are efficient because they drive electric generators or compressors, which reduce the amount of electricity purchased from the utility. Plus they use the engine's waste heat for water heating, space heating, and/or air conditioning at the customer's building, vastly improving fuel efficiency.

Existing customers for these CHP systems 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, and military installations.

The main drivers for end users to opt for a CHP system are a significant reduction in energy costs, fuel efficiency, emissions reduction, and backup power generation and Microgrid capabilities that allow for participation in demand response and load shaving incentive programs.

The Company's products are sold directly to end-users by its own sales team and by established sales agents and representatives, who are compensated by commissions. Various agreements are in place with distributors and outside sales representatives for certain territories and product lines.

The Company is supported by an established network of engineering, sales, and service personnel across the United States. Service contracts make up a reliable and growing part of the Company's total sales. In 2015, approximately 36.5% of total sales were derived from service contracts.

Tecogen is a well-established and respected company in the industry, as it

has shipped over 2,300 units so far, some of which have been operating almost 25 years.

During the third quarter, ended September 30, 2016, Tecogen generated net income of \$207,868 compared to a loss of \$948,842 in the third quarter of 2015. The first positive net income in the Company's public history.

The outstanding performance was achieved by a solid revenue increase, combined with strict cost control. This resulted in gross margin rising to 41.9% compared to 35.7% in third quarter 2015 and well above management's targeted 35-40% gross margin range. In fact, this was the highest gross margin that the Company ever achieved.



Tecogen reported the first positive net income in the Company's public history. Product revenue grew 53.2%, driven by strong InVerde e+ CHP sales.

Revenue for the third quarter of 2016 reached \$6,616,455 compared with \$4,676,042 for the same period in 2015, an excellent increase of 41.5%. Product revenue in the third quarter grew 53.2% compared to Q3 2015, while Services related revenue grew 33.8% over the prior year period, driven by installation activity.

Testament to the strong cost control initiatives is the fact that despite the strong increase in revenue, the Company's operating expense was down 2.6% to \$2,525,325 for the third quarter of 2016 from \$2,592,676 in the same quarter of 2015. This is right on target to keep operating expense near \$10 million annually.

Speaking about the turn to profitability, Benjamin Locke, Tecogen Co-Chief Executive

Officer noted, "Tecogen has achieved a number of notable milestones of late, including the pivotal turn toward what we believe will be **consistent profitability.**"

Moreover, Tecogen keeps reeling in new projects. Hardly a week goes by without new sales being announced. Consequently, the Company's sales backlog of equipment and installations as of Monday November 7, 2016 was \$13.1 million, driven by strong traction in the InVerde product line and Installation services. Note that the backlog does not include sales of TEDOM products by the TTcogen joint venture or service contract revenue, which was more than one third of the Company's revenues in fiscal year 2015.

Judging from the backlog, which continues to be far above the Company's ongoing goal of \$10 million, it's clear that the order pipeline is chock-full.

Tecogen manufactures and maintains four types of products:

- ❑ Combined Heat and Power (CHP) units that supply electricity and hot water;
- ❑ Chillers that provide air-conditioning and hot water; and
- ❑ High-efficiency water heaters

Next to the three products above, Tecogen also markets an emissions control technology called Ultera. This is a muffler-like kit that dramatically reduces a natural gas powered engine's harmful emissions such as NOx, CO, and hydrocarbons. In 2012, a 75 kW CHP unit equipped with the Ultera system became the first unit to obtain a conditional air permit in Southern California, an area with one of the strictest emissions regulations worldwide.

Since then, the Ultera technology has been installed on hundreds of cogeneration systems and functions impeccably. **There is no comparable technology on the market today. It truly sets Tecogen apart from its competition** (also read Ultera on page 9).

In 2015, following Volkswagen's emissions scandal, Tecogen formed Ultra Emissions Technologies Ltd (Ultratek), a joint venture with a group of strategic investors, to test,

verify and develop the Ultera system for gasoline powered automotive engines.



The Ultera Emissions System mounted to a CHP unit. The Ultera is designed to deliver simple, cost-effective solutions for natural gas engines to meet stringent emissions standards.

Results from initial Phase I testing of Ultera on a light duty vehicle indicate that the system is highly effective at delivering emissions reduction in criteria pollutants (those contributing to smog and negatively impacting human health) in excess of currently available commercial technology. Also very important to know is that consistent with the experience of the Ultera in stationary industrial applications, the system did not increase the fuel usage of the test vehicle. Results of Phase II, which was successfully completed late October, will be presented at a prestigious conference early next year (Also read Ultratek JV).

In October 2016, Tecogen was awarded research grant funding from the Propane Education & Research Council (PERC) to develop the Ultera technology for propane powered fork trucks. This could be another lucrative opportunity, knowing that 70,000 propane powered fork lift trucks are sold each year in the US alone (Also read Growth Drivers).

As of year-end 2015, Tecogen had 72 full-time employees and 3 part-time employees, including 6 sales and marketing personnel and 31 service personnel.

Case Study – Toren Tower

The Company's business model, and its benefits for all parties involved, will become perfectly clear on the basis of a case study.

Toren is an iconic skyscraper that forever changed downtown Brooklyn. The 37 story building offers 240 condominium homes with breathtaking floor-to-ceiling views of the Manhattan skyline and New York Harbor as well as the opportunity to live in the most environmentally advanced high-rise residential building in New York, perhaps even in the U.S.



Tecogen's cogeneration system reduces Toren's carbon footprint by more than 2000 tons of CO₂ each year while providing an annual energy cost savings of \$540,000.

Toren uses five Tecogen InVerde 100kW cogeneration modules, located on-site, to meet much of the building's energy needs.

The cogen modules provide electricity, while the waste heat they produce is recovered and used to heat interior spaces, provide domestic hot water, heat the pool and even run the air conditioning.

That way, the remarkably efficient cogeneration system reduces Toren's carbon footprint by more than 2000 tons of CO₂ each

year while providing annual cost savings of \$540,000.

Toren's CHP plant is designed to automatically follow the building's electric demand. As demand for electricity increases and decreases within the building, the electrical output from each of the five CHP modules will also increase and decrease.

Through highly sophisticated load control software built into each unit, the amount of electricity being purchased from Consolidated Edison, the electric utility in Brooklyn, can be maintained at less than 20kW.

Another innovative, unique and very desirable feature of Toren's cogen system is that it is a "Microgrid" with the ability to run independent from the grid in "Island Mode", providing power for the building if New York should ever experience a blackout like the one in 2002.

Nationwide Factory Service

Besides selling machines, which in many cases are one-off deals, Tecogen generates plenty of revenues through service contracts. This is a reliable and growing part of the Company's total sales. In fact, more than half of Tecogen's installed units have a service contract.

Most of the service revenue is in the form of annual service contracts. Customers are invoiced based on equipment run-time hours without unforeseen add-ons for such items as unscheduled repairs or engine replacements.

Tecogen offers service support on all its CHP products nationwide through a network of nine field service centers in California, the Midwest, and the Northeast. In addition, the Company plans to eventually add a 10th service center in the southeast of the US.

These centers are staffed by full-time Tecogen technicians and have been an essential part of Tecogen's growth and success through the years, as good factory support from Tecogen allows its customers to focus on their core missions and businesses. Factory service also keeps Tecogen in close touch with its customers and their specific site issues.

Competition

Tecogen's products fall into the broad market category of distributed generation systems that produce electric power on-site to mitigate the drawbacks of traditional central power and the low efficiency of conventional heating processes.

The Company's CHP products use reciprocating engines originally designed for gasoline fuel and modified to run on natural gas. Although gas-fueled CHP units are relatively common, Tecogen is confident that no other company has developed a product that competes with its inverter-based InVerde e+ CHP, which is highly efficient, facilitates battery or solar array integration, and is compliant with the NFPA 110 standard for emergency and standby power systems.

If competitors wanted to develop a similar product, development time and costs would be significant. In addition, certain Tecogen patents and licenses for microgrid software would prevent others from offering certain important functions.

Government Regulations

Several kinds of government regulations affect the Company's current and future business, such as:

- ▣ Air pollution regulations, which govern the emissions allowed in engine exhaust;
- ▣ State and federal incentives for CHP technology; and
- ▣ Electric utility pricing and related regulations
- ▣ Electric grid interconnection regulations

Strict regulations that control **air quality and greenhouse gases** increasingly favor Tecogen's low-emission products. In some states that have strict emissions regulations, such as California, the pollution from natural gas engines presents a challenge.

However, the development of the Ultra low-emissions technology has addressed this issue. In January 2013, a state-certified source test at a customer's site verified that emissions levels of a CHP unit equipped with

the Ultra technology, were well below the new permitting requirements.

Likewise, in New Jersey, where emissions regulations are trending towards California levels, the Company has already established its Ultra-fitted CHP as a certified technology; a unique status that separates it from the competition.

In addition, there are currently 23 states that recognize CHP as part of their Renewable Portfolio Standards. New York and New Jersey, for example, have **incentive programs** that rebate a significant portion of the CHP project cost.

Similar incentive programs also exist in Massachusetts, Rhode Island, and Maryland albeit with different structures and terms. Massachusetts has an additional CHP incentive in the form of an annual rebate proportional to the carbon savings versus conventional technology.

Finally, the Company is targeting customers in states with **high electricity rates** in the commercial sector, such as California, Connecticut, Massachusetts, New Hampshire, New Jersey, and New York. These regions also have high peak demand rates, which favor utilization of modular units in groups so as to assure redundancy and peak demand savings.

TTCOGEN JV

In May 2016, Tecogen formed a 50/50 joint venture corporation with the Czech company TEDOM, one of Europe's largest Combined Heat and Power manufacturers.

The new company, called TTCogen LLC offers a complete package of 27 different CHP modules, ranging in size from 35 kW up to 4 MW, making it the premier packaged CHP provider with the widest range available in the United States.

TTCogen is initially funded by TEDOM and operates out of Tecogen's Waltham, MA headquarters. A few TEDOM experts have relocated from the Czech Republic to the United States. They are supplemented by several Tecogen dedicated sales and

engineering specialists. Further personnel are expected to be added as the business expands. The CHP units will be installed and serviced by Tecogen's network of service centers across the United States.



TTcogen LLC offers a complete package of 27 different CHP modules, ranging in size from 35 kW up to 4 MW.

Biofuel

Most notably, TEDOM's specialized line of cogeneration equipment has the power to operate on biofuel, a renewable energy source with a rapidly growing market. This is an important feature as the United States is expected to implement new regulations in the coming years which require that all food and agricultural waste be recycled.

New York City's zero waste initiative, for example, aims to reduce garbage by 90% in 2030. A substantial aspect of this initiative is the required collection of organic food waste for use in anaerobic digester facilities to fire large-scale CHP systems by using the resulting biogas as a fuel feedstock. Many of these facilities are planned for construction in 2017 and 2018. Those facilities would be ideal for TTcogen's equipment.

The biofuel CHP units could potentially also open up the market for agricultural installations that are starting to use their agricultural waste as a fuel source. Eventually, it may even open up the wastewater and landfill markets, similar to recent development seen in Europe.

First Orders Booked

The true beauty of this joint venture is that Tecogen in the past often got inquiries from potential clients who ended up not buying a

CHP unit from Tecogen because its equipment was not an appropriate size for the customer's facility. The building's required load was either too big or too small for Tecogen's equipment. Now, thanks to the much expanded offering, TTcogen is able to service those potential customers, quadrupling Tecogen's addressable market for CHP.

Only a few weeks after the JV was announced, it had already proven its value. In August, TTcogen won two orders. The first sale was for a TEDOM Micro 35 kW Combined Heat and Power unit, for a 138 unit multi-family residential building in Brooklyn, NY.

The compact natural gas powered unit – it has dimensions of only 76.8" L x 64.8" W x 72.3" H - is able to serve nearly the entirety of the building's domestic hot water load while also producing between 40% and 60% of the building's electric demand. In addition, the 'blackstart' capability of the Micro 35 allows it to provide power to the building in case of a blackout.

Very interesting to know is that this customer had been approached in the past by Tecogen, but it turned out that the building was undersized to install a Tecogen CHP, which comes with an output of between 60 kW and 100 kW. Now, thanks to the expanded TEDOM offering, an ideal solution could be offered. **So this was basically a lost opportunity that was turned into a sale thanks to the JV.**

The second sale was a 55kW CHP unit to an elementary school in New Jersey. The TEDOM Micro T55 natural gas powered CHP unit will serve all of the school's electrical and heating demand. This type of machine is particularly well suited for educational facilities with smaller energy requirements, as it has a compact equipment footprint, a long service life, and operates very quietly.

Similar to TTcogen's initial sale, this order was won thanks to Tecogen's cooperation with TEDOM. The project engineer specifically requested a 50-60 kW **synchronous generator** CHP. In the past, that request would have eliminated Tecogen from consideration as its smaller CHP units use **induction generators**. However, now TTcogen could step in and compete for the

project with the TEDOM synchronous generator portfolio.

SYNCHRONOUS VS INDUCTION GENERATOR

In a synchronous generator, the waveform of generated voltage is synchronized with (directly corresponds to) the rotor speed. In case of induction generators, the output voltage frequency is regulated by the power system to which the induction generator is connected.

The JV between Tecogen and TEDOM is clearly a success. In both cases a lost opportunity for Tecogen was turned into a sale thanks to the TTcogen joint venture. We expect the JV to have a bright future.

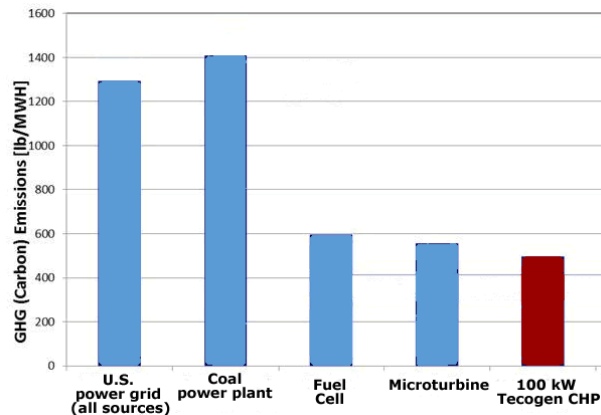
TECHNOLOGY

Combined Heat & Power (CHP) is truly a way to get “two for the price of one”. It produces the electricity or cooling power that a customer needs, and it captures much of the thermal energy that is normally lost during the energy conversion into power. With CHP, the “waste” thermal energy gets captured and put to good use on site, for heating water or building spaces. Waste heat captured from the cogeneration system can even be fed into a device called an absorption chiller, which is able to convert the waste heat into cooling. As such, a normally very energy intensive task, such as heating and cooling, is now accomplished at no additional cost to the customer or environment.

Tecogen’s products also address the global objective of reducing greenhouse gas emissions. When burned to generate power, natural gas produces lower carbon emissions per unit of energy than any fossil fuel, according to the EPA combined heat and power emissions calculator.

The Company’s products, in addition to using the lowest amount of carbon fuel, further reduce CO₂ emissions (greenhouse gases) because of a CHP’s higher efficiency. The graph on the right compares the CO₂ output

of a Tecogen product to that of the national electric grid and other generation technologies. It’s clear that the Tecogen systems are far superior to the grid and even outperform the CHP technologies of fuel cells and microturbines at a fraction of the cost.



Comparison of carbon emissions for various sources including Tecogen’s CHP and chiller products. Source: Company Filing.

Following is an overview of the three types of CHP systems that Tecogen offers. Also, the highly efficient Ultera system that makes CHPs meet the most stringent emissions standards is detailed below.

Combined Heat and Power

Tecogen’s premier cogeneration product is the recently launched InVerde e+ CHP system. The revolutionary unit combines the best technologies in the field, and features a unique set of proprietary innovations by the Tecogen team.

The InVerde incorporates an inverter, which converts direct current, or DC, electricity to alternating current, or AC. With an inverter, the engine and generator can run at variable speeds, which maximize efficiency at varying loads. The inverter then converts the generator’s variable output to the constant-frequency power required by customers (50 or 60 Hertz).

Thanks to the cutting edge inverter technology, an innovative power control, and a new and improved engine, the InVerde e+ reaches an electrical efficiency of 33%, while its nearest competitor achieves efficiencies between 27 and 29 percent.

Note that this efficiency only refers to the produced electricity and that the harvested heat to produce thermal energy is not taken into account. A Tecogen CHP system that also uses the recovered heat, achieves efficiency between 80 to 90 percent.

The DC input capability, facilitating battery or solar array integration, is another huge innovation. It allows for a seamless transfer of energy between the CHP unit, other energy generators, such solar panels, windmills, and backup batteries, eliminating the need for costly converters.

This way, the CHP unit basically becomes a complete **Building Energy Management System**. We're not aware of any CHP competitor having this feature.

BUILDING ENERGY MANAGEMENT SYSTEM (BEMS)

An energy management system (BEMS) is a sophisticated method to monitor and control a building's energy needs. Next to energy management, the system can control and monitor a large variety of other aspects of the building regardless of whether it is residential or commercial. Examples of these functions are heating, ventilation and air conditioning (HVAC), lighting or security measures.

The global market for building energy management systems continues to grow as technologies reach maturity and customers gain understanding of the business value generated by investment. According to Navigant Research, the global BEMS market reached \$2.4 billion in 2015 and is expected to grow to \$10.8 billion by 2024. Although Tecogen is a smaller player in this market, it does indicate the strong demand and growth potential.

Moreover, the new units automatically start up within 10 seconds in the event of a full blackout of the grid, making the CHP units compliant with the new strict Type 110 standard for emergency and standby power systems by the National Fire Protection Association (NFPA). This is yet another innovation that very few competitors offer.

The NFPA 110 standard covers performance requirements for emergency and standby power systems providing an alternate source of electrical power in buildings and facilities in the event that the normal electrical power source fails. Amongst these requirements is that the backup equipment needs to supply electrical power within 10 seconds of the blackout in order for it to qualify.

This is also the first engine-driven product to carry full UL 1741 Certification for "utility-safe" interconnection. So it doesn't need any additional permitting for interconnecting to the electric grid, speeding the installation process.

The best applications for Tecogen cogeneration systems are in facilities that have consistent electrical and thermal needs such as hospitals, nursing homes, colleges, schools, recreational facilities, government buildings, large residential facilities, industrial facilities, hotels, and ice rinks.

Ilios High-Efficiency Water Heaters

The Ilios water heater product operates like an electric heat pump but uses a natural gas engine instead of an electric motor to power the system.

The Ilios high-efficiency water heater, uses a heat pump, which captures warmth from outdoor air even if it is moderately cool outside. Heat pumps work somewhat like a refrigerator, but in reverse. Refrigerators extract heat from inside the refrigerator and move it outside the refrigerator. Heat pumps extract heat from outside and move it indoors.

In both cases, fluids move the heat around by flowing through heat exchangers. At various points the fluids are compressed or expanded, which absorbs or releases heat.

The gas engine's waste heat is recovered and used in the process, unlike its electric counterpart, which runs on power that has already lost its waste heat.

The net effect is that the efficiency of an Ilios' heat pump far surpasses that of conventional boilers for water heating. This translates

directly to lower fuel consumption and, for heavy use customers, significantly lower operating costs. Gas engine heat pumps can deliver efficiencies in excess of 200%.

The Ilios market continues to expand both geographically and into different end-market segments. The high-efficiency water heater is ideal for locations with a gas demand of at least 4000 Therms/month, such as water parks, swimming pools, hotels, hospitals, apartment buildings and recreation centers. The Ilios system also attracts customers that consistently have the simultaneous need for heating and cooling, such as manufacturing and R&D type facilities.

Chillers

TECOCHILL natural gas engine-driven chillers provide building owners with a reliable, proven, efficient, and cost-effective alternative to conventional electric motor-powered chillers. It's the only natural gas engine-driven chiller on the North American market in its size range.

This technology was developed in 1987. The engine drives a compressor that makes chilled water; while the engine's free waste heat can be recovered to satisfy the building's needs for hot water or heating. This process is sometimes referred to as "mechanical" cogeneration, as it generates no electrical power, and the equipment does not have to be connected to the utility grid.

A TECOCHILL's benefits are significant. It cuts a building's cooling costs in half, by eliminating most of the electrical demand (kW) associated with providing cooling. In addition, it offers optional "waste" heat that is always available at the same time. This high-quality heat source (up to 230°F hot water) literally comes for free, whenever the chiller is running.

The TECOCHILL chillers are available in capacities ranging from 25 to 400 tons, with the smaller units air-cooled and the larger ones water-cooled. They are ideal in facilities where new chilling capacity is desired, as replacements for aging electric chilling equipment, where the local electric utility's

kW demand charges are high, or where the site's electrical capacity is limited.

Basically, they make sense wherever large chillers are needed, including hospitals, colleges, schools, office buildings, aquariums, government buildings, large residential facilities, industrial facilities, hotels, and ice rinks.

More recently, sales in the agricultural space have taken off. For example, the Company sold several chillers to indoor growing facilities. Although these particular customers will use the chillers in the cannabis production industry, there are thousands of farmers with greenhouses or indoor facilities that grow fruits, vegetables, plants or flowers, that could also benefit from a similar installation.



The TECOCHILL chillers are ideally suited for use in greenhouses.

Ultra

In 2008 there was a dramatic change in the air quality regulations in Southern California. At that time no technology could meet the new, stricter, emission standards.

In reaction to the new regulations, Tecogen developed the Ultra technology between 2009 and 2010 as part of a research effort funded by the California Energy Commission and Southern California Gas Company. The objective was to bring emissions from natural-gas engines and CHP systems into compliance with California's new standards, which were then and still are, among the most stringent standards in the world.

Tecogen decided to look at the chemistry of emissions instead of the mechanical controls

of the engine to simultaneously get rid of NOx compounds, CO and hydrocarbons. They broke the catalyst process into two steps and ran each step at a different temperature. By controlling the temperature in the first stage, the system could achieve very low NOx emissions. In a second stage process the remaining pollutants were oxidized by injecting a little air between the first and second stages and altering the process conditions.

Tecogen conducted three validation programs for its revolutionary technology:

- ▣ **Third-party laboratory verification** - The AVL California Technology Center, a long-standing research and technology partner with the international automotive industry, confirmed Ultera's results in their state-of-the-art dynamometer test cell, which was outfitted with sophisticated emissions measurement equipment.
- ▣ **Verifying longevity and reliability in the field** - One of Tecogen's 75-kW units, already operating at a customer location in Southern California, was equipped with the Ultera low-emissions technology and a device to monitor emissions continuously. The Ultera low-emissions system operated successfully for more than 25,000 hours, approximately 3.5 years, and consistently complied with California's stringent emission standards over the entire field testing period.
- ▣ **Additional independent tests** - During the field test, two companies, licensed in California to test emissions, each verified the results at different times. The results from one of these tests (obtained in August 2011) enabled the Company to qualify for New Jersey's fast-track permitting for low emissions equipment. Virtually every state nationwide requires some kind of permit related to local air quality, but New Jersey allows an exemption for systems such as Tecogen's that demonstrate superior emissions performance. This certification was granted in November 2011.

In 2012, a 75 kW CHP unit equipped with the Ultera system became the first unit to obtain a conditional air permit in Southern California since the strict regulations went into place in 2009. A state-certified source test, administered in January 2013, verified that the emissions levels of the system were well below the new permitting requirements, and the final permit version was approved in August 2013.

The annual output of emissions of the InVerde unit equipped with the Ultera technology is extremely low and compares favorably with alternative energy technologies producing the equivalent energy output on an annual basis (100 kW, 670,000 Btu/hr).

This technology was patented in the United States in October 2013 with many foreign patents granted or applications pending. The Ultera low-emissions technology repositions the Company's engine-driven products in the marketplace, making them comparable environmentally with emerging technologies such as fuel cells, but at a much lower cost and greater efficiency.

Tecogen originally developed and patented the Ultera-low emission control technology for its own CHP products and has since decided to make the technology available for retrofit on non-Tecogen applications.

The Ultera retrofit kits deliver simple, cost-effective and robust solutions for meeting even the most stringent emissions standards. The patented system provides peace of mind to its customers by lowering NOx and CO to near-zero levels without the need for complex additional controls or frequent maintenance.

ULTRATEK JV

Adapting the Ultera technology to gasoline fueled automotive engines, represents an exciting and potential game-changing new market for Tecogen. The prospect of vehicle and stationary engines, with standard engine technology, but realizing fuel cell like emissions is tremendously compelling from a policy and market standpoint.

In December 2015, following the outbreak of the Volkswagen emissions scandal, Tecogen formed Ultra Emissions Technologies Ltd (Ultratek), a joint venture to pursue this once-in-a-lifetime opportunity.

Tecogen received an initial 50% equity interest in the JV in exchange for a fully paid-up worldwide license to use Tecogen’s Ultra emissions control technology in the field of mobile vehicles burning gasoline. The other half of the joint venture equity interest was purchased for \$3,000,000 by a small group of offshore investors.

In August 2016, the Ultratek stakeholders invested an additional \$4 million, and the following month another \$6.25 million was raised in a third round financing, bringing the total cash on hand to approximately \$12.5 million. Very interesting to know is that investors in the third round of funding paid a substantial premium to prior funding rounds. During the initial round money was raised at \$2 per share, while the second round – exercise of warrants - was conducted at \$1 per share. In the third round investors paid \$7.1656 per share. This gives ULTRATEK a valuation of \$58.2 million!

Although the emissions scandal for vehicles has primarily been about diesel engines, for which the Ultra technology is not suited, gasoline vehicles have been included in the larger problem of being certified in tests that underrepresent their true on-road emissions levels. In fact, European regulators are now implementing on-road, real-world driving tests for vehicle emissions compliance - the United States is considering similar testing standards.

Excellent Test Results

During Phase I testing on a light-duty vehicle, conducted in April 2016, Ultra delivered a stunning 94% reduction in carbon monoxide (CO) and an 84% reduction in non-methane organic gasses (“NMOG” - the pollutant that reacts with NOx to produce ozone).

The results conclusively proved the Ultra technology to be highly effective in reducing pollutants from the test vehicle, in excess of emissions reduction technologies currently in use today.

	CO	NMOG	NOx	Nox + NMOG
Standard Vehicle	332	5.234	5.763	10.997
With Ultra	20	1.001	5.072	6.074
% Reduction	94%	81%	12%	45%

Drive cycle test results - Emissions (mg/mile). Source: Company Presentation

As a result of these highly encouraging Phase I results, Phase 2 testing on a broader range of vehicles commenced in September of this year. This phase was concluded late October and was successful in accomplishing its goals with an Ultra device that was even more accurate than the unit used in Phase I. According to the Company, the tests have provided plenty of data showing the system’s effectiveness.

The next step for ULTRATEK is to compile the test data and prepare a paper, which will be presented at the prestigious SAE conference in April 2017.

SAE INTERNATIONAL

With more than 127,000 members globally, is a U.S.-based, globally active professional association and standards developing organization for engineering professionals in various industries. Principal emphasis is placed on transport industries such as automotive, aerospace, and commercial vehicles.

The SAE paper is a significant validation of the tests. After all, the most important aspect of negotiating with an automotive component supplier or car manufacturer is to make sure that the test data is unassailable and verified.

Needless to say that continued positive developments in the billion dollar automotive emissions market, would be a massive game changer for Tecogen.

RECENT EVENTS

Tecogen Outperforms in New York

A few days ago, Tecogen announced the sale of a 300kW InVerde e+ CHP system to Fairview at Forest Hills, NY. The multi-family

residential condo-coop building is a 14-story, 464-unit with abundant amenities including a large pool, recreation center, and modern on-site laundry facilities.

Fairview is the most recent of a series of Tecogen contract wins in the New York City area. Others include:

- ❑ Several CHP systems for a correctional facility in New York (October 2016);
- ❑ Two Tecogen e+ 100kW CHP systems for Glenn Gardens, a 266-unit residential building on Manhattan's Upper West Side (September 2016);
- ❑ Three InVerde 100 kW units to a multi-family residential building in the Coney Island section of Brooklyn, NY (August 2016);
- ❑ Two CM-75 kW units for a 454-unit multi-family residential building in Yonkers, NY (July 2016);
- ❑ A state-of-the-art InVerde e+ 100 kW unit for a 14-story student housing building near Central Park in New York City, NY (July 2016);
- ❑ Three CM-75 kW CHP units for three different schools in and around New York and New Jersey (July 2016); and
- ❑ An InVerde e+ 100 kW machine for Silver Towers, a luxury 277-unit residential building in Queens, New York (June 2016).

This level of activity in New York is mainly driven by one of the highest spark spreads in the United States. The spark spread is the ratio between the price charged for electricity and the price charged for the fuel used to generate that electricity — which, in Tecogen's case — is natural gas. New York's electricity rates are high and its natural gas rates are low, making it an optimal market for the introduction of CHP, particularly in large facilities like multi-housing units, hospitals, schools and more.

In addition, the availability of government incentives and strict emissions regulations add to the growing interest and demand in Tecogen's clean energy products. The InVerde e+ comes fitted with Tecogen's patented Ultera emissions control technology, making it the only natural gas powered CHP product on the market to nearly eliminate

harmful criteria pollutants that contribute to smog—especially important in large, metro areas like New York City.



Tecogen was awarded a contract worth \$1.4 million to install CHP units at a federal prison in New York.

Tecogen's technology leverages the latest in energy efficiency design with results unmatched by other competing providers. InVerde e+'s electrical efficiency is 7.5 percent greater than prior models and even 15 percent greater than the competition.

Money is also saved through the recovery of free waste heat from the electric generator which can be used in climate control and to provide hot water, cutting a building's energy bills in half while also reducing sites' carbon footprints. As a result of the equipment's superior efficiency over the utility grid, each InVerde e+ saves 378 tons of carbon dioxide annually – the equivalent of removing 72 cars from the road or planting 15,729 trees.

This is only the latest, but surely not the last, installation for Tecogen's environmentally and pocket-book friendly products in the New York market as interest, and positive word-of-mouth, continues to spread.

Tecogen Acquires American DG Energy

Early November 2016, Tecogen announced that it would acquire American DG Energy (NYSE Mkt: ADGE), which offers On-Site Utility energy solutions without any capital or start-up costs to the customer and at lower costs than charged by conventional energy suppliers.

When the acquisition is completed, which is expected in the first half of 2017, Tecogen will

be able to offer a cost-free-installation option to customers that don't have access to financing, or that are not interested in owning and maintaining the equipment.

Noteworthy is that when combined, approximately half of Tecogen's annual revenue will be derived from stable, long-term contracted sources (Tecogen Service revenue and American DG Energy revenue). This revenue base will provide a reliable funding source for both operating expense and growth initiatives, while also making Tecogen's revenue profile more predictable, as the revenue volatility caused by somewhat cyclical equipment sales and installations is reduced.

Another major advantage of the acquisition is that there will be plenty of cost saving opportunities. For instance, the combined companies are expected to benefit from approximately \$1 million of general and administrative cash savings as duplicative functions are eliminated. Also, the merged companies will allow for more efficient deployment of service technicians thanks to Tecogen's wide service network. In addition, a consolidated inventory will improve purchasing economics and shipping costs.

Finally, Mr. Locke mentioned during Tecogen's third quarter conference call that the acquisition of American DG will be accretive.

RECENT EVENTS

Advancing Ultera in the Fork Truck Market

In October 2016, Tecogen was awarded a research grant from the Propane Education & Research Council (PERC) to fund the development of its Ultera technology for the propane powered fork truck market. The grant covers testing and development of a prototype solution in conjunction with PERC and two fork truck manufacturers.

The goal of this project is to develop an Ultera system that can be used on propane powered fork trucks. While these are very versatile in use - contrary to its electric and diesel

powered competitors - their emissions are harmful to the driver and co-workers when used indoors or in poorly ventilated locations.

Testing is expected to get underway in early 2017 and run for approximately nine months.

PROPANE EDUCATION & RESEARCH COUNCIL

The Propane Education & Research Council is a nonprofit organization established, operated, and funded by the propane industry. The only energy council of its kind, PERC educates consumers about propane's many uses and benefits, leads safety and training efforts among propane retailers and consumers, and drives technology development to expand adoption of propane as a clean, affordable, American-made energy source.

"Fork trucks are often used inside large warehouses where indoor air quality is a serious concern. Eliminating pollutants from vehicles operating indoors is important to the fork truck industry and their customers," said Robert Panora, Tecogen's President, Chief Operating Officer, and one of the inventors of the Ultera system.



The primary benefit of the Ultera-equipped propane fork truck will be fuel like emissions and a propane-green brand that offers a robust indoor air quality advantage without compromising vehicle performance.

This grant award is yet another demonstration of Tecogen pushing Ultera into new applications. Hundreds of thousands propane driven fork truck units are sold worldwide each year. Consequently, the fork truck market represents a significant opportunity

for Tecogen to build upon its prior successes with the Ultera system.

Another major advantage is that select industry-leading fork truck manufacturers are participating in the research initiative. This indicates that there's a real need and willingness to find and implement a solution.

FINANCIALS

Sales for the third quarter, ended September 30, 2016, were \$6,616,455, a 41.5% increase, compared with sales of \$4,676,042 in the third quarter of 2015.

Product sales revenues grew 53.2% over the prior year comparable quarter. Higher cogeneration product sales delivered the entirety of this growth, partially offsetting a year-on-year decline in Chiller & Heat Pump sales. Note that no less than ten chillers and heat pumps are currently included in the backlog.

Amounts in \$000's	09/30/16	09/30/15
Product Revenues	2,851	1,861
Service Revenues	3,766	2,815
Total Revenues	6,616	4,676
Cost of Product Sales	1,715	1,262
Cost of Services Sales	2,126	1,745
Total Cost of Sales	3,842	3,007
Gross Profit	2,775	1,669
Operating Expenses	2,525	2,593
Income (Loss) from Operations	249	(924)
Total Other Expenses	(42)	(66)
Net Income (Loss)	208	(949)
Diluted EPS	0.01	(0.06)
Diluted Shares Outs.	20,229	17,154
Most important income statement data for the quarters ending September 30, 2016 and September 30, 2015. Source: Company Filing		

Also Services revenues continued benefiting from increasing penetration in service contracts and favorable operating metrics for the installed fleet. Services revenues grew 33.8% in the third quarter, compared with Q3 2015. It is expected to continue to develop as an important revenue stream.

Net income for the three months ended September 30, 2016 was \$207,868 or \$0.01

per share, compared with a net loss of \$948,842 or \$0.06 per share in the same period in 2015.

On a combined basis, operating expense fell to \$2,525,325 for the third quarter 2016 from \$2,592,676 in the third quarter of 2015, a 2.6% improvement and in line with management's goal to deliver full year operating expense near \$10 million.

Note that **Product revenue** is derived from the sale of the various cogeneration and chiller units. Because the equipment is built to last 20 or more years, most of the product sales are to first time customers. The sales cycle for each module varies widely, and can range from as short as a month to as long as a year or more. The cogeneration and chiller modules are built to order and revenue is recognized upon shipment.

The Company's **service revenue**, however, lends itself to recurring revenues from particular customers. For the last two fiscal years, close to one third of Tecogen's revenues were generated from long-term maintenance contracts, which provide the Company with a somewhat predictable revenue stream.

Revenues in the first nine months of 2016 were \$17,379,278 compared to \$17,163,307 for the same period in 2015, an increase of \$215,971 or 1.3%. Product revenues in the first nine months of 2016 were \$7,525,909 compared to \$8,744,306 for the same period in 2015, a decrease of \$1,218,397 or 13.9%. This decrease was the aggregate of a decrease in cogeneration sales of \$1,263,891 and an increase in chiller and heat pump sales of \$45,494. Service revenues in the first nine months of 2016 were \$9,853,369 compared to \$8,419,001 for the same period in 2015, an increase of \$1,434,368 or 17.0%. This increase in the first nine months of 2016 is due to an increase in installation activity of \$879,411 and an increase of \$554,957 in the service contracts.

Balance Sheet as of September 30, 2016

Tecogen finished the third quarter of 2016 with a little over \$3.5 million in cash,

compared with almost \$4 million one year ago. Also noteworthy is that the Accounts Receivable rose by as much as \$3.6 million. This was due to the large number of machine installations lately.

Amounts in \$000's	09/30/16	09/30/15
Cash and Cash Eq.	3,502	3,970
Accounts Receivable	7,957	4,331
Inventory	5,058	4,700
Total Current Assets	19,501	16,451
Property & equipment	548	565
Intangible Assets	1,042	1,046
Total Assets	23,191	18,173
Accounts Payable	3,033	2,842
Accrued Expenses	1,190	1,138
Total Current Liabilities	5,237	4,537
Promissory Note	3,137	3,000
Total Liabilities	8,813	7,953
Total Stockholder Equity	14,377	10,221

Most important balance sheet data for September 30, 2016 and September 30, 2015. Source: Company Filing

Consolidated working capital at September 30, 2016 was \$14.26 million compared to \$11.91 million at September 30, 2015, a solid increase of \$2.35 million. Tecogen also has a strong current ratio of 3.72.

OUTLOOK & VALUATION

Becoming profitable is always a major turning point at a company. It's no different at Tecogen. But let's be clear, despite its significantly improved financial results, the Company has only started scratching the surface of the huge clean energy market.

Not only is the core business performing exceptionally well, Tecogen also has plenty of growth initiatives. TTcogen for example. During its first full quarter of operation, the joint venture made steady progress toward building product awareness and establishing relationships with key partners. Initial sales were focused around the smaller 35kw CHP system, but larger megawatt system sales are expected down the line.

A second growth driver will undoubtedly be the acquisition of American DG Energy. The transaction will create a vertically integrated clean technology company able to offer equipment design, manufacturing, installation, financing, and long term maintenance service. Bringing American DG under the Tecogen umbrella allows the combined company to offer a cost-free-installation option to customers.

We also expect a lot from the research contract that was awarded to Tecogen by the Propane Education & Research Council (PERC) to develop Ultera for the propane powered fork-truck market. The project will assess the adaption of Tecogen's technology for the category in collaboration with select leading fork truck manufacturers - ultimately with the goal of developing an ultra-clean propane fork truck offering a robust indoor air-quality advantage without compromising vehicle performance.

This grant award is yet another demonstration of Tecogen pushing Ultera into new applications. Hundreds of thousands propane driven fork truck units are sold worldwide each year. Consequently, the fork truck market represents a significant opportunity for Tecogen to build upon its prior successes with the Ultera system.

Another major advantage is that select industry-leading fork truck manufacturers are participating in the research initiative. This indicates that there's a real need and willingness to find and implement a solution.

And as the potential icing on the cake, Tecogen's ULTRATEK joint venture successfully completed Phase II testing. Results will be presented next year at the prestigious SAE International event.

ULTRATEK now has a little over 8.1 million shares outstanding (including 250,000 warrants), giving the JV a valuation of \$58.2 million. Knowing that Tecogen owns 43.09% of ULTRATEK's shares, its stake is worth about \$25 million. Given Tecogen's \$91 million market capitalization, the Company's core business is valued at only \$66 million, which is very low.

Valuation

We see tremendous potential for Tecogen as its management believes it will be profitable going forward, while its growth opportunities come to fruition.

Given the still emerging nature of Tecogen's earnings, a multiple-based valuation is challenging. Instead, we apply a Discounted Cash Flow (DCF) model.

Based on our estimate of 22 million diluted shares outstanding, the intrinsic value of Tecogen's shares derived from our model is \$9.72, an 8% increase compared to our previous report, which is justified with the Company becoming profitable.

We reiterate our buy recommendation for Tecogen Inc. with a price target of \$9.72, which is 123% above today's stock price.

SHARE DATA & OWNERSHIP

As of November 4, 2016, Tecogen had 19,949,672 common shares outstanding. In addition, the Company has 1.13 million options outstanding with an average exercise price of \$3.07. And finally, Tecogen has \$3,000,000 convertible debt, which is convertible into 889,830 shares of common stock.

The principal owners of the Company's common stock are John Hatsopoulos (19.0%), George Hatsopoulos (18.0%), Michaelson Capital Partners (6.0%), Joseph Ritchie (4.5%), and Clear Harbor Asset Management (3.3%).

MANAGEMENT

▣ DR. JOHN N. HATSOPOULOS – CO-CHIEF EXECUTIVE OFFICER

Dr. Hatsopoulos has been the Chief Executive Officer of the Company since the organization of Tecogen in 2000. He has also been the Chief Executive Officer of American DG Energy Inc. since 2000, and the Chairman of EuroSite Power Inc. since 2009. Mr. Hatsopoulos is a co-founder of Thermo Electron Corporation, which is now Thermo Fisher Scientific (NYSE:

TMO), and the retired President and Vice Chairman of the Board of Directors of that company. Mr. Hatsopoulos graduated from Athens College in Greece, and holds a bachelor's degree in history and mathematics from Northeastern University, as well as honorary doctorates in business administration from Boston College and Northeastern University.

▣ BEJAMIN LOCKE – CO-CHIEF EXECUTIVE OFFICER

Mr. Locke was named Co-Chief Executive Officer in October, 2014. He joined Tecogen in June, 2013 as the Director of Corporate Strategy and was promoted to General Manager prior to his appointment as Co-CEO. Previously Mr. Locke was the Director of Business Development and Government Affairs at Metabolix, responsible for developing and executing plans for partnerships, joint ventures, acquisitions, and other strategic arrangements for commercializing profitable clean energy technologies. Mr. Locke has a B.S. in Physics from the University of Massachusetts, an M.S. in Electrical Engineering from Tufts University, and an MBA in Corporate Finance from Boston University.

▣ ROBERT PANORA – CHIEF OPERATIONS OFFICER

Mr. Panora has served as President of Tecogen since 2000. He had been General Manager of Tecogen's Product Group since 1990 and Manager of Product Development, Engineering Manager, and Operations Manager of the Company since 1984. Over his 27-year tenure with Tecogen, he has been responsible for sales and marketing, engineering, service, and manufacturing. Mr. Panora contributed to the development of Tecogen's first product, the CM-60 cogeneration module, and was Program Manager for the cogeneration and chiller projects that followed. Mr. Panora has B.S. and M.S. degrees in Chemical Engineering from Tufts University.

▣ DAVID A. GARRISON – CHIEF FINANCIAL OFFICER

Mr. Garrison has been the Chief Financial Officer, Treasurer and Secretary of Tecogen since August of 2014. Prior to joining Tecogen, Mr. Garrison was Executive Vice

President and Chief Financial Officer of Arrhythmia Research Technology, Inc. and its subsidiary Micron Products, Inc. since 2002. Leading the finance department of this NYSE listed company, Mr. Garrison oversaw all aspects of SEC compliance, internal controls and raising capital through debt in a capital intensive medical device manufacturing business. Mr. Garrison hold a B.S. in Finance from Miami University and a Master in Business Administration from Boston University.

▣ **JOSEPH GEHRET - CHIEF TECHNOLOGY OFFICER**

Mr. Gehret is Tecogen's Chief Technical Officer. He is responsible for leading technology development at Tecogen and defining the Company's research and development efforts. With an expansive depth and breadth of classic as well as cutting edge technology, he has been integral in the development of all Tecogen products and technology for 30 years. He is the primary author on all of Tecogen's major patents. He has a B.S. in Mechanical Engineering as well as an M.S. in Nuclear Engineering, both from the Massachusetts Institute of Technology.

ANNUAL INCOME STATEMENT FY 2013 – 9M 2016

All numbers in thousands

PERIOD ENDING	FY 2013	FY 2014	FY 2015	9M 2016
Total Revenue	15,850	19,343	21,443	17,379
Cost of Revenue	10,820	12,944	13,809	10,782
Gross Profit or (Loss)	5,030	6,399	7,633	6,597
Operating Expenses				
General & Administrative	5,931	7,265	7,998	5,898
Selling	1,424	1,796	1,687	1,218
R&D	1,087	1,041	592	525
Total Operating Expenses	8,700	10,102	10,277	7,640
Operating Income or (Loss)	(3,670)	(3,703)	(2,643)	(1,043)
Other Income or (Expense)				
Interest & Other Income	4	10	14	10
Interest Expense	(141)	(177)	(172)	(132)
Income or (Loss) attributable to the non-controlling interest	357	125	74	65
Net (Loss) attributable to Tecogen Inc.	(3,449)	(3,746)	(2,727)	(1,101)

Annual Income Statement FY 2013 – 9M 2016. Source: Company Filings



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