CAPSTONE TURBINE (NASDAQ: CPST)

Capstone Positioning Itself for The Hydrogen Economy

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Shawn Severson
Head of ClimateTech & ESG Research
shawn@watertowerresearch.com
+1 (312) 283 7595

KEY POINTS

- Capstone is positioned in the distributed energy generation (DEG) - or microgrid industry - with a proprietary microturbine technology platform and fuel flexibility.
- According to Capstone, its platform can reduce energy costs, ensure power availability, and meet CO2 reduction goals with a near-zero emissions profile, which also positions the product within the customer's Environmental, Social & Governance (ESG) framework.
- Broader industry megatrends are expected to generate incremental demand for technologies and services that help companies reduce their carbon footprint, driven by regulation as well as heightened corporate responsibility.
- The global microgrid industry is expected to grow over 10% CAGR between 2020 and 2025 and we expect the industry will continue to benefit over an even longer time horizon.
- Capstone's business has pivoted over the last 12 months to increasingly focus on developing an energy as a services business (EaaS) around its core energy technology platform.
- If the company can continue to execute on an EaaS strategy, it should lead to more predictable and stable cash flows, despite product orders and backlog experiencing variability quarter to quarter.
- The company recently reached adjusted EBITDA breakeven following a multi-year cost cutting effort, but also acutely demonstrated the importance and positive impact EaaS can have on profitability.
- In addition to the existing distributor sales model, Capstone has initiated a National Account effort, which management believes will better target more substantial, corporate accounts with the potential to land larger orders for multiple locations.

CATALYST MONITOR

- Continue to pivot towards the EaaS model demonstrated by growing the rental fleet.
- Refinancing the Goldman Sachs' note of $30M Senior Secured Notes and sourcing additional capital to drive the EaaS strategy and in particular the rental business.
- Management has stated FY21 goals of $10M+ of Y/Y adj. EBITDA improvement, 10MW of rentals, 22% gross margin, 15% of revenue from direct sales and 6 inventory turns.

KEY STATISTICS*

Price:	$5.38
52 Week Range:	$1.00 - $6.00
Avg. Daily Vol. (90 day)	198,665
Shares Out (MM):	11.02
Market Cap (MM):	$53.47
Institutional Ownerships	8.5%
Short Int. (MM)/ % of float:	0.17 / 1.6
Debt to Equity.:	279%
Revenue TTM (MM):	$63.9

*Source: YCharts, *As of Oct. 5, 2020*

OUR INSIGHT

The Opportunities

The hydrogen economy has gained substantial momentum over the past 12 months. Hydrogen is frequently used as a fuel in fuel cells, but can also be used a fuel for combustion-based energy systems. Capstone has historically updated and modified its energy systems to have fuel flexibility. As hydrogen becomes more widely available, energy systems will need to have flexibility to use hydrogen as a fuel. Hydrogen and especially green hydrogen, are believed to be positioned for meaningful growth in the coming years. As a result, Capstone needs to have a solution to capitalize on this trend. To date the company has demonstrated that it can run on a 20% hydrogen mix, but recently announced new a Research & Development partnership with Argonne National Laboratory and ran a 70% hydrogen - 30% natural gas blend. This is a promising milestone toward a goal of 100% hydrogen. The real value sits in the broader context of fuel flexibility and providing a customer with options.

The Obstacles

Hydrogen is certainly an interesting addition to Capstone's flex fuel strategy. However, 100% hydrogen fuel represents many challenges that are not currently experienced with current gaseous product lines and addressed in this Management Series. Hydrogen has received significant press recently, but there is still a long way to go for broad-based commercial availability of hydrogen, so we do not expect this to be a major factor anytime soon. Nonetheless having this as an option expands fuel flexibility and is a high-profile addition to the platform.

COMPANY OVERVIEW

Capstone Turbine Corporation® states it is the world's leading producer of highly efficient, low-emission, resilient microturbine energy systems. Capstone microturbines serve multiple vertical markets worldwide, including natural resources, energy efficiency, renewable energy, critical power supply, transportation and microgrids.

Capstone offers a comprehensive product line-up, providing scalable systems focusing on 30 kWs to 10 MWs that operate on a variety of gaseous or liquid fuels, including hydrogen, and provide solutions for distributed power generation needs. The company is pivoting its focus to further emphasise energy as service (EaaS), which is comprised of growing its rental fleet and aftermarket service and components business described as a Factory Protection Plan (FPP).

For further information please visit www.capstoneturbine.com.

CPST'S PRODUCTS

EXECUTIVE IN FOCUS

Don Ayers, Director of Product Engineering

Mr. Ayers has been serving Capstone Turbines as a Director of Product Engineering since 2014. Prior to joining Capstone, he held program/project manager positions at L-3 Communications, Technicolor and Kavilco.

He holds a masters in business administration from Pepperdine Graziadio Business School and a bachelors in mechanical engineering from Purdue University.

Shawn Severson: Thanks for joining us today, Don, as we continue our look at hydrogen and the impact it is having on companies across our ClimateTech & Sustainable Investing universe. For investors new to Capstone, can you give a brief description of the core technology and tell us a bit more about yourself?

Don Ayers: Thank you, Shawn. First, let me introduce myself; my name is Don Ayers. I am responsible for Engineering and Quality here at Capstone. I attended Purdue University as an undergrad, where my love affair with turbine technology was born. I had the honor of assisting Professor L'Ecuyer as my senior project, where we built and operated a turbine engine using spare parts from the scrap bin outside the combustion labs. We pulled out a Detroit Diesel turbocharger, and an old Boeing combustion can, then integrated them as a simple cycle turbine. Since then, I have worked in many different technical positions supporting the turbomachinery, Department of Defense, automotive, entertainment, and satellite communication industries, ultimately returning to my first love here at Capstone Turbine. I have been at Capstone for roughly seven years, with roles leading new product development such as our Signatures Series packaging, global grid interconnect certifications, and rolling out product improvements to the field.

Capstone's core turbine technology is built upon a single moving part, supported by patented air bearing technology. This achievement cannot be minimized as it reduces the long-term cost of ownership from a highly reliable foundation. Rising from this foundation is a sophisticated and flexible controls and electronics architecture that enables us to adapt our systems to a wide range of different applications, operating modes, accessories, and customer requirements. From these two proven and unique technology baselines, we have an amazing ability to address emerging markets with limited development expenses and quick time to market. A recent example of this was our introduction of first a propane system and then a butane system, each requiring minimal hardware changes (and no changes to our foundational turbine technology) but capitalizing instead on our software controls, allowing us to address these developing markets very quickly.

Shawn Severson: Let me begin by addressing a technology issue: what is different about hydrogen as a fuel vs. say natural gas, which is commonly used in your systems today? What are the unique technological challenges created by hydrogen, and what types of modifications are needed to accommodate hydrogen as a fuel.

Don Ayers: Hydrogen is a fuel that is not naturally occurring. It must be created from something else. In terms of the market today, it is produced as an industrial by-product and through various processes to convert other resources, such as coal, methane, and water, into hydrogen and other constituents, including carbon. Further carbon reductions can be made through carbon capture. The buzzword today is green hydrogen, which is produced through the electrolysis of water, producing no carbon by-product, thus enabling a

source of ultra-clean burning hydrogen. By using surplus renewable energy to run an electrolyzer, you have the most efficient and environmentally friendly way to create hydrogen. This process is known as Power to Gas. The trick once hydrogen is created is how do you store it, transport it, distribute it, and ultimately use it in the most cost-effective manner. Because our existing natural gas infrastructure cannot support the distribution of pure hydrogen, the capital investment and time for the upgrade will be quite long. This is the subject of debate amongst the industry as to when a hydrogen product should be ready. For Capstone as a distributed energy technology, our future will certainly be faster as we can be placed directly at the source of hydrogen generation. Our current off-the-shelf product is already capable of using blended hydrogen and natural gas, with no additional changes required. Recently, we announced new Research & Development partnership with Argonne National Laboratory, we were able to run a production-level C65 with a 70% hydrogen - 30% natural gas blend. This is a very promising milestone leading into our next steps of 100% hydrogen development.

100% Hydrogen fuel, though represents many challenges that are not currently experienced with our current gaseous product lines. Hydrogen is the smallest atom and, as such, is difficult to handle. It finds all sorts of ways to escape around, though, and into other materials that are intended to prevent this from happening. In addition, the extremely low energy density means more hydrogen by volume needs to be flowed than would be required with natural gas. All of this means that innovative ways of delivering the fuel to the injectors must be addressed at the proper inlet conditions.

Once within the combustion environment, hydrogen has numerous challenges, and this is where most research and development efforts are concentrated at Capstone. Compared to methane, hydrogen has a very high flame speed, a higher flame temperature, wide combustibility range, and low ignition energy. These constraints make typical dry low NOx lean combustion systems challenging. Capstone has been working for 15 years to evaluate and iterate our combustion designs to be able to support the evolution to 100% hydrogen. These efforts lead to new two patents recently issued in 2019.

However, not all product development is focused solely on safe and efficient hydrogen combustion. Significant effort must be made in the detection, control, and mitigation of hydrogen, both as a gas and as a flame, from a safety perspective. The microturbine system package will need to be updated to detect, ventilate, and control, to the best extent possible, fugitive hydrogen that could potentially leak, but also that may be present due to external circumstances, such as an emergency system stop event.

Shawn Severson: Let me follow up on that question and help me understand exactly where the technology roadmap is going to from today and how will it ensure that Capstone will clearly sit in the hydrogen economy?

Don Ayers: Capstone has been working for 15 years on the fuel evolution of our core product lines, including our 1 MW

systems. We took a dual-path approach to this development effort. The first path was to iterate our products to operate on progressively harder fuels to handle and safely burn. These fuels included medium BTU fuels, commonly produced by wastewater treatment plants, and higher energy content fuels such as propane, and more recently, butane. These latter fuels are harder to handle in that we require a high-pressure gas, and it is imperative to maintain them in gaseous form throughout fuel delivery into the microturbine combustion system. They also have higher flame speeds relative to natural gas, much like hydrogen does. We work very closely with our global distributor network to ensure the sites are appropriately designed to deliver the fuels at the right temperatures and pressures, and we have designed our fuel delivery systems to continue this control through to the injectors. Our combustion components have also been updated to provide better flame speed control through appropriate dilution and control of pre-mix conditions. We have been extremely successful with these products. The next step on this roadmap is to pursue associated gas opportunities that contain various levels of pentane and hexane.

The second path was more forward-looking. In the early 2000's President Bush launched the Hydrogen Fuel Initiative to develop technologies and infrastructure for hydrogen. Overall, technology at that time and the cost of infrastructure were barriers to progress, and certainly not cost competitive to natural gas in the fracking era. The Capstone team recognized that we needed to be ready when the time came. We have partnered closely with the Department of Energy, specifically Argonne National Laboratory and the University of California, Irvine to run injectors and complete systems on pure hydrogen to evaluate the conditions leading to combustion flashback, to promote combustion stability, and to define a fuel-flexible turbine system. Coming out of these experiments, Capstone received patents on injector designs for high flame speed fuels and fuel flexible technology. These partnerships continue today, where we continue to explore higher flame speed fuels, new injector designs, and controls that exploit our core microturbine technology foundation.

Shawn Severson: Thanks, Don. So, it is clear you have a technology roadmap to pursue hydrogen as a fuel, but I want to take a step back and ask why pursue this as a strategic initiative at all? Is it something that customers are demanding currently, or what is the genesis behind all of this? Have you sold any systems using hydrogen?

Don Ayers: The interest in hydrogen has been growing steadily over the past couple of years. There is definitely more of a push recently as climate change concerns and the initiatives to reduce carbon emissions have expanded internationally, and milestone dates have been moved forward. For combustion technologies, renewable natural gas and hydrogen represent the biggest opportunities to eliminate carbon emissions. These gases place us on equal footing with other renewable energy generation systems when you consider the additional value microturbines can provide by using our stack exhaust for Combined Heat and Power and chilled water, from a resilient power source

available 24 hours a day. Cheap natural gas currently is an impediment to the broader adoption of hydrogen, as well as the difficulty in transportation and distribution of hydrogen.

This is why many gas companies and countries are looking towards a blend of hydrogen and natural gas, as a bridge to a longer-term plan to use 100% hydrogen. In other words, we can get benefit from meeting interim carbon emission goals, without a significant investment in infrastructure. That's the beauty of Capstone's flexible microturbine design. We are able to operate on the blends that they are proposing (usually 20% or less), with no or minimal changes to hardware and software, and be able to reliably support the grid during times of high demand and waning renewable resource availability.

As part of a pilot project in Australia, Capstone has sold a C65 that will initially run on blended natural gas and hydrogen, with a longer-term focus on 100% hydrogen operation. The objective of this "power to gas" project is to show how storing excess renewable energy in the form of green energy can be more efficient than batteries.

Shawn Severson: That was very helpful, Don. My next question is simple, but I imaging the answer is not. If I have a reliable supply of hydrogen – why wouldn't I just buy a fuel cell stack and use that? What is the advantage of Capstone's solution vs. a stationary power fuel cell stack, and how and where would it fit in best in a customer's energy portfolio?

Don Ayers: Fuels cells have not seen wide adoption for many reasons. They are extremely expensive for one, but benefit, I might say unfairly so, by significant state and federal government subsidies. Without these free handouts, or at least if Capstone was able to also benefit from similar handouts, the fuel cells would be comparatively much costlier than they already are even with these credits. In addition, we are able to operate in a CHP or CCHP mode, which provides additional efficiency through the use of thermal energy for hot water, chilled water, and/or steam. What is not widely known, or at least widely publicized, is that fuel cells operate on natural gas, and they do emit emissions. So, while viewed as a green energy and compared to renewables, there is some misunderstanding by the general community, and we feel by the government and political community that sets current policy. In regard to power generation, fuel cells react slowly to changing demand, whereas microturbines provide power where and when you need it. In addition, many fuel cells consume water and need days to start up and safely shutdown. Finally, I have read reports where spent fuel cell stack contamination in landfills is a big problem. This increases their cost of operation and would require extensive fuel conditioning equipment to ensure fuel purity.

While turbines have moving parts and, therefore, might be viewed as less reliable, we have been in use for decades and have proven to be highly resilient to changes in fuels, environmental conditions, load conditions, and regulations. Today,

Capstone has approximately 10,000 units in 73 countries.

Shawn Severson: It might be a bit early to tell, but from which industries and regions do you expect to see the first signs of demand from and some color on why?

Don Ayers: The initial interest has come from the Asia Pacific region, mainly Australia and Japan. As mentioned previously, we have already sold a system to our Australian distributor, Optimal, that will initially run on blended natural gas and hydrogen but eventually be converted to run on 100% hydrogen. We are working closely with them to ensure that the system can operate safely and reliably and meet the grid interconnect requirements for Australia. In fact, we have finished both the Australian specific grid interconnect and safety certification efforts for the C65 and C200 product lines that will enable us to support their grid in times of instability due to natural and man-made causes.

Australia is on the forefront of the hydrogen evolution due to their vast coal mining, which can be converted into hydrogen through gasification. They are looking to export to Japan, which is building up a hydrogen infrastructure and is investing heavily in fuel cell vehicles. They were going to put this on display for the 2020 Summer Olympics, which was unfortunately delayed due to COVID-19. As green hydrogen, that is hydrogen produced through water electrolysis, becomes economically viable, you can understand Japan's desire to achieve energy independence for the first time in their industrial history.

For similar reasons, Europe has also taken an active role in road-mapping their future hydrogen economy to "wean" themselves from imported natural gas. Their main challenge, given the breadth and variety of the EU members, is a safe and reliable distribution model, which can be used with an equally varied number of end uses. Today, European countries have been investigating, and in some cases, have already invested in and implemented natural gas hydrogen blends.

Capstone microturbines have always been a preferred source for behind the meter, low emission distributed energy. Therefore, we are placed in many cases at the source of fuel generation, whether it's at wastewater treatment plants, landfills, oil wells, farms, and more. Hydrogen initially, and likely for many years until infrastructure investments can be completed, will fit this model, and we expect to see much more opportunity before larger energy generating units requiring this hydrogen fuel delivery infrastructure.

Shawn Severson: Will enabling hydrogen as a fuel meaningfully alter the cost of a turbine or the payback times? Also, are there any special measures you must invest in to make this happen outside of R&D?

Don Ayers: We expect that there will be some impact to cost to run on 100% hydrogen. This is mainly due to the changes required for fuel delivery and new components to ensure the system is able to operate safely. What is not currently defined in great detail are the standards and requirements for hydrogen operating energy generation. These can and most likely will have impact on the ultimate cost too. For the remainder of the system, we expect costs

to be in line with what we have today. While this might portend to a longer payback time, at least for the first systems as we work through the initial and as yet unknown certification requirements, it is expected that there will be government tax and investment credits to adopt the new hydrogen technologies sooner, which could actually have a positive impact on the actual return on investment.

Shawn Severson: Lastly, can you help me understand the milestones we should be monitoring from the outside to track the progress of this program? What types of things should we be looking for that will help measure the progress and or success of this program?

Don Ayers: As always, listen to our quarterly earnings calls for business updates. In between earnings you should follow Capstone and Darren Jamison social media such as Twitter, Instagram, and LinkedIn, for updates that he will post from time to time, not to mention for some of the entertainment quality of some posts. We are planning to continue our dual-path approach over the next year.

So, keep your eyes open for updates on pentanes and hexanes, which are commonly found in oil extraction associated gas. This will complete the path for more energetic fuel product commercialization. In parallel, we have an aggressive plan outlined to complete the evaluation and commercialization of our C65 and C200 product lines to run on hydrogen natural gas blends.

Once these two paths are complete, we will merge these product development efforts to qualify the new injector designs and system operation and controls for hydrogen. Key to this effort will be our research partners, the U.S. Department of Energy, Argonne National Laboratory, and the University of California, Irvine. It would be a good idea to follow them on social media for announcements and release of white papers relative to our combined efforts.

Lastly, we are also in discussions with other companies on complementary technologies that could accelerate our market entry. More information will come from these efforts as they become official.

Shawn Severson: Thanks, Don

Don Ayers: You're welcome, Shawn. I have really enjoyed our conversation and discussing Capstone's exciting carbon-free future.

ABOUT THE ANALYST
Shawn Severson – Co Founder & President
Head of ClimateTech & Sustainable Investing Research

Shawn Severson is President & Co-Founder of Water Tower Research and is a member of the Board of Managers. Prior to co-founding Water Tower Research and previously founding predecessor firm alphaDIRECT Advisors, Shawn spent over 20 years as a senior equity research analyst covering the Technology and ClimateTech sectors, including senior positions at JMP Securities, ThinkEquity, Robert W. Baird (London) and Raymond James, and he started his career as an equity research associate at Kemper Securities. Shawn was frequently ranked as a top research analyst including one of the Wall Street Journal's "Best on the Street" stock pickers and a StarMine Analyst Awards Top 3 stock picker. Prior to co-founding Water Tower Research as well as alphaDIRECT Advisors, Shawn spent over 20 years as a senior research analyst covering the Technology and ClimateTech sectors that included senior positions at The Blueshirt Group, JMP Securities, ThinkEquity, Robert W. Baird (London) and Raymond James and he started his career as an Equity Research Associate at Kemper Securities. Shawn was frequently ranked as a top equity research analyst including one of the Wall Street Journal's "Best on the Street" stock pickers and multiple awards as Starmine's top three stock pickers. Shawn holds a BA in Finance and Economics from Augustana College.

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