

# ETI ALPHADIRECT MANAGEMENT SERIES

**AUGUST 15, 2018**

## **IN FOCUS: BALLARD POWER SYSTEMS AND THE HEAVY-DUTY TRANSPORTATION MARKET**

This report focuses on Ballard Power Systems Inc. (BLDP) and the heavy-duty transportation market, including key trends underpinning the growing interest in fuel cell products.



Ballard's HQ facility in Burnaby, Canada. Source: [www.ballard.com](http://www.ballard.com)

### **THE ALPHADIRECT ENERGYTECH INVESTOR INSIGHT**

Ballard has the technology readiness in the hydrogen industry to enable full scale production of commercial hydrogen fuel cells for a range of Heavy Duty Motive applications. The underlying trends that are driving interest in fuel cell technology favor the company's two major growth platforms: Power Products and Technology Solutions. Given its focus on hydrogen-powered Heavy Duty Motive applications, including buses, trucks, trains and the marine sector, we believe in the commercial viability of fuel cell technology and products. The surge in demand for clean energy propulsion systems across a growing array of Heavy Duty and Medium Duty Motive uses positions Ballard, and its products, in a critical sweet spot.

### **BLDP Business Snapshot**

**Founded:** 1979

**Headquarters:** Burnaby, Canada

**Ticker:** BLDP (NASDAQ/TSX)

**Stock Price:** USD\$3.15\*

**Market Cap:** USD\$572.2M\*

**Website:** [www.ballard.com](http://www.ballard.com)

\*As of August 13, 2018



#### **About *alphaDIRECT* EnergyTech Investor**

alphaDIRECT Advisors (ADA), a division of EnergyTech Investor, LLC (ETI), is a Publishing and Investor Intelligence firm that creates and implements digital content and programs to help investors better understand a company's key drivers including industry dynamics, technology, strategy, outlook and risks as well as the impact they could have on the stock price. ADA's expertise encompasses a variety of sectors including Clean Transportation, Emerging EnergyTech, Energy Services, Smart Buildings, Solar, Water Value Chain and Industrial. ADA was founded by Wall Street veteran and research analyst, Shawn Severson, after seeing a significant shift in the investment industry that resulted in less fundamental research conducted on small cap companies and a significant decline in information available to all investors. ADA's mission is to bridge that information gap and engage companies and investors in a way that opens information flow and analytical insights.

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| (415)-233-7093 (tel) | [www.energytechinvestor.com](http://www.energytechinvestor.com) | [research@energytechinvestor.com](mailto:research@energytechinvestor.com) |

## Participants

**Rob Campbell**  
**Vice President and Chief Commercial Officer**  
**Ballard Power Systems Inc.**

Rob Campbell was appointed Chief Commercial Officer at Ballard Power Systems in May 2017. Mr. Campbell's responsibilities include global business development, sales, marketing, product line management and after-sales service activities in the Company's key Power Products markets of Heavy Duty Motive, Material Handling and Back-Up Power.

Rob has considerable experience in global business development for technology-based products in China, Japan, India, Europe and the United States. He has deep knowledge of high-growth markets and engineering-based capital equipment sales to sophisticated customers. Rob was most recently President and CEO of SoloPower Systems Inc. Prior to SoloPower, his career included SVP of Business Development at Energy Conversion Devices and Solar Integrated Technologies in the U.S., EVP of Sales and Marketing at Hydrogenics in Ontario, Canada and senior leadership roles at several construction and power generation companies in Ontario, Canada.

**Mr. Shawn Severson**  
**Founding Partner**  
**alphaDIRECT Advisors**

Mr. Severson is the Founding Partner of alphaDIRECT Advisors (ADA), a division of EnergyTech Investor, LLC (ETI). He has over 20 years of experience as a senior research analyst covering the technology and cleantech industries. Prior to founding alphaDIRECT Advisors, he led the Energy, Environmental and Industrial Technologies practice at the Blueshirt Group. Mr. Severson was frequently ranked as a top 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.

**BALLARD®**

## ABOUT BALLARD POWER SYSTEMS INC.

Ballard Power Systems Inc. engages in the design, development, manufacture, sale and service of proton exchange membrane (PEM) fuel cell products for a range of applications. The company provides Power Products for Heavy Duty Motive, Portable Power, Material Handling and Backup Power applications and also provides Technology Solutions that help customers accelerate their fuel cell development programs.

Ballard believes it is poised with highly-disruptive and field-proven technology at the convergence of three global megatrends – decarbonization, air quality and electrification of propulsion systems – presenting a compelling future for the business. The company's fuel cell value proposition is gaining traction across a broadening array of fuel cell electric vehicles (FCEVs) that include buses, commercial trucks, rail and marine, in the key geographic markets of China, Europe and the U.S. In the company's view, FCEVs will become a meaningful portion of the heavy, medium and light duty transport markets where long range, rapid refueling and route flexibility are customer requirements. In addition, in management's view the company also offers significant embedded optionality in such markets as fuel cell passenger vehicles and drones.

Ballard Power Systems Inc. was founded in 1979 and is headquartered in Burnaby, Canada, a suburb of Vancouver. To learn more, please visit [www.ballard.com](http://www.ballard.com).



*Rob Campbell, Vice President and Chief Commercial Officer*

Source: [www.ballard.com](http://www.ballard.com)

**Shawn Severson:** First of all, I'd like to thank you, Rob, for taking the time to speak with us today. The last time that we spoke with Ballard Power Systems (BLDP) we discussed your catalyst technology. Today our focus will be on the heavy-duty transportation market. However, before we get started, could you give us a brief introduction of yourself, your background and what brought you to Ballard?

**Rob Campbell:** Certainly and thank you, Shawn, for the opportunity to discuss our heavy-duty transportation market. As Chief Commercial Officer at Ballard, I am responsible for global sales and marketing, product line management and aftermarket service. I am an engineer by training and have been on the business side of technology for most of my career, spending almost two decades in renewables starting with hydrogen in 2001. I was also in the solar industry until I recently joined Ballard in 2017. I decided to rejoin the hydrogen economy and get back into the industry because I believe the time is right to drive the industry forward. I am very excited and honored to be part of the Ballard team.

**Shawn Severson:** Thank you, Rob. Let's move on to today's focus. The growing interest in fuel cells is driving demand for Ballard products – can you describe the different products that Ballard is focused on?

**Rob Campbell:** Absolutely, Shawn. We have two major business growth platforms, Power Products and Technology Solutions, which can go hand-in-hand depending

on our customer needs. Our Power Products are focused on heavy duty fuel cell applications requiring long operating life and rugged durability. Our Technology Solutions bring expertise to both the passenger car market and the heavy-duty markets and provide solutions that apply our technology and intellectual property to the industry in helping drive commercialization of PEM fuel cells.

**Shawn Severson:** Thank you, Rob. Can you describe the key trends that underpin today's growing interest in fuel cell technology?

**Rob Campbell:** Yes, I see a number of major trends that are linked and driving our business to new heights. The first is electrification of mobility. During the last couple of years, we have seen a tremendous upswing in the number of options available and the number of programs announced to electrify vehicle drive trains. This is a fundamental shift that's enabling new solutions, in particular fuel cell solutions, to provide different fuel choices and options for end users.

Furthermore, we are seeing a tremendous uptick in the focus on decarbonization of the planet to minimize climate change. This has increased the level of awareness within many jurisdictions that we are working in. We are also focused on regions with urban air quality issues as well.

Air quality in cities and in certain parts of the world is now being prioritized for immediate change due to the impact that poor air quality is having on health.

Furthermore, on a macro, longer term trend, low cost renewables are now clearly demonstrated to be one of the lowest production costs for energy and we can harness this going forward with appropriate energy storage solutions to provide the input for affordable and plentiful hydrogen supply to help drive change within the industry.

Finally, we have the technology readiness of the hydrogen industry. It is at a place that will now enable full scale production for true commercialization of hydrogen fuel applications.

**Shawn Severson:** So, Ballard is very focused on the transportation factor. How do fuel cells compare to internal combustion engines and battery technologies in terms of emission?

**Rob Campbell:** Fuel cells compare extremely well. Essentially, an electric drive train with hydrogen gives you the best of internal combustion engines as well as batteries. We can also ensure zero emissions with clean produced or "Green Hydrogen", as we call it. In addition, we have quick fueling capability as well as extended range. The fueling infrastructure is not directly coupled to the grid and therefore provides overall flexibility. So, we are really complimenting battery vehicles since hybrids are more flexible and provide greater operator use capabilities and range for the vehicles.

**Shawn Severson:** You touched on this a bit in your answer, but are there any other aspects to the fuel cell value proposition

and transportation - be it cost or ease of use or anything else - that you would highlight in terms of the competitive advantage of your fuel cells?

**Rob Campbell:** There are many, but I want to focus at a high level, which is the essence of what we call a hydrogen economy thesis. This is really about the big picture scale up of renewables to displace carbon based electrical generation and the use of carbon fuel in transportation. Coupling low cost renewables to displace carbon-based power generation and simultaneously using green hydrogen in the transportation sector can be achieved with hydrogen energy storage. This approach provides grid system resiliency and hydrogen for fueling as well as other applications. This is a big picture, which really focuses on the ecosystem and the strategy that we need to prioritize transportation in order to deal with the issues of air quality and climate change. We need to leverage the progress made with electrification of mobility and within all this, I believe hydrogen electric vehicles used in fleet applications make the most sense because we can initially deploy large fueling stations to scale hydrogen demand and have cost effective fuel. Overall, we believe that fuel cell technology is the only technology combined with the electrification of the drivetrain that can enable this longer-term strategy to effectively decarbonize our society and address air quality through the use of hydrogen as a fuel. The key starting point is with fleets of buses and trucks, which is Ballard's sweet spot for heavy-duty applications.

**Shawn Severson:** Regarding the heavy-duty mode of applications, where do you see the short-term opportunities for fuel cells?

**Rob Campbell:** We are seeing scaling of bus fleets globally in Europe, the United States and China. We also made several announcements – one for the major deployment of trucks in Shanghai, another for our work with Kenworth with an initial drayage truck project in Long Beach, California. We also have many other trucking applications in our pipeline and we are really seeing a surge in trucking and the forklift area. There is great progress being made through deployment of hydrogen forklifts primarily throughout the United States and Canada. Bus fleets and the forklift area, are the near-term applications opportunities and we are certainly seeing a surge in interest in demand and orders.

**Shawn Severson:** From a longer-term perspective, what do you see as some long-term or emerging opportunities for fuel cells in Ballard?

**Rob Campbell:** Again, looking at the heavy-duty transportation market, we are very focused on hydrogen trains and the marine sector. We are focusing on these two sectors through strategic partnerships. The trains and the marine sectors are moving much faster than anyone really expected. On the train sector side, we are working with Siemens which has an amazing new hydrogen train called the Mireo that's being finalized and planned for deployment post 2020.

On the marine side, following a recent announcement by the International Marine Organization to reduce carbon emissions in shipping by 50% by the middle of this century, we are seeing tremendous interest. The interest is driven in part by the fact that in order to decarbonize trains and ships (these are 20-30 year+ asset lives) by 2040-50, you effectively have to start working on them now. We announced the collaboration with ABB for megawatt scale fuel cell solutions in the marine sector, and in addition, we are working on a purpose-built ferry that will be deployed in Scotland. All this once again demonstrates the viability of this technology in the marine sector. Maybe it is not so long-term in reality for both of these applications after all.

**Shawn Severson:** Ballard recently announced the 3.5-year extension to the long-term contract with Audi. What is your view on the likelihood that we will see fuel cell passenger cars soon and in any real commercial scale?

**Rob Campbell:** In my opinion, the fuel cell car market is scaling up just like the other sectors and Audi's commitment is tangible evidence of this. However, the car market needs to be closely coupled with creating a network of fueling stations such as those happening in California, Asia and now in Germany with their recent announcement of having doubled their fueling infrastructure within the last year. There is more work to be done to facilitate large volume deployments, which may take a few more years in order to be able to enable significant volumes of fuel cell cars.

**Shawn Severson:** Thank you, Rob. My next question is on the natural availability of hydrogen fuel and how the recently established Hydrogen Council impacts the adoption of fuel cells?

**Rob Campbell:** Fueling infrastructure is the key – without hydrogen, you’re not able to move forward and especially, in Ballard’s opinion, is the importance of what we call “Green Hydrogen”, which I previously mentioned, is hydrogen made from renewable energy. Naturally, this all has to be delivered at affordable levels. Overall, the Hydrogen Council knows this very well and is a fantastic industry advocate that can help accelerate the faster deployment of the infrastructure to support affordable fuel needed to enable the industry to move to new levels. Again, this is well-understood within the Hydrogen Council and the collaboration of member companies such as Shell, GE, Toyota and many others will help accelerate the mission to bring the infrastructure required by fleets to drive change.

**Shawn Severson:** As we look at the adoption rates around the world, are there any tangible differences in the adoption rates in regions such as Asia, Europe and North America for example?

**Rob Campbell:** Yes, there are. First of all, the good news is that all of these markets are actively adopting fuel cell technology, which is really quite remarkable. This is a global trend and the largest in terms of short-term potential from our assessment is Asia. China, Japan and Korea are providing strong commitments and

support for immediate adoption, with China being the largest overall market within that group. Europe is also building on approximately two decades of continuous support for clean energy and for hydrogen technology. Europe continues to have a deep commitment resulting in expanding adoption rates within that market built upon a strong foundation of market awareness, increasing fleet deployments and further funding commitments that are enabling the industry to step up and increase penetration. This is creating tremendous opportunities in Europe as a result. The historic center of activity in the United States is in California, however, in the last year we have seen traction of many other states such as Ohio and Illinois. In terms of our short-term forecast, Asia, Europe and the United States will all be FCEV adoptors, with Asia as the largest market followed by Europe and then the United States.

**Shawn Severson:** Lastly, certainly technology adoptions curves can be lumpy at times with variations from year-to-year, but what do you see as the biggest risk to the continued commercialization of fuel cells?

**Rob Campbell:** We are absolutely in a scale-up phase right now and the market will need to invest in all aspects of the hydrogen ecosystem in order to meet the important zero emission and climate change goals that are being set. This needs careful coordination. Therefore timing of the ecosystem could be a short-term challenge to avoid lumpiness. We don’t want vehicle fleets ahead of

infrastructure or infrastructure ahead of fleets. We need the fueling infrastructure to be closely coordinated with the vehicle deployments which is a timing risk but should be manageable.

Further, we need to make the right decisions on infrastructure not only for the short-term but also for the long-term. The good news is that many studies are underway assessing the comparative cost of the electric charging versus hydrogen fueling. It does seem, however, that some utilities wish to subsidize electrical charging systems to make this option more favorable in the short-term and my question to that is whether it is the right investment decision for the future. This issue is being addressed by the Hydrogen Council and I believe they will issue comprehensive studies on this subject.

In addition, the industry is studying this question and from what we are hearing, the scale-up of the hydrogen solution for fueling is very attractive and, in our opinion, it is the clear choice. This is not only to address the refueling challenges of infrastructure build-up, but also to address the important linkage to the ecosystem to enable deployment of much more renewable energy into our grids and into our societies to help with those important decarbonization air quality goals.

Overall, these risks are going to be addressed with knowledge and with experience. With the scale-up of the hydrogen industry, we will have that experience to point us in the right direction going forward. Overall, we at Ballard are absolutely energized by what we are seeing and with a tremendous team of dedicated professionals, we are very proud to be part of this revolutionary transformation that we are seeing in the world today. Ballard is scaling up to meet the growing demand and we are here to become part of the hydrogen economy.

**Shawn Severson:** Thank you very much, Rob. That was very helpful, and we look forward to speaking with Ballard again within the near future.

**Rob Campbell:** Thank you.



*Ballard's FCveloCity®-HD7 module, generates up to 100 kilowatts of power for use in Heavy and Medium Duty Motive applications. Source: [www.ballard.com](http://www.ballard.com)*

## SHAWN SEVERSON FOUNDER AND CEO

Mr. Severson founded *alphaDIRECT* Advisors (ADA), a division of EnergyTech Investor, LLC in 2016 after seeing a significant communication and information gap developing between small and micro-cap companies and the financial community. Mr. Severson has over 20 years of experience as a senior research analyst covering the technology and cleantech industries. Previously, he was Managing Director at the Blueshirt Group where he was the head of the Energy, Environmental and Industrial Technologies practice. Prior to the Blueshirt Group, Mr. Severson was at JMP Securities where he was a Senior Equity Research Analyst and Managing Director of the firm's Energy, Environmental & Industrial Technologies research team. Before joining JMP, he held senior positions at ThinkEquity, Robert W. Baird (London) and Raymond James. He began his career as an Equity Research Associate at Kemper Securities. He was frequently ranked as a top 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.



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