

# ALPHADIRECT MANAGEMENT SERIES

AUGUST 28, 2019

## IN FOCUS: PRODUCT EVOLUTION AT BALLARD POWER SYSTEMS

This interview focuses on Ballard Power Systems Inc. (BLDP) product evolution, including its next-generation product, the FCmove™ fuel cell module, seen below.



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

### THE ALPHADIRECT INSIGHT

Ballard launched its new eighth generation heavy-duty fuel cell power module, part of its FCmove™ family, in June this year, with the key objective being reduced product lifecycle cost, which is essential for commercialization and competitiveness of fuel cell electric vehicles, or FCEVs. In addition to reducing lifecycle cost, the new power module is also easier to integrate for vehicle OEMs. Ballard believes the new product received a great response when it was initially launched at the UITP 2019 Exhibition in Stockholm. We believe that Ballard's unique mix of on-road experience and performance data on buses and trucks, along with technical innovation, are all reflected in the new FCmove™ heavy duty power module. Lastly, Ballard estimates that there will be approximately 20,000 fuel cell commercial vehicles (buses and trucks) on the road by 2023, providing a significant revenue opportunity in our view.

### BLDP Business Snapshot

**Founded:** 1979

**Headquarters:** Burnaby, Canada

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

**Stock Price:** USD\$4.32\*

**Market Cap:** USD\$991M\*

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

\*As of August 23, 2019



### 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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## Participants

### **Mr. Nicolas Pocard** **Director of Marketing** **Ballard Power Systems**

Mr. Pocard brings to Ballard more 20 years of experience in business development and marketing at an international level. Pocard joined the fuel cell industry in 2004 and Ballard Power Systems in 2012. In 2014, he was appointed Director of Marketing and Business Operations at Ballard corporate headquarters in Vancouver. Among his responsibilities, Nicolas looks after market strategy, marketing activities and government relations for Ballard. He is a board member of the California Hydrogen Business Council, co-chairing the Public Transit group, and represents Ballard with various Industry Associations and Government forums. Nicolas holds a degree in Chemical Engineering from ESCOM (Paris) and a Master's of Science from The Ohio State University (USA).

### **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.

## ABOUT BALLARD POWER SYSTEMS

Ballard a Canadian public company headquartered in Burnaby, British Columbia and is listed on both NASDAQ and the Toronto Stock Exchange under the ticker BLDP.

The Company's vision is to deliver fuel cell power for a sustainable planet. Ballard provides clean energy products – utilizing fuel cell technology – that reduce customers' costs and risks, and helps customers solve difficult technical challenges or address new business opportunities.

For further information please visit [www.ballard.com](http://www.ballard.com).



Nicolas Pocard, Director of Marketing  
Source: [www.ballard.com](http://www.ballard.com)

**Shawn Severson:** First, I'd like to thank you, Nicolas, for taking the time to speak with us today. The last time that we spoke with Ballard, we reviewed the rapidly growing China market for fuel cell power solutions. Today our focus will be on product evolution. Before we get started, could you give us a brief introduction of yourself and what brought you to Ballard?

**Nicolas Pocard:** Of course, thank you, Shawn. I am the director of marketing for Ballard and I'm in charge of looking after our marketing strategy, understanding the evolution of our markets and working on future product requirements. I have actually been in the fuel cell industry for more than 15 years now, initially with Idatech and then eight years ago, following Ballard's acquisition of Idatech, I became part of Ballard. It's a very interesting field since fuel cell technology is aligned with my engineering degree and Masters studies that I undertook in the United States. Working for Ballard is incredible, especially at this time, when we see a growing interest in our technology.

**Shawn Severson:** Thank you for that, Nicolas. Before we discuss Ballard's fuel cell product strategy, can you explain why you see fuel cell technology gaining traction in the marketplace and what's providing the momentum?

**Nicolas Pocard:** The main thing is that there are strong global drivers for our technology. First of all, I think many cities now realize the impact of air pollution on health and they are really trying to address this pressing issue. However, they are also starting to look at reducing GHG or greenhouse gas emissions in order to mitigate the effects of climate change. Those are the driving forces toward clean transportation as part of the decarbonization of our economy. The focus

on transportation is very important since it is responsible for around 25% of global GHG emissions. So, there is a really strong driver to electrify the transportation sector and move toward zero-emission vehicles globally.

Traction in the market is certainly indicated by major players in the transportation value chain recently making investments in the fuel cell industry, as well. This includes Weichai Power's investment in Ballard, Bosch's licensing deal with PowerCell and Cummins' offer to acquire Hydrogenics.

**Shawn Severson:** So, with the convergence of key global megatrends, why not simply focus on battery electric solutions for the transportation sector? Why should fuel cells be considered?

**Nicolas Pocard:** An important part of electrification of transportation is battery technology, but there are limitations. We believe that batteries alone will not be able to achieve a complete decarbonization of transportation. Batteries tend to be heavy, take up a lot of space in a vehicle and require several hours to recharge. Additionally, you have to look at the implications of large scale battery vehicle charging on the electric infrastructure and the impact on its resilience.

Today, if you were to plug every single vehicle we have on the road into the electrical grid, power production would not be sufficient. The electric grid was not designed to support mass electrification of vehicles. We need to develop alternative ways to bring low-carbon or zero-carbon fuels to the transport sector. Hydrogen can be used as a very efficient clean fuel and it provides an incredible opportunity for industry sector coupling as a versatile energy carrier.

In the future I believe that there will be both battery electric and fuel cell electric vehicles and that both technologies will play an important role. However, the key is to also look at the infrastructure required to recharge or refuel those vehicles at scale.

The growing capacity and lower cost of wind or solar energy provides a path to the production at scale of green hydrogen. Hydrogen can be used to store and distribute renewable energy and can be a decarbonized fuel for vehicles.

**Shawn Severson:** Narrowing in on that a bit, what types of vehicles are there as a target for fuel cells or hybrid power configurations and why? What's the value proposition for these fuel cell electric vehicles for a city for example?

**Nicolas Pocard:** As of today, fuel cells offer the best value proposition for heavy duty vehicles and by that we mean buses, trucks, trains, and marine vessels. These types of vehicles have a disproportionate higher contribution to GHG emissions and air pollution.

The vehicles I just mentioned are on the road more often than private cars and they have high duty cycles. A transit bus, for example, is on the road 15-to-20 hours a day, so it makes a significantly higher contribution to local emissions. Powered by fuel cells, vehicles can cover longer distances compared to batteries and are able to handle more challenging routes in all climate conditions

In addition, benefiting from hydrogen's high energy density, fuel cell heavy duty vehicles are lighter than battery vehicles. If you want to transport people on a bus or goods in a truck over long distances, you will need a lot of batteries and that will be very heavy,

which compromises the payload of the vehicle.

Lastly, fast refueling is also an important consideration. You can refuel a fuel cell car in less than five minutes and a truck or bus takes less than 10 minutes. Fleet operators cannot afford to have vehicles off the road for hours while recharging their batteries. So, fuel cells and hydrogen as a fuel, deliver a compelling value proposition in terms of maximizing vehicle payload and asset utilization.

**Shawn Severson:** You launched next-generation products in June this year – specifically the first FCmove™ fuel cell module. Can you explain what advances are represented by FCmove™?

**Nicolas Pocard:** Sure Shawn. FCmove™ is actually the eighth generation of our Heavy Duty fuel cell power modules. We have over 16 million kilometers of on-road experience during which Ballard has collected significant performance data on fuel cell-powered buses and trucks. In this way we have been able to assess our customers' needs, and build our products to deliver customers' operational requirements. All of these learnings and our latest technology advancements are reflected in FCmove™. Our key objective was to reduce the product lifecycle cost which is very important to drive the commercialization of fuel cell vehicles.

Some of the main features of this product are the fact that the system is a lot more compact, and lighter, which lowers cost and makes it much easier to integrate for the vehicle OEM, but at the end of the day, it's also reducing the total lifecycle cost – the initial cost and the operating cost as well as reducing the maintenance and parts cost –

that are the most important achievements of FCmove™.

**Shawn Severson:** Could you expand on that a bit - how do you expect FCmove™ to impact the level of market interest in heavy and medium duty vehicles specifically?

**Nicolas Pocard:** Well, we did launch the product originally at the UITP Exhibition in Stockholm, which is a large public transport conference, and we received a great response. Many bus operators and transit agencies came and expressed a strong interest in our new product line.

This product is going to power fuel cell electric buses under the recently announced H2Bus Europe Consortium. With H2Bus Europe, we are going to deploy over 1,000 fuel cell electric buses in Europe, starting with 600 in the U.K., Denmark and Latvia. These deployments, with our industry partners, is a joint effort to drive down cost in order to offer a turnkey fuel cell electric bus solution, as the most competitive zero-emission option to bus operators – not only in terms of the vehicle, but also in terms of hydrogen fuel supply and ongoing maintenance. And today Ballard's FCMove™ is a part of this important ground-breaking initiative.

**Shawn Severson:** Looking at that, how large is the total market opportunity that you think fuel cell products can potentially address in the near and the mid-term time frame?

**Nicolas Pocard:** We are focusing on Heavy Duty Motive applications because that's where fuel cell technology delivers the most value. I would estimate that the total market value in relation to electric buses and trucks will reach around \$20 billion within the next five years. We expect there will be approximately 20,000 fuel cell buses and

trucks on the road by 2023 and the Hydrogen Council anticipates about 500,000 fuel cell trucks on the road by 2030.

**Shawn Severson:** Should we expect to see fuel cell cars for the consumer market in the foreseeable future?

**Nicolas Pocard:** This is actually already here on a small scale. There are about 12,000 fuel cell cars on the road today in Europe, the U.S., and Japan, including 7,000 in California alone.

Also here in British Columbia we hosted an event at Ballard in July where Toyota delivered Mirai fuel cell cars that some of our employees have purchased.

**Shawn Severson:** The infrastructure seems to be a challenge for the consumer car market. How do you expect to overcome that challenge?

**Nicolas Pocard:** Well, it's the story of the chicken and the egg. However, if you remember when the first gasoline car started its long-distance journey back in 1888, there was no gas station available either,

Currently in California there are approximately 40 hydrogen stations and 91 in Japan. This shows that there are already investments being made by several countries to develop station networks,

At Ballard we are focusing on applications like transit bus and delivery truck fleets requiring centralized hydrogen refueling station which minimizes the hydrogen infrastructure investment per vehicle. One depot refueling station can serve up to 100 vehicles. So, I think it's starting to happen and even if it takes time, the eggs have been laid and the chicken will emerge.

As part of this evolution the Hydrogen Council is working on widespread deployment of hydrogen globally and during the G20 last month in Vancouver a new hydrogen initiative was announced by 20 countries including the U.S., Canada, Japan and the European Union, which have agreed to collaborate to reduce adoption barriers and make hydrogen part of the energy transition.

The Hydrogen Council was created approximately two years ago by major international companies including Shell, Engie, and Total as well as automotive OEMs such as Toyota, Hyundai and Weichai along with technology companies, such as Ballard and a number of hydrogen and fuel cell suppliers. There are now more than 60 companies signed up as members of the Council that are committed to invest in the deployment of hydrogen and fuel cells at scale. These players are working with governments to remove regulations and to unify some of the standards in order to enable large scale deployments of fuel cell cars, buses, and trucks.

**Shawn Severson:** From a performance perspective, what lifetime can customers expect from FCMove™ and how does this compare to battery alternatives?

**Nicolas Pocard:** Fuel cells have demonstrated lifetime in operation of more than 30,000 hours as in the case of the fuel cell buses that we are powering in London. Fuel cells are not affected by weather conditions offering consistent vehicle performance at any time of the day and any time of the year.

Not only do fuel cells provide zero-emissions but they are also a sustainable solution, a

big advantage compared to batteries, particularly considering the raw materials used and end of life issues. Alternatively, fuel cells provide a much more sustainable total life cycle. Many reports have come out lately regarding the carbon intensity of producing batteries, including the environmental impact of mining core metals. In the case of fuel cells, the only precious metal we use is platinum, which we fully recycle at the product end-of-life. As you look at a long-term sustainable option, this is a key advantage of fuel cell over batteries.

**Shawn Severson:** Thank you very much, Nicolas, for your time today. We look forward to talking more with Ballard in the near future.

**Nicolas Pocard:** Thank you, Shawn, I think it's a very exciting time today for the industry. The interest we see from end-users for fuel cell zero-emission vehicles is incredible as many stakeholders are starting to realize the essential role of hydrogen for the sustainable future of our planet.

**Shawn Severson:** Thank you very much Nicolas.

## SHAWN SEVERSON FOUNDING PARTNER

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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