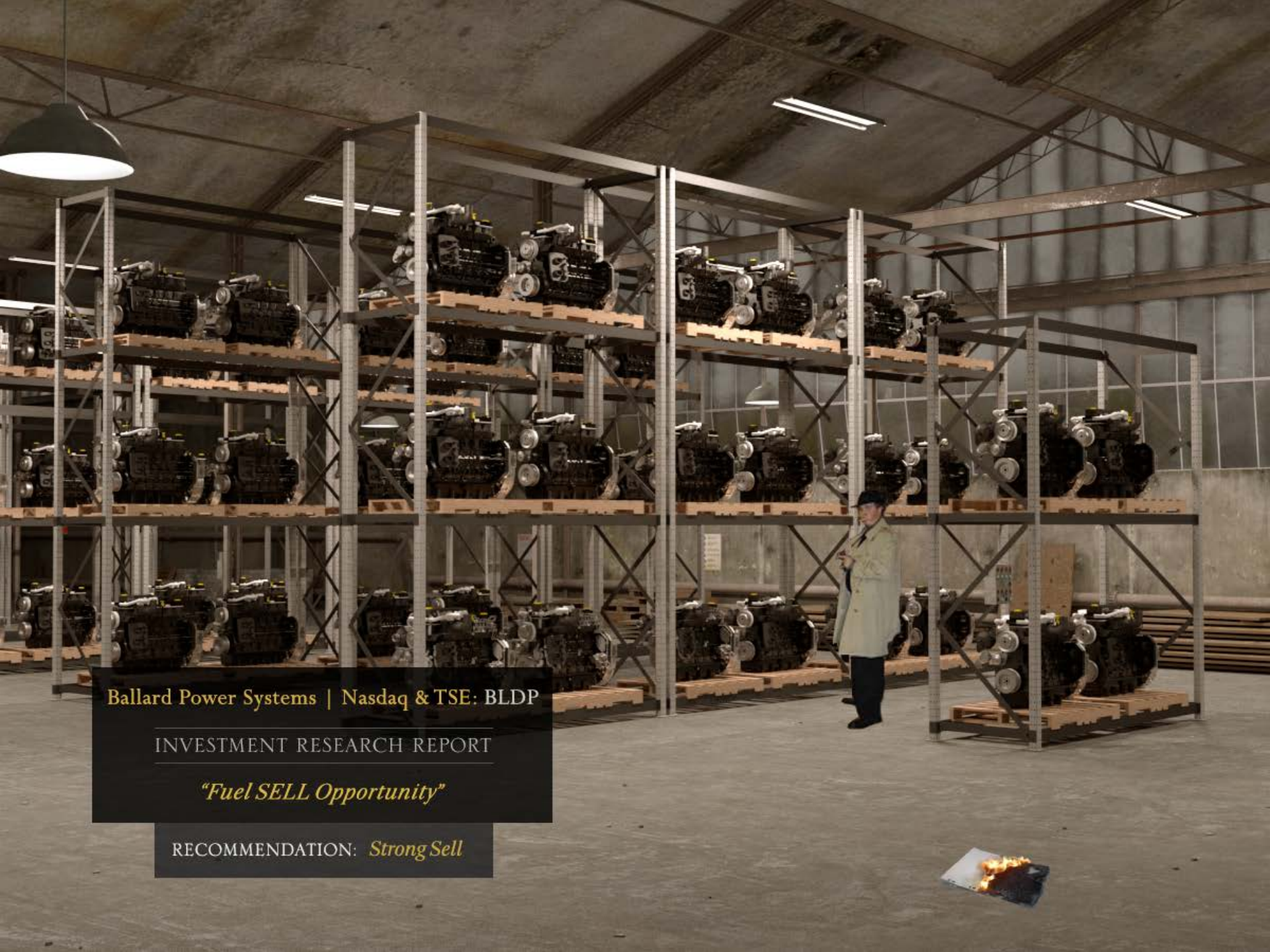

Ballard Power Systems | Nasdaq & TSE: BLDP

INVESTMENT RESEARCH REPORT

"Fuel SELL Opportunity"

RECOMMENDATION: *Strong Sell*

SPRUCE POINT CAPITAL MANAGEMENT

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SPRUCE POINT CAPITAL MANAGEMENT

About Spruce Point Capital Management

Spruce Point Capital Is An Industry Recognized Research Activist Investment Firm Founded In 2009

- Founded by Ben Axler, a former investment banker with 17 years experience on Wall Street
- Ranked the #1 Short-Seller in the world by Sumzero after a comprehensive study of 12,000 analyst recommendations dating back to 2008 (March 2015)
- Ranked the #13 Most Influential FinTweeter on Twitter according to Sentieo analysis (Dec 2016)

Track Record of Prescient Research Calls Emanating from Deep China Due Diligence

	ZST Digital (Nasdaq: ZSTN)	China Integrated Energy (Nasdaq: CBEH)	Camelot Information Systems (NYSE: CIS)
Report Date	11/3/10	12/5/10	8/5/11
Market Value	$100m	$320m	$440m
Company Promotion	Leading provider of digital and optical network equipment to cable system operators in Henan Province	Leading non-state-owned integrated energy company in China engaged in three business segments: wholesale distribution of finished oil and heavy oil products, the production and sale of biodiesel and the operation of retail gas stations	Leading Chinese provider of enterprise application services and financial industry IT services
Our Criticism	Improbable financial model and questionable financial policies, understating competition, governance concerns	Spruce Point's research indicated that CBEH's biodiesel business could not possibly produce the margins being represented, and that its capex and cash management policies raised serious concerns about the nature of its business	Our intense fundamental and forensic due diligence uncovered evidence to suggest Camelot was overstating its size and profitability through revenue overstatement and cost understatement. We saw 60% downside risk
Successful Outcome	Auditor resigned in March 2012 and noted ZST's difficulty in allowing it to verify its cash. Shares were delisted and ultimately ZST's SEC registration was terminated on Aug 2012	May 2011: KPMG auditor resigned and noted concerns about management's representations. Shares delisted and the SEC revoked its registration in Dec 2014	Following our report, CIS's share price collapsed, and a month later management disclosed a margin call. The shares reached a low of $1; CIS was finally taken private for $2.05/sh or 77% below our initiation price

Executive Summary

SPRUCE POINT CAPITAL MANAGEMENT

Spruce Point Believes BLDP Is A "Strong Sell" Sees 35% - 70% Downside For The Following Reasons:

What's Driving The Ballard Bull Story

- Ballard's stock had a tremendous run in 2017 (+167%) based on strong revenue growth, margin improvement and a perception that the commercialization of fuel cells is on the horizon (i.e., "hype"). This improvement occurred despite Ballard's portfolio largely consisting of businesses in run off (e.g., backup power, materials handling), experiencing uncertainty (portable power) or in very early stages of development (e.g., drones). The primary force underpinning recent growth and future expectations has been Ballard's China partnership efforts with Synergy Ballard JV (customer/partner) and Broad Ocean (customer/distributor). At current valuations an investment in Ballard with an intermediate time horizon is essentially a bet on China Heavy-Duty Motive ("HDM") success. We have conducted on the ground due diligence in China and believe that Ballard's Chinese growth ambitions are likely to fail from weak partnerships with Broad Ocean and Synergy, and a market that is not developed enough to support fuel cell vehicle growth; Déjà vu, Ballard's last China deal with Azure resulted in a contract breach and revising guidance lower in early 2015; investors should brace for similar disappoints this time around too

China Industry Challenges

- Unfortunately, the Chinese hydrogen fuel cell market is still in very nascent stages of development. We believe there are currently only 36 licensed fuel cell vehicles on the road in China, only six refueling stations (one is public), and limited planning being devoted to hydrogen sourcing and transportation. In Spruce Point's view, the lack of refueling infrastructure, confusion around refueling subsidies and abysmal refueling station economics pose the greatest threat to fuel cell vehicle ("FCV") commercialization. Not surprisingly, there are only two scale auto manufacturers of hydrogen fuel cell vehicles today and we expect this number to grow to only six by the end of 2018. At this point, it still remains highly uncertain if China will develop the fuel cell vehicle market beyond an experimental phase
- As it pertains to Membrane Electrode Assemblies ("MEA")/Stack/Engine production in China, the focus area for Ballard, there are actually two (rarely discussed) competing "value chains". We believe that Ballard's partners, Yunfu City Government (Synergy) and Broad Ocean, are relatively weak given their lack of network into the central ministries of China and their limited success to date in partnering with the State-Owned Enterprise's ("SOE") that are the primary agents for delivering on policy

Ballard Partner Specific Challenges

- It wasn't long ago that Broad Ocean was a humble manufacturer of electric motors for appliances (e.g., air conditioners). As the US property cycle peaked, Broad Ocean decided to diversify itself with the purchases of Prestolite (auto electronics) and Shanghai Edrive (electric vehicle power trains) in 2014 and 2015, respectively. When Broad Ocean announced the Ballard deal in 2016, it had no prior hydrogen fuel cell experience, but likely hoped to leverage the company's local connections with automakers in the electric vehicle space. Unfortunately, Broad Ocean has failed to deliver partnership opportunities to Ballard with the likes of BAIC (Shanghai Edrive's largest customer) and Yutong (leader in Chinese bus production), both of whom have chosen Sinohytec despite relying heavily on Shanghai Edrive for electric vehicles

SPRUCE POINT CAPITAL MANAGEMENT

Spruce Point Believes BLDP Is A "Strong Sell" Sees 35% - 70% Downside For The Following Reasons:

Ballard Partner Specific Challenges (cont'd)

- Since the Ballard deal was inked, Broad Ocean has announced $1 bn in hydrogen investment related projects. However, in 18 months, Spruce Point has yet to see one fuel cell module produced or vehicle using its technology. Spruce Point believes that Broad Ocean appears to be experiencing a cash crunch as a result of its recent acquisitions, hydrogen investments, and inability to sell any of the MEAs that it has purchased from Ballard to date**.** We also believe Broad Ocean's cash flow issues have likely contributed to the firm backing out of the Wuhan project and perhaps are responsible for the stalled/collapsed Zhongtong JV. Barring a successful convertible bond issuance this year, in what has been a difficult issuance market in China, we anticipate that Broad Ocean will be unable to continue to make good on purchasing commitments, and that 2018 purchases from Ballard/JV are at high risk of falling well short of 2017 levels

- Given that Broad Ocean is the primary customer of the Synergy "Supply Chain" we would expect that there is a strong probability that Synergy will look to renegotiate the Ballard "Take or Pay" Agreement or exit the relationship completely. If these events playout as we anticipate, then not only will China sales disappoint, and the current backlog go largely unrealized, but it will have the knock on effect of failing to achieve the desired cost reduction in MEA production for other applications. **Broad Ocean owns 17.2m Ballard shares and its 2yr hold period ends July 2018**. **We expect this to be a major overhang on Ballard's share price**

Spruce Point's Take on Potential Outcomes (probability)

1. The Chinese fuel cell market doesn't move beyond an experimental stage in the near term (20%)
2. The Chinese fuel cell market slowly commercializes, but Broad Ocean fails to raise capital and the "Synergy Value Chain" fails. This likely translates into a missed, or greatly reduced market opportunity, for Ballard in China over the long-term (40%)
3. The Chinese market slowly commercializes, Broad Ocean is able to raise the capital needed to wait out the maturation of the industry, and eventually makes good on Ballard commitments. Synergy renegotiates take or pay (duration or value) (30%)
4. The Chinese market rapidly commercializes, and Broad Ocean is able to raise the capital needed to make Synergy commitments in the near term. Synergy take or pay agreement holds (mgmt base case: 10%)

Valuation And Reasons We See 35% - 70% Downside Risk

- Ballard's heavily retail Investor base needs to exercise significant skepticism. Ballard and its management have virtually nothing at risk if its China growth ambitions fail. The company committed just $1.0m to the China JV, and insiders own a miniscule 0.45% of the Ballard's stock. Buying into the sell-side analysts bull case for 47% upside to $5.60, requires a leap of faith that it can execute flawlessly in China with its partners, and finally turn a profit after years of losses and rampant share dilution. Analysts are unjustifiably giving Ballard an all-time high multiple, while tweaking discount rates lower to justify their price targets. Our on the ground research in China tells a different story: we believe the Company is set-up to fail yet again on its Chinese growth ambitions just like Azure was a failure in years past. **We believe that Ballard shares should trade in line with its fuel cell peers historical valuation range at 2.0x-2.5x and 1.5x-3.5x Price/Book Value and Price/LTM Sales, respectively. These ranges imply a long-term price target for BLDP of $1.15 - $2.50 per share or 35% - 70% downside risk**

SPRUCE POINT CAPITAL MANAGEMENT

Ballard: A Retail Driven Stock

Ballard is 76% owned by the public, making it a heavily retail driven stock. Ballard's management and directors own virtually no shares and its current ownership is near all-time lows. When compared against other speculative fuel cell publicly owned peers, we find that Ballard has the least support from the financial institutions and insiders.

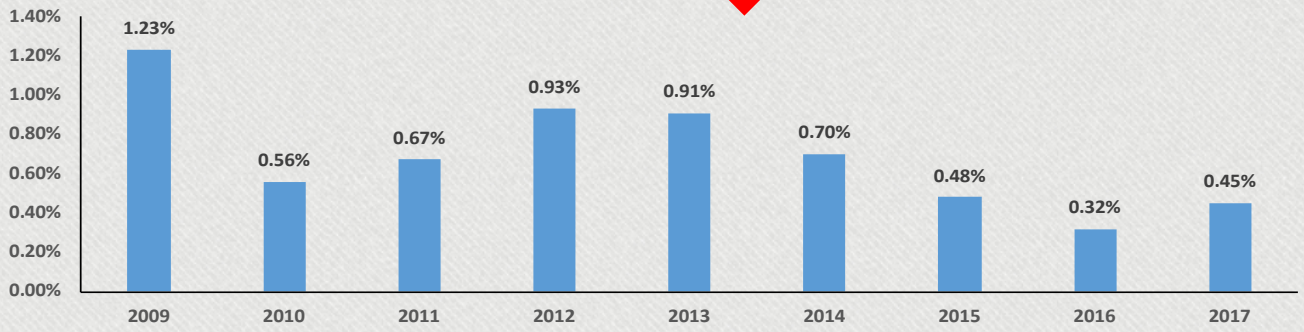
Ballard Ownership Heavily Retail Driven

Ballard Owner	Date	Investment Price	Ownership
Broad-Ocean	July 2016	$1.64	9.9%
Various Financial Institutions	--	--	6.6%
United Technologies	April 2014	$3.97	2.9%
Anglo American	March 2014	$0.84	2.7%
Nisshinbo Holdings	October 2015	$1.50	1.9%
Ballard Insider Ownership	--	--	0.5%
Retail Investors	**--**	**--**	**75.6%**

Ballard vs. Other Fuel Cell Peers

Public Company	Insider Ownership	Financial Institutional Ownership
Hydrogenics (Nas: HYGS)	5.5%	24.6%
Plug Power (Nas: PLUG)	4.9%	25.0%
FuelCell Energy (Nas: FCEL)	1.2%	13.3%
Ballard Power	**0.5%**	**6.6%**

Ballard Insider Ownership Trends



Source: Yahoo finance, Nasdaq ownership, proxy statements

Capital Structure and Valuation

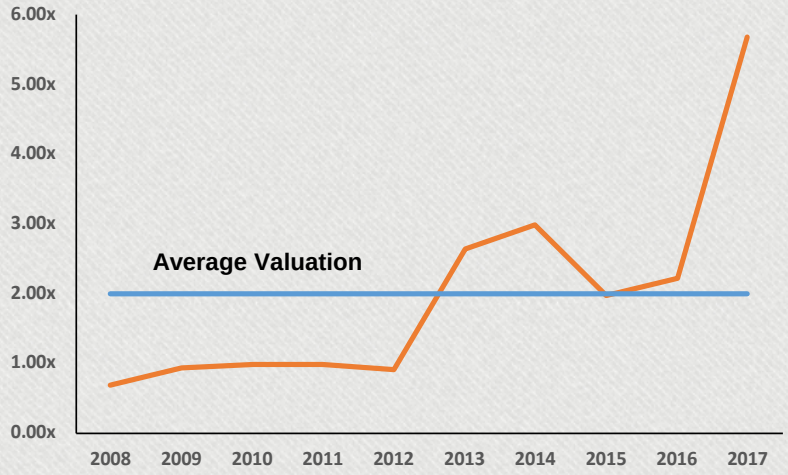
Enthusiasm is running high that Ballard is well positioned in a Chinese FCV bus market on the brink of commercialization; its valuation multiple is pushed to all-time highs. Our on the ground research in China will illustrate why Ballard is again set to disappoint.

$ in mm, except per share figures

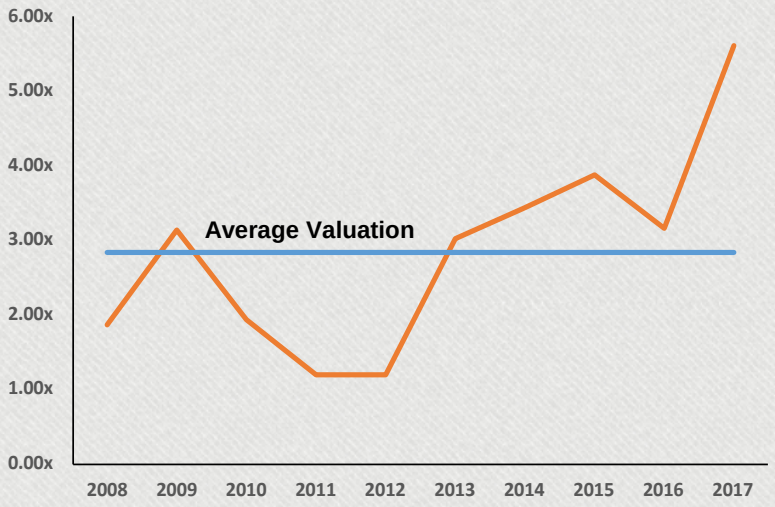
Stock Price	$3.80
Basic Shares	177.2
Impact of Warrants/Options	3.3
Fully Diluted Market Cap.	**$685.8**
Leases Obligations	$7.1
Total Debt Outstanding	**$7.1**
Less: Cash and Equivalents	$60.1
Total Enterprise Value	**$632.8**

Street Valuation	**2017E**	**2018E**	**2019E**
EV / Sales	5.6x	4.9x	4.1x
EV / Adj. EBITDA	150.7x	191.8x	72.7x
Price / Adj. EPS	NM	NM	NM
Price / Tangible Book	5.7x	5.8x	5.4x
Growth and Margins			
Sales growth	32.0%	14.6%	18.6%
EBITDA Margin	3.7%	2.6%	5.7%
EPS growth	69.2%	50.0%	400.0%

Ballard's Historical Price / Book Value



Ballard's Historical Price / Sales Ratio

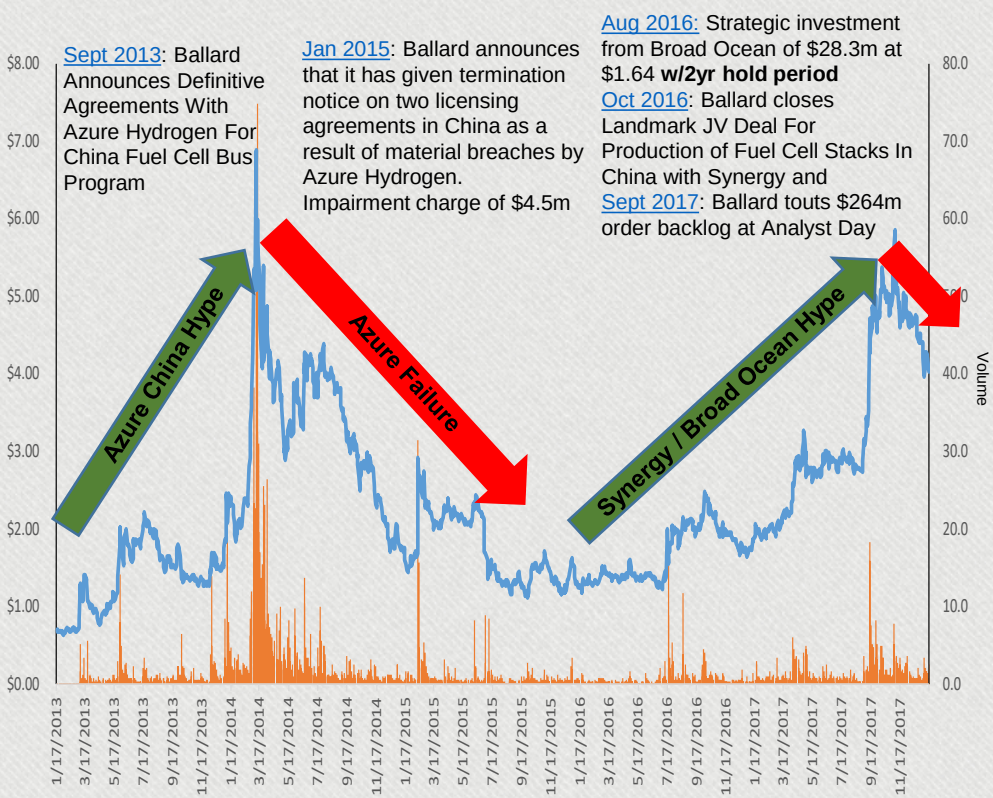


SPRUCE POINT CAPITAL MANAGEMENT

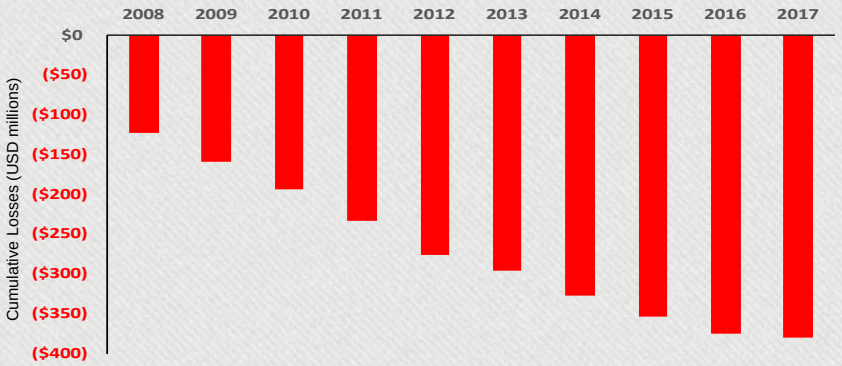
Déjà Vu: Ballard's China Promotion

Spruce Point believes Ballard investors should be cautioned by its history of partnership failures in China, notably Azure in 2013-15. Our on the ground due diligence strongly suggests this time around with Synergy/Broad Ocean will result in disappointment and a significant stock price correction. This will likely result in more losses and continued share dilution.

Investors Set-Up For Disappointment Again



Resulting in More Cumulative Financial Losses



And More Share Count Growth (Dilution)

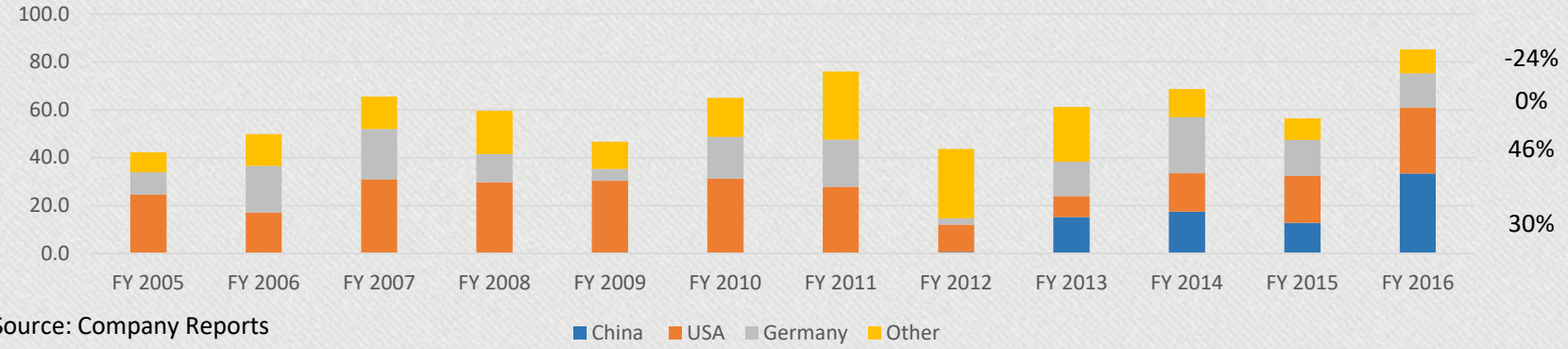
SPRUCE POINT CAPITAL MANAGEMENT

Ballard Business (and Stock Price) Heavily Dependent on China HDM Growth

Revenues $ millions	Disappointing Results Post Management Promotion / Comments	Q3 17	TTM	Y/Y Change	Lake Street Revenue Forecasts for Established Businesses		
					Fiscal 2018	Fiscal 2019	Fiscal 2020
Telecom Backup	• Asset impairment charges of $1.2 million Q1 16 • Sale of Methanol Telecom Backup Power to CHEM and tech solution deal with Synergy for licenses Q2 16	$0.6	$3.7	-25%	$0	$0	$0
Materials Handling	• Plug Power develops own proprietary stack to become less dependent on Ballard	$2.0	$9.2	-39%	$8.0	$8.0	$8.0
Heavy-Duty Motive	• SP believes that the HDM backlog and growth is heavily predicated on China, despite select other opportunities	$17.8	$48.2	+137%	$44.1	$52.2	$58.1
Portable Power	• Significant delays in achieving program of record status • Ballard announces narrowed focus and further cost reductions at Protonex Subsidiary - Jan 18	$0.9	$5.9	-71%	$33.0	$38.5	$45.7
Technology Solutions	• SP believes that this business is heavily concentrated between VW/Audi and China Partner Revenue	$10.6	$45.1	+77%	$40.0	$40.0	$40.0

Source: Company Reports, Earnings Transcripts, Lake Street Capital Markets

Ballard Revenue By Geography, Increasingly China Dependent



Source: Company Reports

SPRUCE POINT CAPITAL MANAGEMENT

Ballard Backlog Heavily Dependent on China

Ballard claims a backlog order book of $264m (1); we estimate that announced China projects (assuming most are still live) account for $204m or 78% of the company's backlog

Date	Partner/buyer	Item	Value US$ m	Delivery Date	Remaining Value	Status
Jan-15	Beijing's Azure Hydrogen	Failed partnership loss of $4.4m	($4.4)	--	--	Failed
Jun-15	Tangshan Railway Vehicle Company, Limited (TRC) (owned by CRRC)	Fuel cell module for trams	$3	2016	$0	Project completed no new revenue - demonstrated 2017
8-Jun-15	Nantong Zehe (Rugao Special hydrogen development, Jiangsu)	33 buses produced by Greenwheel in Jiangsu and Foshan Feichi in Yunfu	$10	2015	$10	These buses were never produced and the company has not reported any revenue from the project
25-Sep-15	Guangdong Synergy Hydrogen Power Technology Co., Ltd.	300 Fuel Cell Busses for use in Foshan and Yunfu	$17	2016	$0.1	24 delivered by Oct 2016, Produced by Foshan Feichi and integrated by Shanghai Re-Fire and Sinohytec. Only 11 are licensed. None of the buses lines are in service.
28-Sep-15	CRRC Qingdao Sifang	10 fuel cell engines for trams in Foshan (later reported as 8)	$6	2019	$2	Commercial service in 2019 and five engines shipped by Q2 2017
Jan-16	Guangdong Synergy Hydrogen Power Technology Co., Ltd.	Fuel cell stacks for cars Dongfeng Xiangyangtouring Car Co., Ltd. part of Dongfeng Motor Corporation, Wuhan	$12	2016/17	$0	N/A
11-Jun-16	Guangdong Nation Synergy Hydrogen Power Technology Co. Ltd. ("Synergy")	Technology Solutions fuel cell backup power systems in China. Plus a royalty on each sale	$2.5	NA	$0	Synergy has made almost no sales as the cost of the hydrogen machines is 3 to 4 times higher than battery back up
18-Jul-16	Guangdong Nation Synergy Hydrogen Power Technology Co. Ltd. ("Synergy")	Joint venture to produce fuel cell stacks for busses and commercial vehicles 6,000/year (1 shift) 20,000/year (3 shifts). $40m invested by Synergy	$170	2021	$141.7	Factory completed and producing fuel stacks. We believe that it has produced less than 50 fuel cell stacks to date

Source: Company Reports, press releases and J Capital

1) Ballard Announces $264m Order Backlog, Sept 13, 2017

SPRUCE POINT CAPITAL MANAGEMENT

Backlog Heavily Dependent on China (Continued)

Date	Partner/buyer	Item	Value US$ m	Delivery Date	Remaining Value	Status
18-Jul-16	Zhongshan Broad-Ocean Motor Co., Ltd.	Zhongshan Broad-Ocean Motor Co., Ltd. Signs a deal with Synergy to buy 10,000 fuel cell motors for its leasing business for buses and trucks	NA	NA	NA	These vehicles will be manufactured by Dongfeng Special Vehicles and FAW using fuel cell stacks from the JV
26-Jul-16	Zhongshan Broad-Ocean Motor Co., Ltd.	Investment in Ballard 9.9% for $28.3m	NA	NA	NA	Deal closed 17,500,000 share at $1.64 on 28 Aug 2016
7-Sep-16	Shenzhen UpPower Technology Co., Ltd. ("UpPowerTech") and Gaungxi Yuanzheng New Energy Co. Ltd.	10 Fuel Cell Engines	$3	2016/2017	$3	The company has not reported revenue from this project and there is no evidence the project is proceeding
24-Jan-17	Yinlong Bus	10 Fuel Cell Engines for buses to be used in Beijing - purchase directly from Canada	$3	N/A	$2.3	Purchase of equipment has commenced
15-Feb-17	Zhongshan Broad-Ocean Motor Co., Ltd.	Assembly and sale of fuel cell engines from fuel cell stacks provided by Synergy Ballard JV in three cities in China including Shanghai	$25	2021	$24	Includes $12m in tech solutions. The first production location will be established in 2018
6-Apr-17 5-Jun-17	Zhongshan Broad-Ocean Motor Co., Ltd.	Purchase of 200 and 400 fuel cell engines direct from Canada	$11 $18	2017	$21	The 200 and 400 engine sale are now reported together. Broad Ocean stated they have imported 400 engines to date. Industry sources state that BO have not sold these engines
		Total	**$281**		**$204**	

Source: Company Reports, press releases and J Capital

SPRUCE POINT CAPITAL MANAGEMENT

Summary of Red Flags From On The Ground Diligence In China

In order to build an appropriate appreciation for Ballard's China HDM opportunity we engaged a China based research firm to perform key site visits and deeply diligence Synergy and Broad Ocean.

The investigators work confirmed the nascent stages of the China fuel cell market and raised the following red flags

- There presently aren't any hydrogen research institutes operational at the national hydrogen fuel cell development zone in Nanhai District of Foshan, Guangdong
- Investigators saw a total of 5 demonstration buses in Yunfu Tech Park and only two had license plates
- Industry sources claim that Synergy Ballard JV is only capable of producing a few hundred stacks per year
- A government official stated if there was a cheaper domestic MEA, that performed well, they would prefer to switch from Ballard
- Ballard and local press releases indicate that Foshan has produced 114 FCV buses. Despite originally being told buses were "offsite being painted" a Foshan employee claimed that far fewer buses have been produced to date and only 11 are licensed
- Yunfu Tech Park currently has a single refueling station with an idle mobile hydrogen production unit
- Despite public claims, the refueling station attendant told our investigators that there are no demonstration lines operating in Guangdong and that no bus lines are in service in Sanshui or Yunfu. They also only refuel one bus per day

SPRUCE POINT CAPITAL MANAGEMENT

China Fuel Cell Market In Nascent Stages of Development

- **China is still at the very beginning of an experimental phase of developing fuel cell vehicles, much like the US was over a decade ago. It is not at all certain that China will develop a fuel cell vehicle market beyond an experimental phase**
  - We estimate that there are currently 36 licensed fuel cell vehicles on the road in China, all buses and none in regular service
  - There are 6 refueling stations, only one is public the other 5 are attached to manufacturers operating facilities
  - Current level of HFCV development zone investment only represents 1% of announced plans

- **Stated objective of the China Electrical Industry Association in the Blue Book for China's Hydrogen Industry Infrastructure Development is that there will be a total of 10,000 Hydrogen fuel cell vehicles (FCV) by 2020 and 2,000,000 by 2030 and 1,000 refueling stations by 2030 (source, source)**
  - A fundamental flaw in this plan is that 1,000 refueling stations is likely not nearly enough to support millions of vehicles

- **Subsidies provided by both local and national governments are critical to the development of hydrogen fuel cell vehicles and the necessary refueling infrastructure**
  - As a result of fraud associated with electric vehicle subsidies, the requirements for fuel cell vehicle subsidies are more rigorous, leading to longer payback periods and strains on the supply chains cash flow and working capital (source)
  - Subsidies for refueling stations seem less understood and don't appear to be on the scale necessary to support the planned demand for vehicles

- **Despite little mention from Ballard or the Sell Side Analysts there are currently three fuel cell "value chains" competing in China and we expect credible domestic MEA producers to emerge in the next three years**
  - Companies based in or near Beijing and connected to the major SOE enterprises, like Sinohytec, will always be more successful than companies in South China backed by local government and without ties to central SOEs (Synergy)
  - Shenzen Centre Power Tech (002733 SHE) has announced plans to invest $754m (RMB 5bn) to develop hydrogen fuel cell technology and Snowman (002639 CN) recently purchased a 17.6% stake in Hydrogenics

SPRUCE POINT CAPITAL MANAGEMENT

China Fuel Cell Market In Nascent Stages of Development (Continued)

- **Only two auto manufacturers have constructed production capacity for hydrogen vehicles at any scale to date. The remaining auto manufacturers have announced models and plans to establish production, but are taking a wait and see approach**
  - Seeking clarity on certain subsidies necessary to make their operations profitable
  - Waiting for local governments or State Owned Entities to build a network of refueling stations to make operating these vehicles viable
  - Spruce Point understands that only six manufactures will be producing in 2018 and estimates total production units to be less than 1,250 vehicles

- **The biggest challenge the Chinese fuel cell market faces is a lack of refueling station infrastructure**
  - Based on market research we expect 15 and 45 refueling stations to be operational by the end of 2018 and 2019, respectively. Assuming 50 buses can be refueled a day, this implies the infrastructure can support less than 2,250 buses in total by end of 2019
  - Spruce Point believes that the economics of hydrogen refueling stations are so poor, 12.5 years to repay investment amount without overhead (based on Foshan refueling station economics), that they will never be built barring significant sustained subsidies from government

- **Spruce Point believes that many plans will be postponed or scrapped until the above uncertainties are reduced**
  - Achieving 10,000 FCV in total by 2020 is possible but 2,000,000 by 2030 is in the realm of fantasy
  - **Spruce Point expects total FCVs produced by 2030 to be between 200,000 and 300,000 units**

SPRUCE POINT CAPITAL MANAGEMENT

Ballard Faces Uphill Battle As One of Three Competing Fuel Cell Value Chains in China

Despite little discussion of competition in China from Ballard, Spruce Point believes that the "Sinohytec chain" is best positioned to capture the China fuel cell opportunity given relationships with influential research universities and manufacturers.

Fuel Cell Membrane (MEA)	Ballard	Hydrogenics, 3M and others	Sunrise Power
Fuel Cell Stacks	Ballard, Synergy Ballard	Sinohytec	Sunrise Power
Fuel Cell Modules	Broad Ocean, Shanghai Re-Fire	Sinohytec	Sunrise Power
Car Manufacturers			SAIC
Bus Manufacturers	Zhongtong, Feichi, Ankai	Foton, Yutong, Shenlong, Kinglong	
Deliver Van Manufacturers	Dongfeng	Dongfeng	FAW
Year of first China production	2017	2016	2017

Source: Jcap

	"Ballard Chain"	"Sinohytec Chain"	"Sunrise Power Chain"	Total
Fuel Cell Engines Produced in 2017	**100**	**250**	**10**	**360**
Autos produced 2017	30	100	5	135
Autos licensed 2017	11	4	--	15
Total FC Engine Production 2018	**491**	**604**	**115**	**1,210**
Car production 2018	--	--	100	100
Bus production 2018	250	500	--	750
Delivery van production 2018	200	--	10	210

Source: Jcap, Hebei.com.cn, afinance.cn, chinabuses.com, chinabuses.com, sohu.com, auto.cnr.cn, sohu.com, jndihao.com, source, Chinabuses.com, China-hydrogen.org, chinabuses.com, chinabuses.com, finance.sina.com, srxoutdoor.com, cnautonews.com, chinabuses.com, finance.sina.com, ibgbuy.com , chinabuses.com, eastmoney.com, jndihao.com, tyncar.com, auto.hexun.com, eastmoney, leiyukeji.com, Liaoning.nen.com, chinacar.com, evpartner.com, eastmoney.com

SPRUCE POINT CAPITAL MANAGEMENT

Transition to New Energy Vehicles Has Negatively Impacted Broad Ocean Cash Flows

Spruce Point has significant concerns about the financial condition of Ballard's partner Broad Ocean, and don't believe it has the clout necessary to make the partnership a winner in the industry.

- **Broad Ocean's performance was so weak that the Shenzhen stock exchange, in August 2017, requested a formal explanation from the company, including why the Shanghai Edrive acquisition has performed so far below guidance**

- **Cash flow from operations has been negative all year, and the rebound in new energy vehicle sales in Q3 did not translate into improved cash flow:**
  - Q4 cash flow should improve as new energy vehicle sales will peak in that period; however, we expect it will be a small positive number

Broad Ocean Cash Flow From Operations and Borrowing (Cumulative)

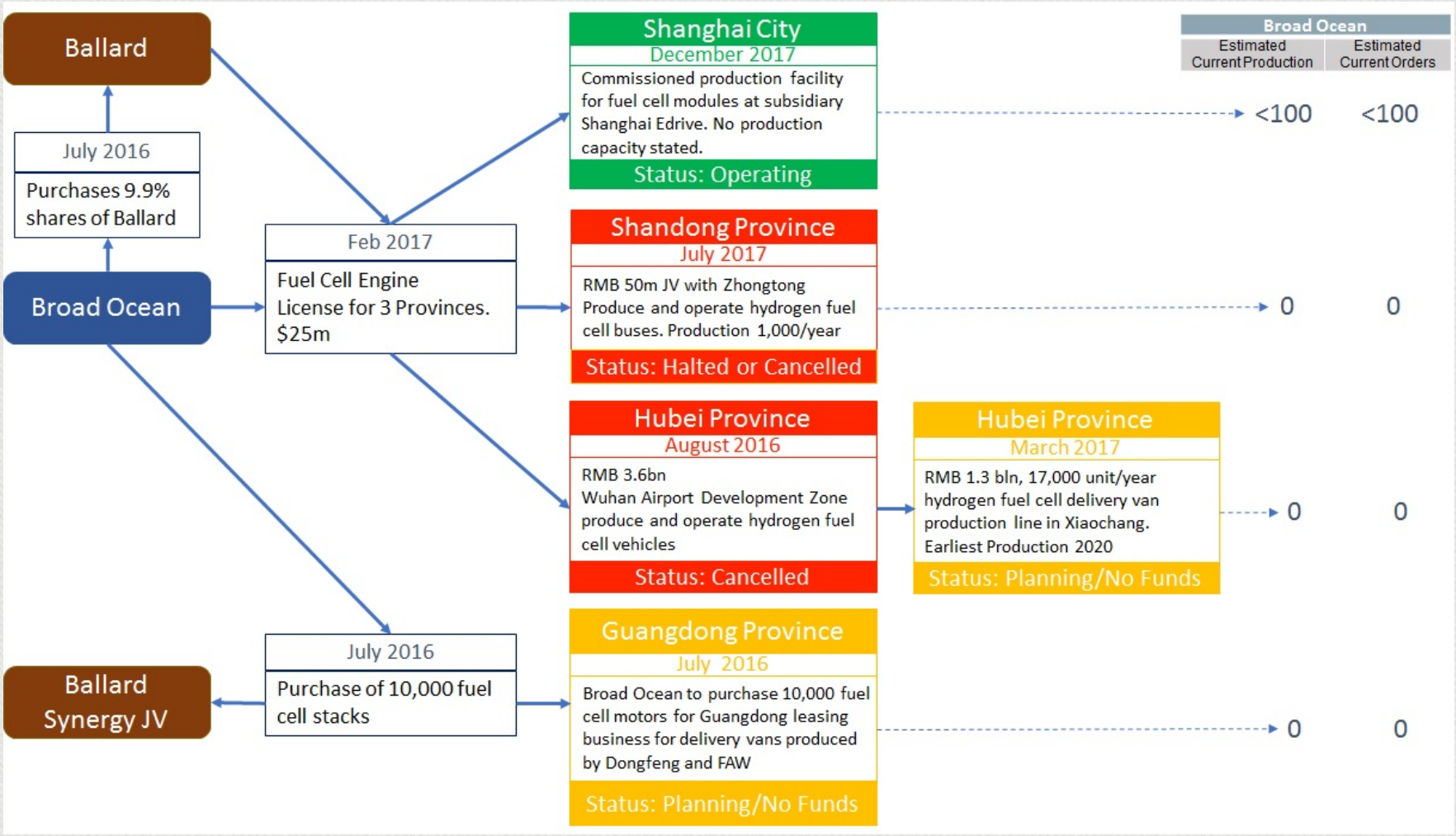
RMB millions	Q1 2017	Q2 2017	Q3 2017
Net Cash Flow from operations 2017	(39)	(90)	(47)
Net Cash Flow from operations 2016	47	124	364
Net increase in borrowings 2017	100	557	765

Source: Company Reports

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean's Production Status Should Give Investors Pause Given State Of Balance Sheet

Based on public statements and our investigators research it would appear that Broad Ocean has a long way to go before hitting a 16,000 order



SPRUCE POINT CAPITAL MANAGEMENT

Successful Bond Issuance Critical to Broad Ocean Funding FCV Initiatives

- **Broad Ocean has been preparing to issue a convertible bond to raise RMB 3.4 billion all year and achieved the final required approval from the China Securities Regulatory Commission to issue the bond on November 20th, 2017 (source)**
  - The CSRC requested further information on the feasibility of the intended use of funds, not once, but twice before approval

Planned Usage From Convertible Bond	Amount RMB billions
Vehicle Leasing Company	1.6
Electric Vehicle Power Train Production Line	0.9
Hydrogen FCV Delivery Van 17,000-unit production line	0.5
Hydrogen FCV Research	0.2
Software	0.2
Total	**3.4**

Source: Company Reports

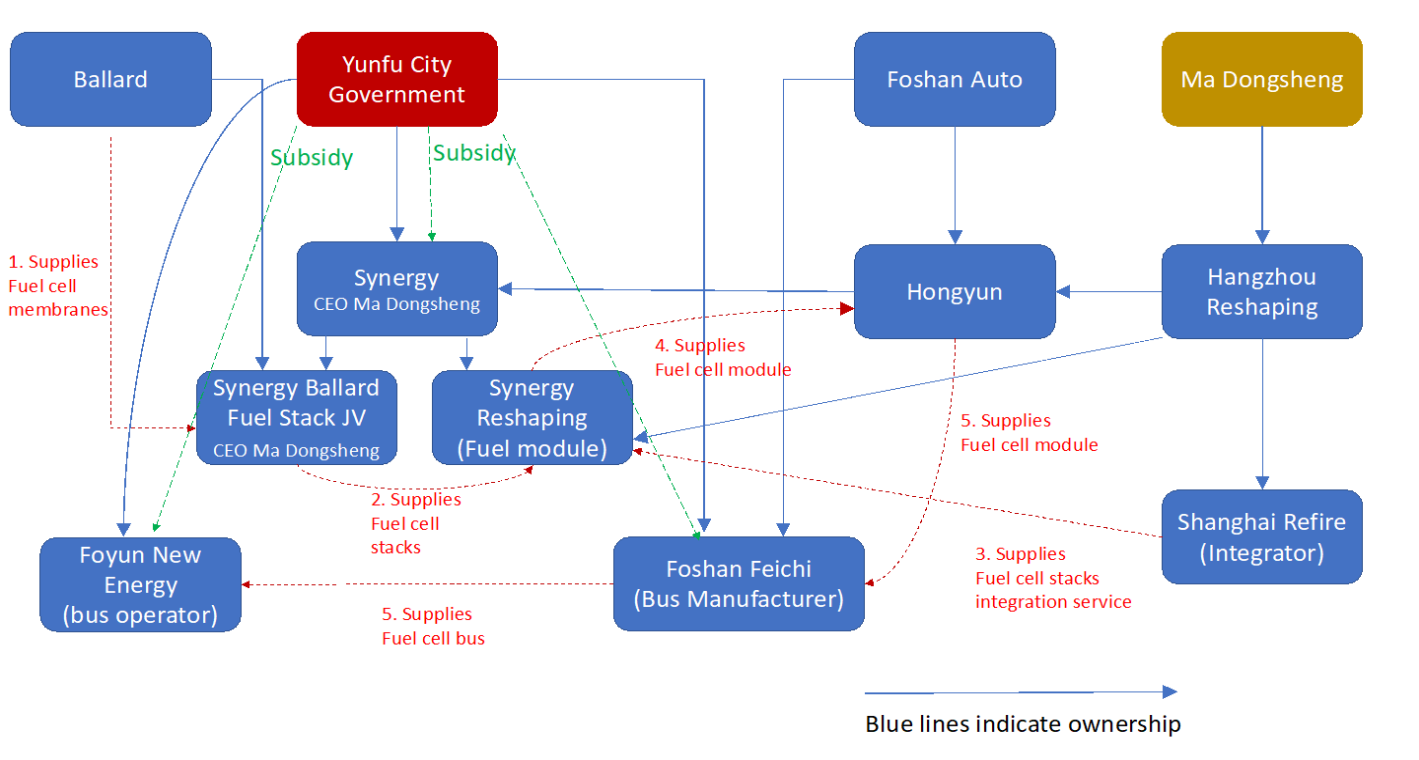
- **Chinese Corporate bond issues were down 37% in 2017 and we believe Broad Ocean will struggle to successfully issue these bonds given the poor net operating cash flow**

- **The Chairman and largest shareholder, Mr Lu Chudong, increased his borrowings against his shares on December 11th, 2017**
  - He provided a further 125 million shares of his 755 million shares as collateral for borrowing, taking his total shares as collateral to 220 million which is 29% of his total shares and 9.28% of the total outstanding shares of the company
  - He first borrowed against his shares in July 2017
  - It appears not just Broad Ocean, but also its Chairman might be experiencing cash flow difficulties (source)

SPRUCE POINT CAPITAL MANAGEMENT

Yunfu City Government Touches and Mr. Dongsheng Profits from the Entire Synergy Supply Chain

Synergy, the company that has made the single largest purchase in the history of Ballard, is essentially owned and controlled by the local government (Yunfu City), the CEO, Ma Dongsheng, and some venture investors



Source: J Capital, SAIC, MIIT, qichamao.com

- The local government also owns the bus manufacturer Foshan Feichi (largest buyer of the fuel cell stacks), Foyun New Energy (bus operator) and provides the subsidies to operate the production facilities and the bus operating company (source, source, source)
- Ma Dongsheng shifts the activity of the business through subsidiaries or related companies (cross ownership) where he can mask larger ownership (source)

SPRUCE POINT CAPITAL MANAGEMENT

Ballard's History of Product Promotion and Disappointment

Ballard has historically hyped segments or products/partnerships within segments only later to restructure, exit or change strategic direction. Will the China HDM 2.0 Strategy be the latest disappointment?

Product	Management Commentary	Disappointing Outcome
	• *"So we will have some deployments in 2015, but I don't view them as scale deployments, they will position us for 2016 though in that market segment very strongly."* – CEO MacEwen (Q1 2015 Earnings Call) • *"We have added now, I think 10 to 12 new channel partners that are better positioned for higher volume sales as we move forward."* – CEO MacEwen (Q2 2015 Earnings Call)	• Asset impairment charges of $1.2 million Q1 16 • Sale of Methanol Telecom Backup Power to CHEM and tech solution deal with Synergy for licenses Q2 16
	• *"We are working very hard as you know to achieve the program of record status. So we expect to see a very strong growth year for Protonex in 2016 in the $20 million revenue range and expect to see on the strength, particularly of the program of record achievement that we expect. We expect to see a very strong growth year in 2017 as well."* – CEO MacEwen (Q4 2015 Earnings Call)	• Trailing 12 month revenue of only $9.2 as of Q3 17 • Ballard announces narrowed focus and further cost reductions at Protonex Subsidiary - Jan 18
	• *"In Q1, we experienced significant year-over-year growth in fuel cell stack shipments to Plug power for the material handling market. We continue to strengthen our collaboration with Plug as they secure repeat and new customer business.* - CEO MacEwen (Q1 2015 Earnings Call)	• *"China should more than compensate the anticipated reduction in revenue from Plug Power (PLUG) as that company continues to increasing use its own stacks as against purchasing those from BLDP. We are not expecting any significant revenues from PLUG beginning in 2018."* – Rodman March 17
	• Multi-year definitive agreements to support Azure Hydrogen's zero emission fuel cell bus program for the China market. Ballard agreed to provide a license, associated equipment and Engineering Services to enable assembly of its FCvelocity bus power modules by Azure in China. As per the agreements, once this assembly capability was established, Azure would assemble modules with fuel cell stacks to be supplied exclusively by Ballard. September 2013	• Ballard announces that it has given termination notice on two licensing agreements in China as a result of material breaches by Azure Hydrogen. Impairment charge of $4.5M – Jan '15

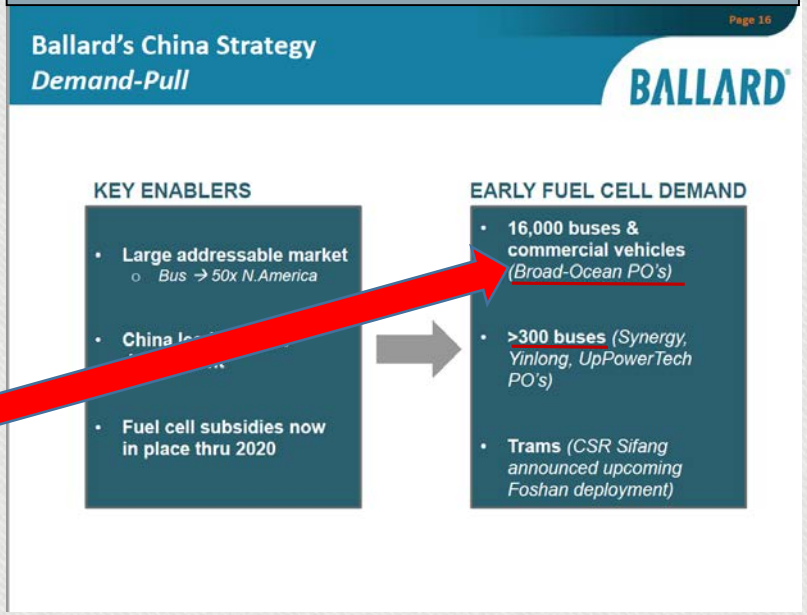
Is Ballard's Management Team Becoming Increasingly Promotional About China HDM?

Ballard seems to have "magically" converted Broad Ocean's 5 Year Expectations into Purchase Orders between the Ballard Investor Day and the Needham Conference. Clarity on the >300 bus order would also be helpful. Purchase orders of these size appears to be missing from Ballard's shrinking order backlog.

Broad Ocean "Targeting"

Source: Broad Ocean PowerPoint from slides from Ballard Investor & Analyst Day. September 14th, 2017

Ballard Suggesting It Has Purchase Orders



Source: Ballard presentation at Needham Growth Conference on Jan 17th, 2018

ORDER BACKLOG	Order Backlog At End-Q2 2017	Orders Received in Q3 2017	Orders Delivered in Q3 2017	Order Backlog At End-Q3 2017
Total Fuel Cell Products & Services	$263.5M	$5.2M	$31.9M	$236.8M

Source: Ballard presentation at Needham Growth Conference on Jan 17th, 2018

Hydrogen Fuel Cell Market in China

SPRUCE POINT CAPITAL MANAGEMENT

History of China New Energy Policy

As a result of fraud related to electric vehicle subsidies, Synergy and Broad Ocean now face much tighter requirements and longer payouts than they would have expected when partnering with Ballard in 2016.

- **The Chinese government introduced subsidies for electric vehicles in 2014. Generous subsidies attracted investment and fraudulent activity (source)**
  - By 2016 there was an investigation into fraud at 7 auto manufacturers
  - Fraud ranged from over-stating performance to achieve a higher subsidy, selling units to related parties but never using them, to failing to produce and faking statistics
  - **From September 2016 to February 2017 seven manufacturers were heavily fined**
- **As a result of the above behavior, subsidies were reduced by around 30% in 2017 (source)**
  - There are now strict compliance requirements. Subsidies will only be paid once a vehicle has been registered
  - When vehicles are sold to related party leasing fleets, subsidies will only be paid when the vehicle has been used for 30,000 km
- **Subsidies were historically paid with a one to two year time lag. Given stricter compliance standards, payments are likely to be pushed out further creating a larger cash flow drag on vehicle producers (Ballard purchaser chain)**
- **When Synergy and Broad Ocean moved into the hydrogen fuel cell market they would have expected looser requirements for subsidy payments**
- **The government is now concerned there is excess capacity in electric vehicles and has pushed out a mandated requirement for 10% of all vehicles produced to be electric vehicles to 2019**

SPRUCE POINT CAPITAL MANAGEMENT

Government Policy and Subsidies

Both central and local government subsidies play a critical role in supporting the economic viability of the hydrogen fuel cell industry. Delays in subsidy payments are resulting in FCV manufacturers being short working capital.

- The central government pays a subsidy to the purchaser of a vehicle. Due to fraudulent claims for electric vehicle subsidies, a car sold to a manufacturers fleet must achieve 30,000 km before the subsidy may be claimed
- Local governments subsidize producers to the same level as the central government. Local government subsidies appear to vary widely, but are at least 50% of total subsidies paid per vehicle. A local government will use subsidization to induce manufactures to establish local operations

Central Government Purchaser Subsidy Schedule through 2020

Vehicle Type	Subsidy
Passenger sedan	RMB 200,000
Delivery van and small bus	RMB 300,000
Heavy duty trucks and large buses	RMB 500,000

Chinabuses.com

- Local governments not only subsidize production but also purchase and operate the vehicles. For example, the Foshan City government has announced a vehicle leasing subsidy for FCV delivery vans (fsonline.com)
- Our investigators also heard that they can get a subsidy of around RMB 80,000 per year to operate bus lines from the city government which is the same amount as a diesel bus operating subsidy (equals 50% of the fuel cost of operation a diesel bus). They can also get the advertising rights for the exterior of the bus
- Our investigators heard from manufacturers that subsidy payments are very slow. The subsidies for 2015 were only being paid in Q4 2017. **As a result, companies in the FCV manufacturing value chain are all short of working capital**

Examples of Specific Fuel Cell Subsidies

Vehicle	Total Cost of Production	Local subsidy	Central Subsidy	Post subsidy cost
Feichi 8.5 meter bus	RMB 1.6m	RMB 0.5m	RMB 0.5m	RMB 0.6m
SAIC FCV80 SUV	RMB 1.3m	RMB 0.8m	RMB 0.2m	RMB 0.3m
Dongfeng 3.3 ton delivery van	RMB 1m	RMN 0.5m	RMB 0.5m	0

Source: Jcap interviews, eastmoney, jiemian.com

SPRUCE POINT CAPITAL MANAGEMENT

Hydrogen Fuel Cell Vehicle Development Zones In Nascent Stages

Despite all the hype in China over announced hydrogen fuel cell development zones, we can only find two that are producing vehicles and actual investment is less than 1% of announced plans.

Location	Zone	Government Support	Planned Investment RMB bn	Key Companies	Operational Status
Beijing	Beijing Future Science Park Development-Hydrogen Technology Innovation Platform	Local/central/ UNDP	100.0	Shenhua, State Power, State Grid, 5 Central government research institutes	Active R&D
Yunfu, Guangdong	Foshan (Yunfu) Industry Transfer Industrial Zone	Local	23.5	Synergy, Feichi	Producing fuel cell stacks and FCV
Zhengzhou, Henan	Bak New Energy New Materials Industrial Zone	Local	22.0	Bak Power, State Power	Planning
Taizhou, Zhejiang	International Hydrogen Industry Town	Local	16.0	Investment Companies	Planning
Rugao, Jiangsu	Rugao Economic and Technological Development Zone-Hydrogen Town	Local/central/ UNDP	6.7	Zehe New Energy,	Planning
Foshan, Guangdong	South China New Energy Auto Integration Innovation Industry Zone, Guangdong New Energy Auto Key Parts Industry Base	Local/Central/ UNDP	6.0	Changjiang Hydrogen Power System Development Centre	Refueling station, pilot projects, no R&D
Wuhan, Hebei	Center Power Hydrogen Fuel Cell Industrial Zone	Local	5.0	Center Power (Xiangyao)	Planning
Ningde, Fujian	Ningde Hydrogen Industry Zone	Local	5.0	State Power Investment Corp	Planning
Liu'an, Anhui	Liu'an Hydrogen Energy Industrial Zone	Local	2.5	N/A	Planning
Zhangjiakou, Hebei	Zhangjiakou Fuel Cell Production Base	Local	1.0	BAIC Foton, Sinohytec	Producing Fuel cell engines and buses
Yancheng, Jiangsu	Hydrogen Industry High-end Equipment Base	Local	NA	Shenzhen State Hydrogen	Planning

Source: Jcap, sina.com, zhongum.gov, 21jingji.com, fsonline.com, cnghdz.com, xinhuanet.com, Hebei.com.cn, itdcw.com, sina.com, investnd.gov.cn, cnpc.com, luaninfo.com, chinanews, gdipa.org, 21cn.com, xinhuanet.com, sohu.com, baidu.com

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CAPITAL MANAGEMENT

Hydrogen Fuel Cell Vehicle Development Zones In Nascent Stages (Cont'd)

To date the UNDP programs have had very limited impact on the development of the hydrogen fuel cell vehicle industry in China. It also appears that local governments are unwilling or unable to provide the required subsidies.

- **The United Nations Development Program ("UNDP") has announced a hydrogen energy development program, working with China's Ministry of Science, in five cities, Beijing, Shanghai, Foshan, Yancheng and Rugao and has US $62 million in funding for the project (source)**
  - Two of the cities, Rugao and Foshan, have had formal launch ceremonies for the cooperation
  - When Investigators checked with Foshan about the UNDP program they seemed a little puzzled and unsure about the nature of the cooperation
  - Foshan stated that the UNDP had sponsored the purchase of one hydrogen demonstration bus via tender and had provided financial support for a conference

- **Some projects have been announced multiple times each time with a new corporate partner, like the Wuhan zone that was originally a cooperation with Broad Ocean and now with Shenzen Center Power. This project remains in the planning stage. Local governments, it seems are unwilling or unable to provide the required subsidies**

SPRUCE POINT CAPITAL MANAGEMENT

Overview of China Domestic Fuel Cell Manufacturers

Shenzen Centre Power:

- **Shenzhen Center Power Tech Co Ltd (002733 SHE), a listed producer of lithium batteries, has announced that it will invest RMB 5 billion to develop hydrogen fuel cell technology**
  - Their objective is to produce 100,000 integrated fuel cell modules and electric motors within 5 years (source)
- **They are establishing a new energy manufacturing facility in Wuhan Development Zone**
  - Ballard's partner Broad Ocean had previously announced a similar investment plan in Wuhan and that has now been cancelled and replaced by Shenzhen Centre Power Tech Co (source)
- **Shenzhen Centre Power has a technical cooperation with Qinghua University's fuel cell research center to commercialize its technology**

Snowman (002639 CN):

- **Domestic listed company that manufactures refrigeration equipment purchased 17.6% of Hydrogenics, Ballard's key competitor, on April 29th, 2017 for $21 million (source)**
- Snowman, prior to this acquisition, has acquired other international companies to become a supplier of fuel cell air supply systems
- We expect Snowman to emerge as a key competitor to Broad Ocean and the "Ballard Supply Chain" in China

Sunrise Power:

- **Sunrise Power was established in 2001 as a spin off from a government backed research institute. It has 200 staff and produces MEA, fuel cell stacks, and fuel cell engines for vehicles and power back up systems**
- Sunrise Power is suppling fuel cell engines, using their own MEA, for 100 FAW logistics vehicles and for SAIC's FCV sedans (source, source)

SPRUCE POINT CAPITAL MANAGEMENT

Sinohytec Overview

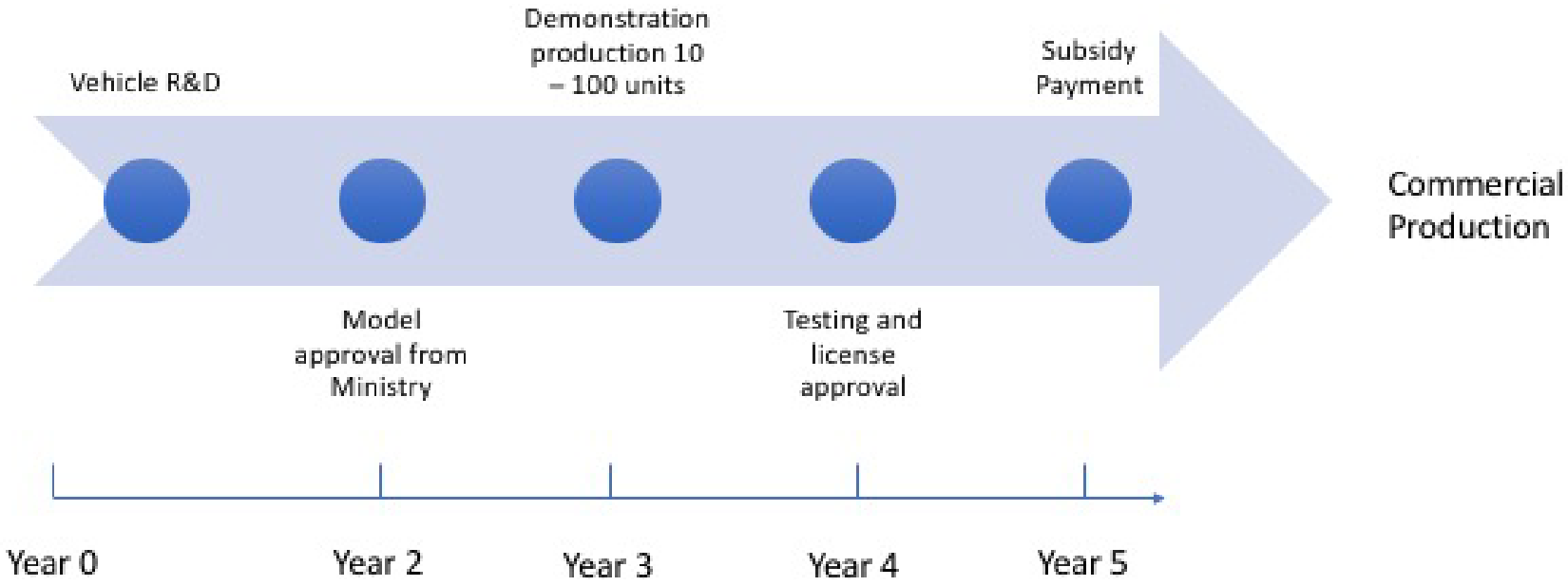
Companies based in Beijing and connected to the major SOE enterprises, like Sinohytec, will generally be more successful than companies in South China backed by a local government without ties to central SOE's (Synergy).

- **Sinohytec, a Beijing based hydrogen fuel cell engine producer, is the biggest competitor to Ballard and its partners in China**
  - We estimate Sinohytec presently has approximately 50% market share (Ballard ~40%)
- **Sinohytec purchases MEAs from a variety of foreign suppliers like 3M and Hydrogenics and they do not plan to develop their own MEA**
- **Sinohytec engines are under the hood of 7 of the 13 approved vehicle producers by the Ministry of Information Industries Technology**
- **Sinohytec works closely with its second largest investor Qinghua University, the "Harvard of China"**
  - Many Senior government, Communist Party and SOE management elites are graduates of Qinghua
- **They have already sold 244 FCV engines to Zhangjiakou City government through a tender process. We estimate that they produced approximately 250 FC engines in 2017**

SPRUCE POINT CAPITAL MANAGEMENT

Development Time Line for Fuel Cell Vehicles

From vehicle R&D to commercial production takes around 5 years. From demonstration to commercial production will take around 2 years. There will only be two commercial producers of hydrogen fuel cell vehicles in China in 2018 and we expect at most another 2 in 2019.



Source: Jcap

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Automotive Manufacturers Overview

We can identify that of the thirteen approved automotive companies, only six will produce vehicles this year. We expect total production from these six in 2018 to be less than 1,250 vehicles.

Most Likely Producers By 2018

Automobile Company	Market Position	Fuel Cell Vehicle Status	FC Engine Supplier
Foton	Top 5 bus producer	Commercial Production	Sinohytec/Hydrogenics
SAIC	Largest Auto Manufacturer	Commercial Production	Sunrise Power
Dongfeng	Second largest auto manufacturer	Demonstration	Shanghai Re-fire/Ballard
Foshan Feichi	Small bus manufacturer	Demonstration	Shanghai Re-fire/Ballard
Yutong	Largest bus manufacturer	Demonstration	Sinohytec/Hydrogenics
Shenlong	Small bus manufacturer	Demonstration	Sinohytec/Hydrogenics
FAW	Third largest auto manufacturer	Planning	Sunrise Power

Source: Jcap and sources indicated on previous slide

- **Ankai and Zhongtong have announced they will produce hydrogen fuel cell vehicles but they appear to either remain plans, have been shelved or quietly cancelled**

- **Changjiang and others have plans to commence production several years from now. No doubt they are delaying to see how refueling infrastructure, subsidies and other critical elements for the industry come together before committing to any investment**

SPRUCE POINT CAPITAL MANAGEMENT

Overview of Chinese Fuel Cell Vehicle Manufacturers – Foshan Feichi

Ballard's press releases and local government officials would have you believe Foshan Feichi have produced 114 FCV buses. Based on our research, we believe they have likely produced less than 50 buses to date, and only 11 of those are licensed and on the road.

Foshan Feichi:

- Foshan Feichi is a tiny regional producer of diesel, LNG and electric buses that has now diversified into hydrogen vehicles after becoming a joint venture with the Yunfu local government
- The group operates long distance as well as city buses. About 80% of the buses they build are operated by themselves. They operate about 500 buses. They also have a logistics company with 400 trucks.
- Almost all of the buses using Ballard FC technology have been built by Foshan Feichi

Source: J Capital. Feichi factory floor, assembling electric buses for Foton, no fuel cell vehicles in production.

SPRUCE POINT CAPITAL MANAGEMENT

Overview of Chinese Fuel Cell Vehicle Manufacturers – Foton

Broad Ocean's inability to convince Foton to source its fuel cell engines from Ballard is a significant failure for Ballard's strategic future in China.

Foton:

- **Subsidiary of the state-owned Beijing Automotive Industry Holding (BAIC) the fourth largest automobile manufacturer in China**
  - BAIC is the joint venture partner of Daimler AG and Hyundai in China
  - Foton is the fifth largest bus manufacturer in China with around 5% market share producing 10,000 buses a year including 1,000 electric buses
- **Built a factory to produce FCV in Zhangjiakou Hebei province around 100 km from Beijing. The production facility, recently completed, has installed capacity to build 2,000 buses per year and it is planned to expand to 10,000 in 2018 (source)**
- **Sinohytec is supplying the fuel cell engines to Foton from its adjacent manufacturing facility:**
  - Foton has an order for 100 buses from the city government of Zhangjiakou and is expected to win a further 250
  - Foton can produce a FCV bus at a cost of RMB 1.4 million
  - This is significantly lower than the RMB 1.6 million of Foshan Feichi
- **Foton's decision to source its fuel cell engines from Sinohytec is a significant failure for Ballard's strategic future in China. Foton will be the largest producer of FCV in China in the next few years**
  - It also shows the weakness of Broad Ocean. Broad Ocean, despite having a joint venture partnership with BAIC producing electric vehicles, was unable to supply fuel cell engines to Foton
  - Foton cooperates with Foshan Feichi to produce electric and FCV buses. Yet Ballard, which shares the same ultimate partner as Feichi, the Yunfu Government, was unable to become the supplier to Foton FCV bus company

SPRUCE POINT CAPITAL MANAGEMENT

Overview of Chinese Fuel Cell Vehicle Manufacturers – SAIC, Yutong, & Dongfeng

SAIC:

- **SAIC, an SOE, is the largest automobile manufacture in China and is Volkswagen's JV partner**
  - SAIC will produce its first fuel cell vehicle, the FCV80, for use in SUVs in 2018 (source)
  - The car will be produced at the company's Shanghai location and the production line capacity is said to be 2,000 vehicles a year
  - The fuel cell stacks will be provided by Sunrise Power (source)
- **SAIC's choice of using Sunrise Power to supply the fuel cell stacks for the FCV80 again shows the strategic failure of Ballard's choice of partner**
  - Broad Ocean, despite providing the electric power train, could not get Ballard fuel cells into the model. It also shows how a subsidy driven market will favor domestic technology over imported technology

Yutong:

- **Yutong in the largest bus manufacturer with 35% of the market**
  - It is purchasing the fuel cell modules for its FCV buses from Sinohytec and currently building 100 fuel cell buses (source, source)

Dongfeng:

- **Dongfeng, a SOE based in Wuhan, is the second largest automobile manufacturer and its joint venture partners include, Honda, Kia, Peugeot, and Renault**
  - Based on investigators conversations with industry sources, we believe Dongfeng will build 250 – 300 FCV delivery vehicles in 2018. Equities analysts in China are estimating 400 have been produced to date and that an additional 2,000 will be built in 2018. We believe this is overstated (source)
  - Ballard will supply the fuel cells and Shanghai Re-Fire will build the fuel cell engines

SPRUCE POINT CAPITAL MANAGEMENT

Overview of Chinese Fuel Cell Vehicle Manufacturers – FAW & Shenlong

FAW:

- **FAW is the third largest vehicle manufacture in China and partners with Volkswagen's Audi division**
  - It plans to produce FCV delivery vans using Sunrise Power fuel cell modules (source)

Shenlong:

- **Shenlong has 1% of the bus market**
  - The parent company of Shenlong, the listed company Dongxu Optoelectronic Technology Co Ltd (200413 SHE), owns 5% of Sinohytec (source)
  - It is purchasing its fuel cell from Sinohytec and plans to build 100 FCV in 2018

SPRUCE POINT CAPITAL MANAGEMENT

State of Chinese Refueling Stations

China's hydrogen fuel cell future is impeded by a lack of refueling stations.
There are currently only six refueling stations in operation (286 globally), located in Beijing, Shanghai, Zhengzhou, Dalian, Foshan, and Yunfu.

- **Five of the refueling stations in operation are to service research and development and demonstration vehicles and are not in commercial operation (source)**
  - Only one is licensed to operate commercially
- **Spruce Point estimates China has 9 refueling stations under construction and another 30 in the planning stages**
- **We expect there will be 15 operational refueling stations at the end of 2018 and 45 by the end of 2019**
  - These quantities are less than the U.S. has now with 60 and Japan with 91, despite a fraction of the total number of buses being touted in China
  - Each refueling station will take approximately one year to build

SPRUCE POINT CAPITAL MANAGEMENT

Refueling Station Economics & Challenges

The abysmal economics of refueling stations, even with a subsidy, will discourage any large-scale uptake

- **If a bus fills up 24 kg each time at a cost RMB1,080 and assuming a gross margin of around 10% then a refueling station would make a gross margin of at most of RMB 3,240 per day (assuming 30 buses per day)**

- **Without paying any overheard or operating costs it would take 12.5 yrs to repay the investment (RMB 15m)**

- **Operating a hydrogen vehicle is more expensive than a diesel vehicle as the price of hydrogen is higher**
  - We estimate that 70%-80% of the retail cost of hydrogen is the delivery cost

	Diesel (liter)	Hydrogen (kilogram)
Price RMB	6	45
Consumption per 100 km	40	7
Cost per 100 km RMB	240	315

Source: J Capital interviews

- **Hydrogen can be a dangerous gas to transport, costs are high and reliable supply is not assured**

- **Portable machines that can convert water to hydrogen are available and our investigators saw one in Yunfu**
  - It was not in operation as you need to establish an operating area as you would for any chemical plant
  - While the plant is portable the infrastructure to use it in China is very expensive

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Refueling Stations Future Likely To Hinge On Converting Existing Gas Stations to Hybrids

- **Petrochina and Sinopec, the two primary owners of gas stations in China, have joined together to build a demonstration hydrogen refueling station in Foshan, Guangdong (source)**
  - Construction was said to commence in December 2017 and to be operational by the end of 2018
- **As these two companies can potentially convert existing gas stations into hybrid petroleum/hydrogen or hydrogen stations, the success of this experiment will be one critical step forward for the future of the industry**
- **With the above being said, based on our research, we believe refueling stations will likely continue to remain uneconomic and it will likely take a political directive to drive scale adoption**

Key Findings From Investigative Research in China

SPRUCE POINT CAPITAL MANAGEMENT

Key Takeaways from Investigators Visit to Foshan, Guandong

Our investigators visited the Nanhai District of Foshan, Guangdong where the national level hydrogen fuel vehicle development zone is located. To date most of the development appears to be in the planning stage and only a single refueling station exists.

- **Four hydrogen energy research institutes have been announced, but none are operational**
  - Investigators drove past one building that is meant to house a research institute that looked abandoned and we were told it was being "renovated"
  - The local government official did not know when they would start
- **JAC, the tenth largest auto manufacturer, will launch a production facility for passenger cars in 2020**
  - The location currently consists of an empty field with no infrastructure
- **Tyros has produced four FC buses, built by JAC, but none have license plates**
- **Ruihui, a domestically listed public company focused on LNG, built a refueling station operated by Nanhai government. They do not know of any plans to build additional stations**

Overview of the Yunfu Technology Park

Source: Baidu.com. Entrance to the Yunfu Technology Park that reads "China Yunfu International Stone Material Industry City" and is surrounded by commodity stone cutting business.

- Our investigators visited the Yunfu Technology Transfer Industrial Park in Yunfu, Guangdong Province where Ballard's joint venture partner Synergy is located
- Yunfu is famous for producing cut stone building materials. In fact the Yunfu Technology Transfer Park is on the site of the failed Yunfu International Stone Exhibition Park. The Park began in 2011 with RMB 6 billion in investment and closed in 2014 having failed abysmally to attract visitors (Baidu.com)
- The 200,000 SQM exhibition halls remain empty and unused. The abandoned hotel now houses visiting experts and the research center for the new Technology Transfer Park. The office building has been repurposed into the local government office for developing the park

SPRUCE POINT CAPITAL MANAGEMENT

Key Takeaways From Investigators Visit To Yunfu Technology Park Visit

- **Investigators saw a total of 5 demonstration buses in the park and only two had license plates**
  - Three were 11-meter hydrogen fuel cell buses that were in the original 28 buses produced. The fuel cell motors they used were produced by Ballard
  - Two were 8.5-meter buses that use the Synergy Ballard fuel cell stacks and Shanghai Re-Fire integrated modules. None had a number plate.

- **Industry insiders make reference that Synergy Ballard JV may have less annual stack capacity than publicly stated**
  - The development zone plans to produce 1,000 buses and 1,000 logistics trucks next year
  - Industry insiders stated that they believe the Synergy Ballard joint venture is only able to produce a few hundred fuel cell stacks per year

- **Our Investigators were shown the Synergy JV display room and informed backup power machines have had poor sales**
  - A Ballard fuel cell engine with 6 fuel cell stacks and a Shanghai Re-Fire fuel cell engine with 2 fuel cell stacks were displayed
  - The Shanghai Re-Fire fuel cell motor is much smaller and used to power the 8.5-meter buses
  - The Ballard fuel cell motor powers the 11-meter bus
  - Investigators were shown one of the Ballard power back-up machines and told the back-up machines are four times the cost of comparable back-up machine and sales have been poor

- **A government official clearly stated if there were a cheaper domestic MEA (fuel cell membranes) then they would prefer to use that over Ballard's MEA. He pointed out the domestic MEA produced by Sunrise Power does not currently perform as well as Ballard**

SPRUCE POINT CAPITAL MANAGEMENT

Key Takeaways from Investigators Visit to Yunfu Technology Park Visit

- **An Employee of Foshan Feichi claims that less than 50 fuel cell buses have likely been produced to date**
  - Investigators were taken on a tour of the Foshan Feichi bus manufacturing facility, that was relocated from Foshan in 2015, and now produces hydrogen fuel cell buses
  - The factory was only producing pure electric buses for Foton when visited
  - Investigators were told on the tour that Feichi had produced 114 fuel cell buses but they were "offsite being painted"
  - An employee of the bus company later stated that he believed they had produced less than 50 fuel cell buses to date, of which 11 have license plates
  - We believe 28 of those buses were the 11-metre buses
- **There is currently a single refueling station with an idle mobile hydrogen production unit**
  - Investigators visited the refueling station and were told the equipment was imported and the total cost of the refueling station was RMB 10 million
  - A mobile hydrogen production unit was sitting idle at the refueling station. It was unable to be put into operation as regulations require that it have the infrastructure and operation procedures of a chemical plant
  - The cost of hydrogen at this facility was RMB35/kg and 75 – 80% of that cost was transport
  - Investigators were told that the local government is building 5 refueling stations in Yunfu and has planned a further 20
- **We believe that a new production facility for hydrogen FCV delivery vehicles, likely operated by Dongfeng, will be announced shortly**
  - Spruce Point believes Dongfeng is still evaluating if it will produce FCV at an existing facility, in Yunfu or in another region
  - Investigators were told the cost to produce a FC logistics truck is RMB 1 million. The local and central subsidy amounts to RMB 1 million there will be no cost. The local subsidy is paid to the producer and would be RMB700,000/truck. The central subsidy is paid to the purchaser after the vehicle has traveled 30,000 km

SPRUCE POINT CAPITAL MANAGEMENT

Key Takeaways from Investigators Visit to Yunfu Technology Park Visit

Despite public claims that the Yunfu HFCV bus line is operational, our investigator's experience indicates otherwise

- Investigators saw a bus that had local route signage displayed on the front, however, it had no license plate and remained motor operating outside the office for the duration of our investigators 2 hour site (below left image). **This sort of showcase display was common during our work with Chinese reverse merger frauds**

Foshan Feichi FCV bus with the Yunfu bus route on display above the driver but no number plate. It remained, engine running, in the same location for the duration of investigators 2 hour visit. Source: J Capital

One of the two 8.5 meter buses we saw in Yunfu, neither had a license plate. Source: J Capital

SPRUCE POINT CAPITAL MANAGEMENT

Overview of Chinese Fuel Cell Vehicle Manufacturers – Foshan Feichi

Ballard's press releases and the local government officials would have you believe they have produced 300 FCV buses. The reality is that they have likely produced less than 50 buses to date and only 11 of those are licensed and on the road.

Foshan Feichi:

- Our investigators visited the Feichi factory and all the vehicles being produced at the time of visit were pure electric buses
- Most were being produced under license from Foton for delivery to Foton customers in South China. The outside of the buses had Kunming Transport Company painted on them

Feichi factory floor, assembling electric busses for Foton, no fuel cell vehicles in production. Source: J Capital November 2017

SPRUCE POINT CAPITAL MANAGEMENT

Findings From Investigators Visit to Foshan (Guangdong) Refueling Station

The refueling station attendant told our investigators that they only refuel one bus per day.

Source: J Capital. The first public hydrogen refueling station in Foshan, Guangdong.

- Our investigators visited the hydrogen refueling station in Danzao Village, Nanhai District Foshan (pictured above). It is the only commercial refueling station in China (source)
- The facility cost RMB 15 million to build and is owned by the local government. All the critical equipment is imported from Germany
- There is a rebate of RMB 4 million available for refueling stations of this scale. They had not applied for the rebate and they were not sure how or if it could be obtained
- The station has storage capacity of 350 kg and can refuel about 14 – 15 buses per day. We were told they only refill one bus per day

Review of Broad Ocean:
Challenges Faced By A Key Partner Critical To Ballard's Success

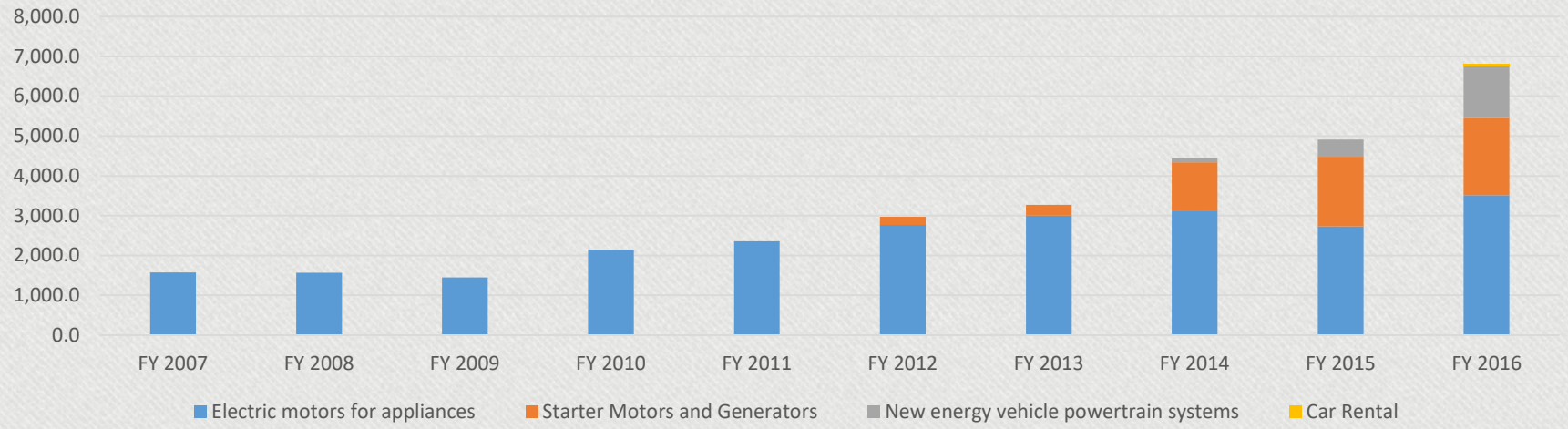
SPRUCE POINT CAPITAL MANAGEMENT

Overview of Broad Ocean

In our opinion, Broad Ocean (002249 CH) is a weak partner for Ballard in China. Based in South China, it lacks a network into the central ministries that determine policies and SOE's that are the agents for delivering on policy.

- Broad Ocean's organic revenue growth flattened out around FY2012. The revenue growth achieved since then has all come as a result of expensive acquisitions
- Its acquisition strategy has left it laden with debt and downward revisions of new energy subsidies have turned operating cash flows negative
- Ballard's key China partner, much like Ballard itself, has a penchant for making frequent statements about current and future projects, but then fails to deliver

Broad Ocean Revenue By Product (RMB mm)



Source: Company reports

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean: Missed Opportunities & Competing Partnerships

- **Broad Ocean had hoped to leverage its dominant market share in eclectic power trains to get an edge in supplying hydrogen fuel cell modules to automobile manufactures**
  - BAIC is its biggest customer for electric vehicle motors and it has a substantial joint venture operation with BAIC for electric buses
  - BAIC chose to work with its competitor Sinohytec to supply it with fuel cell modules

- **Broad Ocean supplied Yutong, the leader in bus production in China, with electric power trains for its electric buses**
  - Sinohytec is now supplying Yutong with the fuel cell modules for its initial production of 100 hydrogen fuel cell buses
  - This seems to be the motivation for Broad Ocean choosing to establish a joint venture with Zhongtong (000957 CN), one of the smaller top ten bus manufactures

- **When our investigators met with Broad Ocean they claimed the key manufacturers they are working with are Dongfeng, BAIC, Foton, Zhongtong, SAIC and Foshan Feichi bus**
  - Broad Ocean told us Shanghai Edrive has built 300 to 500 fuel cell engines this year and that most were supplied to SAIC for the FCV80 passenger vehicle, Dongfeng for delivery trucks and that a few were supplied to Foshan Feichi for buses

- **Our research suggests that apart from a small cooperation with Feichi, Broad Ocean is only really working with Dongfeng on a project of any commercial scale**
  - However, one industry insider told us that Dongfeng was being supplied by Shanghai Re-Fire and not Broad Ocean
  - The other auto manufacturers, such as BAIC and SAIC have chosen to work with Sinohytec and Sunrise Power

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean: Failed JV with Zhongtong?

- **Broad Ocean announced on July 27th, 2017 a RMB 50 million joint venture with Zhongtong to produce and operate hydrogen fuel cell buses in Shandong Province**
  - The joint venture, to be 88% funded by Broad Ocean, was planned to produce around 1,000 units each year

- **Zhongtong released a statement about the cooperation on the same day but did not mentioned it in the 1H or 3Q reports or any other public statements subsequently**
  - The board approved announcement specifically stated the name of the joint venture as "Shandong Zhongtong Broad Ocean Fuel Cell Technology Ltd" (通洋燃料电池科技(山东)有限公司)

- **Broad Ocean briefly mentioned the cooperation with Zhongtong in its 1H 2017 report, but was silent on the cooperation in the Q3 report and there is no investment cash flow account that matches this level of investments**

- **Our Investigators have checked registration records and this company, nor any other joint venture between these two groups, had been legally established as of December 18th, 2017**

- **We think this joint venture is unlikely to proceed**

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean: Stuffed With Unsold Inventory?

- **The plan was for the joint venture with Zhongtong to purchase stacks from Ballard, and later from the Ballard Synergy joint venture**
  - When investigators visited Broad Ocean in November 2017 they were informed that the Ballard Synergy JV is currently unable to provide them with fuel cell stacks
  - This venture was to produce 1,000 vehicles in 2018

- **As the Ballard Synergy joint venture could not produce the stacks, Broad Ocean then decided in April and June of 2017 to import a total of 600 fuel cell modules directly from Ballard's Canadian operations**
  - Broad Ocean told investigators it has already imported 400 of those modules

- **Investigators heard from competitors that Broad Ocean has failed to sell those 400 motors and this has become a huge drag on the company's cash flow**
  - We believe this is further evidence that the joint venture with Zhongtong will not proceed

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean: Vehicle Leasing Isn't In A Position To Purchase & Operate FCVs

In our view, Broad Ocean's leasing company has low capacity and no funds to purchase fuel cell vehicles. In our opinion, the idea of Broad Ocean using its leasing business to purchase and operate hydrogen fuel cell vehicles remains just a plan, not a reality

- **Broad Ocean has stated that it will purchase and operate hydrogen fuel cell vehicles using its vehicle leasing business**
  - This seemed like a good business model in mid 2016 when electric vehicle manufacturers were milking subsidies by using their own vehicle leasing business to buy their own production
  - This is now more difficult because a vehicle has to have been used for 30,000 km before a subsidy can be claimed and longer to get paid

- **Online and in announcements, Broad Ocean claims they have 6,000 vehicles in their fleet**
  - When investigators met with Broad Ocean they stated the car leasing business currently only has 4,000 cars and none are hydrogen fuel cell vehicles

- **Broad Ocean reported RMB 82 million in 1H 2017 from the business which is RMB 20,500 per vehicle. This indicates either a low utilization rate or that the number of vehicles is lower**

- **Broad Ocean is leasing buses and taxis to the city government in Guangzhou and Zhongshan**
  - They have developed an app for vehicle leasing and charging stations which provides data on vehicle usage. They can get a subsidy of around RMB 80,000 year to operate bus lines from the city government and the rights to advertising on the exterior of the bus

SPRUCE POINT CAPITAL MANAGEMENT

Broad Ocean: Unsold Inventory Implications For Ballard's Future Revenues

- **With Broad Ocean appearing to be stuck with an inventory of 400 Ballard fuel cell modules, this could become a drag on Ballard's sales to Broad Ocean in 2018**
  - Broad Ocean will need time to sell down inventory before it can buy from Ballard again, and Synergy will struggle to make sales to Broad Ocean

- **Broad Ocean had only paid $8m of the $29m order for 600 fuel cell modules by Q3 2017. As they have taken delivery of 400 fuel cell modules, we can expect Ballard to record another $12m in sales for this order in Q4 2017**

- **We estimate that Broad Ocean at best will sell about 500 fuel cell engines in 2018**

It is unlikely that Broad Ocean will buy more than 100 fuel cell stacks or engines from Ballard or its China joint venture in 2018

It looks like Ballard may have stuffed the channel with sales in 2017, and as a result, sales to China in 2018 will be lower than 2017

We should expect Synergy to renegotiate its take or pay with Ballard in 2018

Valuation and Downside Scenario

SPRUCE POINT CAPITAL MANAGEMENT

Sell-Side Analysts Naturally Bullish

Ballard's sells-side supporters, all based in the US and likely challenged in staying on top of a quickly evolving and complex Chinese market dynamics, see nearly 47% upside to $5.60 per share. We find it odd that Ballard is not endorsed by any Canadian brokers given its headquarters in British Columbia and dual-listing on the TSE.

Broker	Price Target
H.C. Wainwright (Rodman & Renshaw)	$6.00
FBR / B. Riley	$6.00
Lake Street	$6.00
Cowen	$5.00
Roth Capital	$5.00
Average Price Target **% Upside From $3.80 Price**	**$5.60** **+47%**

1) Rodman & Renshaw has historically been associated with fraudulent Chinese companies. Although Ballard is Canadian based, its entry into China and promotion of the opportunity merits caution

SPRUCE POINT CAPITAL MANAGEMENT

Bull Market Economics: It's All About "Potential" Business

According to analyst Lake Street, 83% of Ballard's value is "potential" new business. Ballard has been public since 1995 with countless failures to deliver profits. Investors should no longer be paying for potential, but rather tangible earnings and a sustainable business model

($ million)	Visible Model CY20E	Future New Business Potential CY20E	Total
EBITDA	$13.6	$100.0	$113.6
(x) Assumed multiple	12.0 x	12.0 x	
(=) EV	$163	$1,200	
(-) Debt	$0		
(+) Cash	$68		
(=) Market value	$231	$1,200	--
(/) Shares out	180.0	180.0	
(/) Discount factor	1.2	1.3	
Discount rate	7%	16%	
Discount term (years)	3	2	
(=) Value Per Share	**$1.05**	**$4.95**	**$6.00**

Source: Lake Street Capital Markets analysis

Nov 17, 2017 report

SPRUCE POINT CAPITAL MANAGEMENT

Price Targets Justified Mostly By Multiple Expansion

Bull market economics are at work when analysts justify higher prices by increasing multiples and changing discount rate assumptions.
We question how much on the ground diligence in China has been done by these analysts.

Roth Capital	12/15/16	3/6/17	5/4/17	8/4/17		11/1/2017
Price Target	$3.00	$3.00	$3.00	$3.00		$5.00
Multiple – P/Sales	5.0x	5.0x	5.0x	5.0x		8.5x

Cowen & Co.	10/2/15	3/3/17	5/2/17	8/3/2017	9/15/17	11/2/17
Price Target	$1.40	$3.00	$3.00	$3.00	$4.50	$5.00
Multiple – EV/Sales	1.2x	2.5x-3.0x	3.5x	3.5x	5.0x	5.5-6.5x

Rodman&Renshaw /HC Wainwright	7/4/15	3/3/17	6/14/17	8/4/17	9/15/17	11/3/17
Price Target	$2.50	$3.00	$3.00	$3.00	$6.00	$6.00
Multiple – growth rate		25%	25%	25%	29%	28.4%
Discount rate - WACC	9.3%	10.5%	10.9%	10.6%	8.1%	8.2%

Lake Street		3/3/17		8/3/17	9/15/17	11/3/17
Price Target		$3.00		$4.00	$5.00	$6.00
Discount Rate		25%		15%	16%	16%

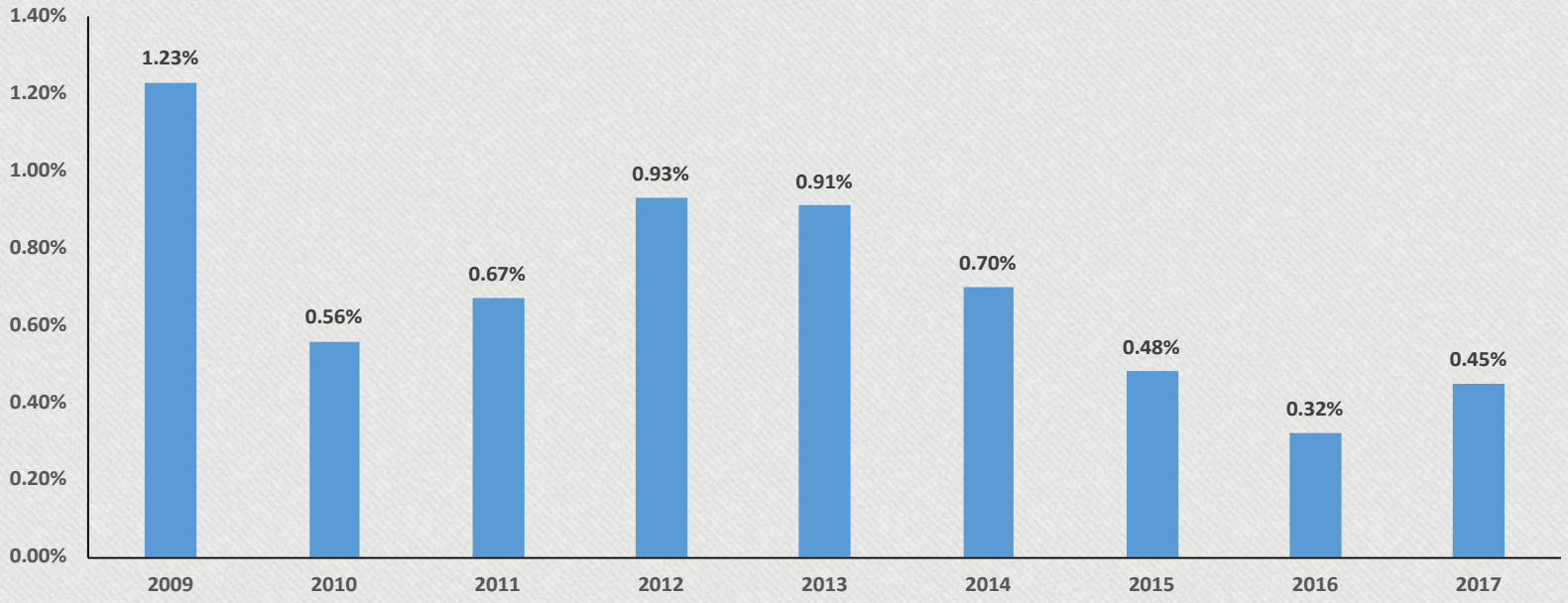
SPRUCE POINT CAPITAL MANAGEMENT

Insiders Don't Own Shares, Why Should You?

Investors need to take a step back and realize that Ballard and its management have virtually nothing at risk if its China growth ambitions fail. It committed just $1.0m to the JV, and insiders own a miniscule 0.45% of the Ballard's stock – near all-time lows.

Ballard on its "Landmark" JV in China: *"Ballard will contribute approximately $1.0 million for its 10% interest in JVCo. Under the terms of the agreement, Ballard has the right to appoint one of the three JVCo board directors and Ballard's CEO was appointed to the board of JVCo effective as of closing. Ballard has veto rights over certain key JVCo decisions and has no further obligation to provide future funding to JVCo."* Source: Ballard Press Release, Oct 2016

Insider Ownership of Ballard's Shares

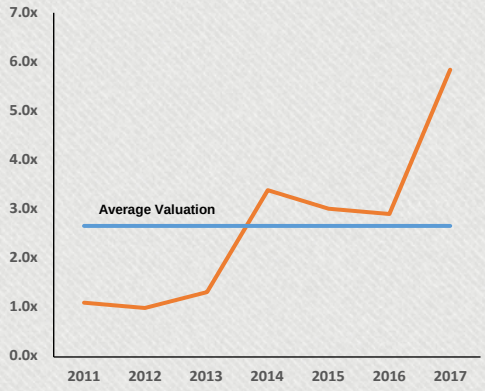
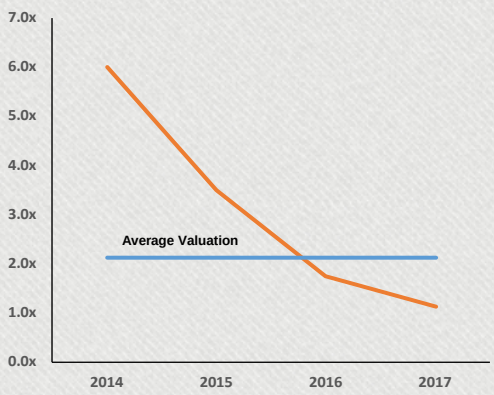
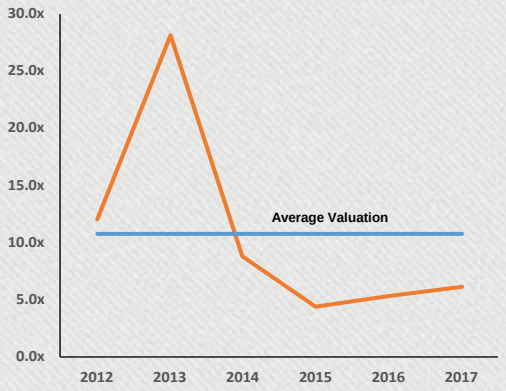
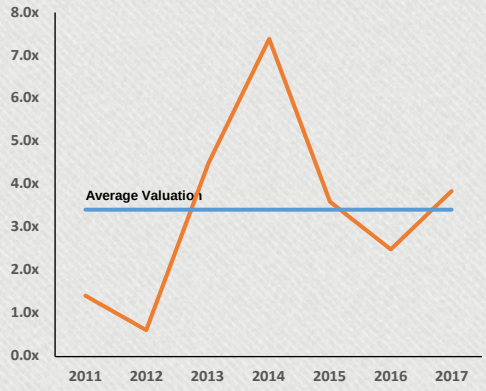
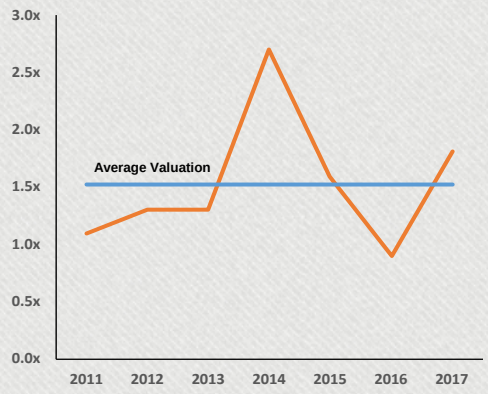
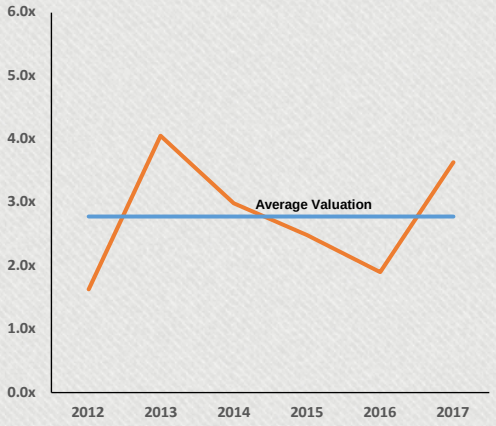


Source: Ballard filings at Sedar.com

SPRUCE POINT CAPITAL MANAGEMENT

Ballard Valuation In Perspective

Investor enthusiasm ebbs and flows over the years for money-losing and speculative fuel cell and energy storage companies similar to Ballard (ex: PLUG, FCEL, and HYGS). We find long-term valuations tend to be around 2.0x - 2.5x book value and 1.5x – 3.5x revenues

	Plug Power (PLUG)	FuelCell (FCEL)	Hydrogenics (HYGS)
Price To Book Value			
Price To Sales Ratio			

Source: Bloomberg

SPRUCE POINT CAPITAL MANAGEMENT

Approximately 35% - 70% Downside Risk In Ballard's Share Price

Ballard is currently trading near an all-time high valuation on the belief its China growth story will materialize and profits will finally appear. Our on the ground research in China suggests a different base case outcome of financial disappointment. We believe Ballard is a "show-me" story given its numerous prior failures and should trade closer to long-term valuation multiples for speculative, money-losing fuel cell peers.

$ in mm	Price / Book Value	Price / LTM Sales
Multiple Range	2.0x – 2.5x	1.5x – 3.5x
LTM Financial Figure	$120.9	$131.8
Equity Value	$241.8 – $302.2	$197.7 – $461.3
Diluted Shares	180.6	180.6
Price Target	$1.34 – $1.67	$1.10 - $2.56
Approx Downside (1)	-65% to -56%	-71% to -33%

1) Based on $3.80/share