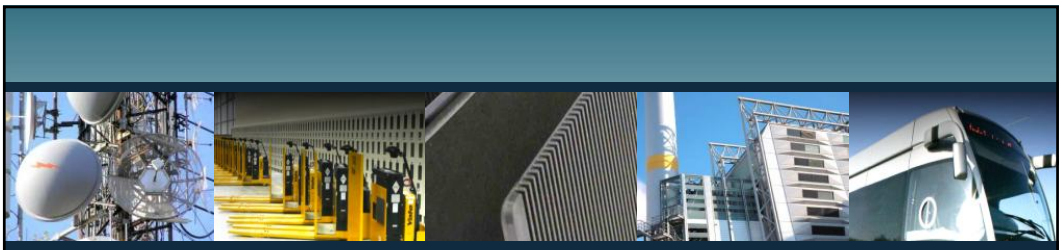

BALLARD®

PUTTING FUEL CELLS TO WORK

NASDAQ:BLDP • TSX:BLD

ZBus Regulation and Technology Summit

Dr. Christopher Guzy, Vice President and Chief Technology Officer

September 2013

Who We Are

BALLARD
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- **Ballard Power Systems, Inc. is the global leader in clean energy PEM fuel cell product design, manufacturing & deployment –**
  - 2,500 ➔ Telecom Backup Power systems shipped … *9MW's of power*
  - 4,000 ➔ Material Handling stacks shipped … *10M hours of runtime*
  - 180 ➔ Bus power modules shipped … *more than 4M miles of revenue service*
- **355 employees**
- **Operations:** Canada, U.S.A. (College Park, MD; Bend, OR), Mexico, Denmark

Ballard headquarters facility – Burnaby, B.C., Canada

2

Current Fuel Cell Bus Deployments

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43 Ballard-powered buses operating worldwide today

3

Growing Market Momentum

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- **Government policy & funding support growing globally:**

- **Western Europe**
  - Deployments supported by EU JTI funding through the High V.LO-City, CHIC & HyTransit Programs
  - 22 additional Ballard-powered fuel cell buses to be deployed in San Remo, Flanders, Cologne & Aberdeen in 2014
  - Open call for JTI 2013 includes funds for fuel cell bus demonstrations (20-30 vehicles)

HyTransit CHIC HIGHVLOCITY

- **North America** FTA California
  - Additional Ballard-powered buses to be deployed in Palm Springs (2), Hartford (1), and Boston (1)
  - New FTA funding announced for 2 new Ballard-powered buses, extended operation of 2 others
  - CaFCP Bus Roadmap released in March - 40 vehicles at 2 sites in California
  - FTA Map 21 - Building on the success of the National FC Bus Program. $23.5M/yr allocated to rolling stock
- **China**
  - Need and strong fit for zero emission FC buses in major cities in China
  - Ballard signed MOU with Azure of Beijing, China to supply HD7 technology starting in 2014

4

Similar Bus Design Serves Many Markets

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	European Fuel Cell Bus	North American Fuel Cell Bus
Bus Chassis/Model	Van Hool A330 Fuel Cell Hybrid	El Dorado National, Axess
Curb Weight	~43,000 lbs	34,800 lbs
Length	43 ft	41 ft
Passenger Capacity	34 seated, 47 standees	39 seated, 19 standees
Power Plant	Ballard 150kW FCvelocity®-HD6	Ballard 150kW FCvelocity®-HD6
Hybrid System	Van Hool hybrid system	BAE Systems series hybrid system
Electrical Energy Storage	Li-Ion	Nanophosphate Li-Ion
Fuel Storage	Gaseous hydrogen: 40kg at 350 bar	Gaseous hydrogen: 50kg at 350 bar
Range	400 km	400 km

5

FCvelocity™-HD6

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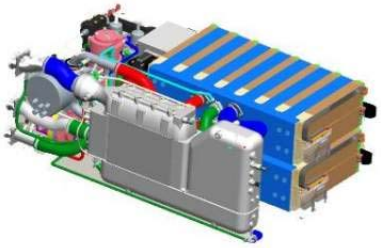
- **Current generation fuel cell bus module:**
  - Available in 75kW or 150kW configurations to appropriately match bus type and application
  - Leveraging state-of-the-art automotive stack technology (economies of scale)
  - Air compressor supplied separately
  - Offered with a 12,000-hour or 5-year fuel cell stack warranty
  - Module lifetime 10+ years

FCvelocity™–HD6



6

Performance Metrics

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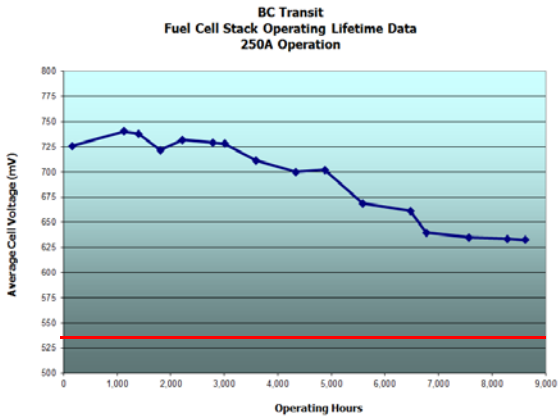
- **FCvelocity™-HD6 MTBF: 1020 hours (July 2012 – August 2013)**
- **BCTransit Fleet:**
  - Total kilometers of operation: 3.5 million
  - Total hours of operation: 177,750
  - MDBF: 3080 kms



7

FCvelocity™-HD7

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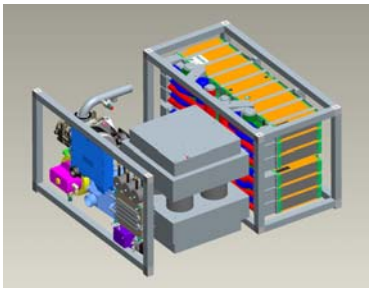
- **Next generation fuel cell bus module:**
  - 100kW configuration available by Q2 / 2014
  - 30-40% cost reduction
    - Latest generation fuel cell stacks – automated manufacturing and assembly processes
    - Reduced parts count – simplified humidification and resulting balance of plant
  - Higher durability
  - Fully integrated power module
    - Air compressor and coolant pump included
    - Integrated HRB motor controller (internally mounted)
    - Reduced preventive maintenance activities
  - Offered with a 15,000-hour warranty



FCvelocity™–HD7

8

FC Bus Capital Cost Trajectory

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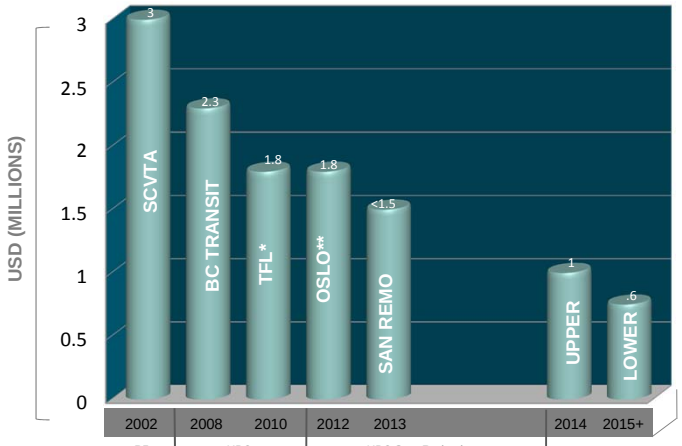

P5

HD6

HD6 Cost Reduction

and Greater Volumes Through Fleet Deployments

Next Generation Fuel Cell Module Serial Production 100+ Units

* 10.5 Meter Buses
** 13.5 Metre Buses
OSLO 11,000,000 NOK/bus
BCT = $46M program

9

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Fuel Cell Bus Commercialization

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PUTTING FUEL CELLS TO WORK

10