

The Ballard logo is displayed in white, bold, uppercase letters on a teal rectangular background in the top-left corner of the slide. The background of the entire slide is a photograph of a blue and white high-speed train, with the word "HYDRAIL" printed on its side, set against a starry night sky.

BALLARD®

Zero-Emission Fuel Cell Solutions for Rail Applications

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Stuttgart

The Ballard logo is displayed in white, bold, sans-serif capital letters on a dark teal rectangular background. The background of the entire slide is a scenic photograph of a city skyline at dusk, with buildings and sailboats reflected in the water.

BALLARD[®]

Power to Change the World[®]

- Committed to sustainable mobility and clean air for everyone
- Relentlessly developed technology 38 years
- We have leading talent, with >500 people passionate about our mission
- \$85m in revenue in 2016, up 51%

We are strategically positioned.

- Customer-centric, diversified & synergistic business model
- Leader in core markets
- Strong balance sheet
- Listed for >20 years on NASDAQ and TSX
- Strategic shareholders:



Our Platforms

Technology Solutions



Intellectual Property & Engineering Expertise

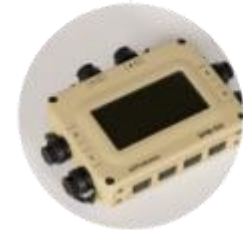
Power Products



Heavy Duty Motive



Material Handling



Portable Power



Backup Power

The future of propulsion is electric.

- Electric power is the efficient, clean and quiet energy alternative to polluting diesel engines
- Fuel cell propulsion offers the environmental benefits of an electric powertrain with the lower infrastructure cost of diesel
- Hydrogen and fuel cell enable longer distance routes than batteries

Hydrogen is the energy source for fuel cells.

- A clean energy carrier and energy storage
- Commercially available
- Can be produced from natural gas, biogas, and electricity (including renewable sources)
- Hydrogen contributes to energy independence

Hydrogen is a flexible fuel.

- Safe and manageable
- Supplied as compressed gas or liquid
- Can also be produced on-site
- Existing infrastructure solutions
- Scalable fuelling infrastructure

Fuel cells offer the benefits of electrification without significant infrastructure investment.

- No requirement for overhead catenary infrastructure
- Central hydrogen refueling avoids cost of electricity-generation plant, transformers, and transmission lines

Fuel cell-powered rail is zero-emission.

- Reduces GHG emissions in urban centers and at railyards
- Meets emission reduction goals and new regulations
- Enable zero-emission trains over non-electrified rail networks.

Fuel cell technology addresses several rail applications.

- Regional and Commuter Trains
- Trams and Light Rail
- Shunt/Yard Locomotives
- Underground mining



Robust fuel cells
meet the demands
of rail applications.

Delivering performance, flexibility,
range and top speeds demanded by
the rail industry.



BALLARD[®]



We have the
leading technology.

- World leader in PEM fuel cells
- 2,000 patents & applications
- 320 MW of fuel cell products shipped
- Over 300 heavy-duty fuel cell engines shipped to date



BALLARD[®]



FCveloCity[®] platform
is the world leader
for fuel cell heavy-
duty vehicles.

- Zero-emission
- Safe (built-in safety features)
- Tested, quality-assured
- Durable (>23,000hrs stack life in service)
- Fuel efficient

FCveloCity[®]-XD for rail applications

- 100 and 200kW power modules
- Customizable product to meet application architecture constraints
- Designed and tested to rail-specific standards



FCveloCity[®]-XD

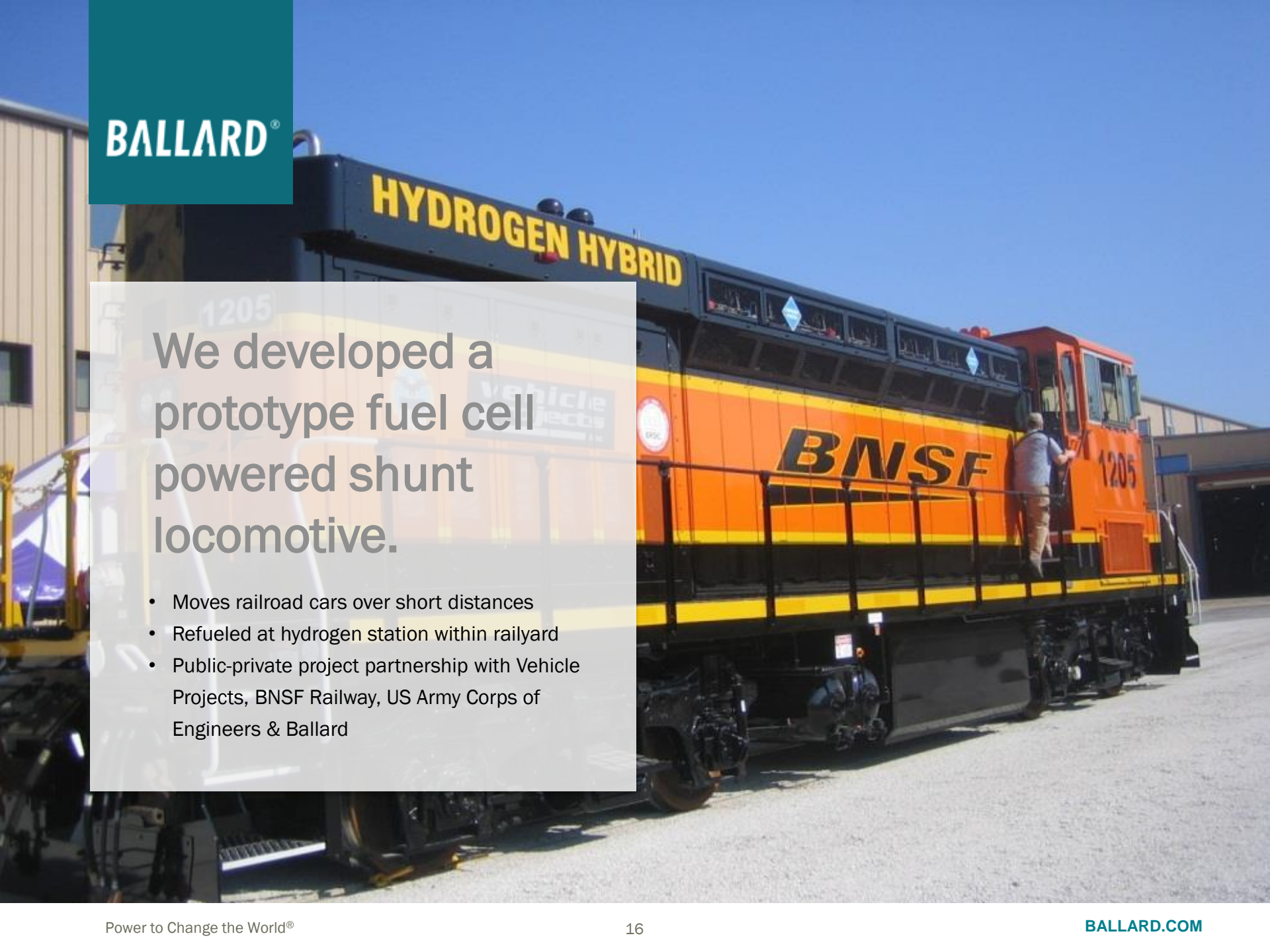
We have the experience in rail applications

- Light rail with CRRC China
- BNSF Railway shunt locomotive in the USA
- JR East commuter rail in Japan
- Shunt locomotives in India



We are powering the world's first fuel cell light rail.

- Fuel cell tram line in Gaoming district of Foshan
- Expected to enter in service in 2018
- Speed up to 70km/h with 100km autonomy
- 200kW fuel cell module for rail applications
- CRRC Qingdao Sifang Co, Ltd

A BNSF Hydrogen Hybrid locomotive, number 1205, is shown in an orange and black livery. The words "HYDROGEN HYBRID" are written in yellow on the black upper section of the locomotive. The BNSF logo is prominently displayed on the orange side panel. A person is standing on the side of the locomotive. The locomotive is in a rail yard with a building in the background.

We developed a
prototype fuel cell
powered shunt
locomotive.

- Moves railroad cars over short distances
- Refueled at hydrogen station within railyard
- Public-private project partnership with Vehicle Projects, BNSF Railway, US Army Corps of Engineers & Ballard



Shunt Locomotive Project

- Ballard has signed a MoU in August 2016 with Latvia Railways to support a pilot project to refurbish Shunt Locomotive with fuel cells
 - Engineering work in progress
- Further interest in Germany , Austria and Eastern European Countries, India – currently under discussion

The solution for zero-emission rail is clear.

Fuel cell and hydrogen powered rail :
the affordable, operable zero-emission solution

Ballard fuel cell products:
proven technology, leadership, experience and commitment

