

BALLARD®



**FUEL CELLS
AND HYDROGEN
JOINT UNDERTAKING**

**We are Ballard
Europe**

November 22nd 2017

Europe is a strategic market

- Strong market drivers (including diesel vehicle regulations, COP21, commitment to ZEB)
- Large market with leading heavy duty OEMs
- Established hydrogen eco-system
- Fuel cell industry leadership with qualified scientists, engineers and technicians

A side-view advertisement on a hydrogen bus. The text 'Wasserstoff - Der Energieträger der Zukunft im ÖPNV' is written in white on a black background. Below it, 'Regionales Kooperationsprojekt für eine saubere Umwelt' is written in green. The bus is silver and has a large green '0' with 'NULL Emission' written next to it. The background shows a blurred city street with a cathedral spire.

Wasserstoff - Der Energieträger der Zukunft im ÖPNV

Regionales Kooperationsprojekt für eine saubere Umwelt

The background of the slide features a group of nine Ballard Europe staff members standing in front of a white Ballard FCveloCity-HD fuel cell bus. The Ballard logo is prominently displayed in the top left corner. A large, 3D-style graphic of a blue and grey box is positioned in the lower right, containing text about the company's European presence.

BALLARD®

We are growing our presence in Europe

- Ballard Europe is our competence center for stationary systems and vehicle integration, as well as service and training center for fuel cell buses
- Ballard has invested over €25M over the past 10 years in Europe
- Ballard Europe's staff of 50 employees covers the complete value chain
- We will produce our FCveloCity®-HD fuel cell module for motive applications in Europe

Production

Technical
Competence
Center

**Ballard
Europe**

After-Sales
Service

Business
Development
Sales

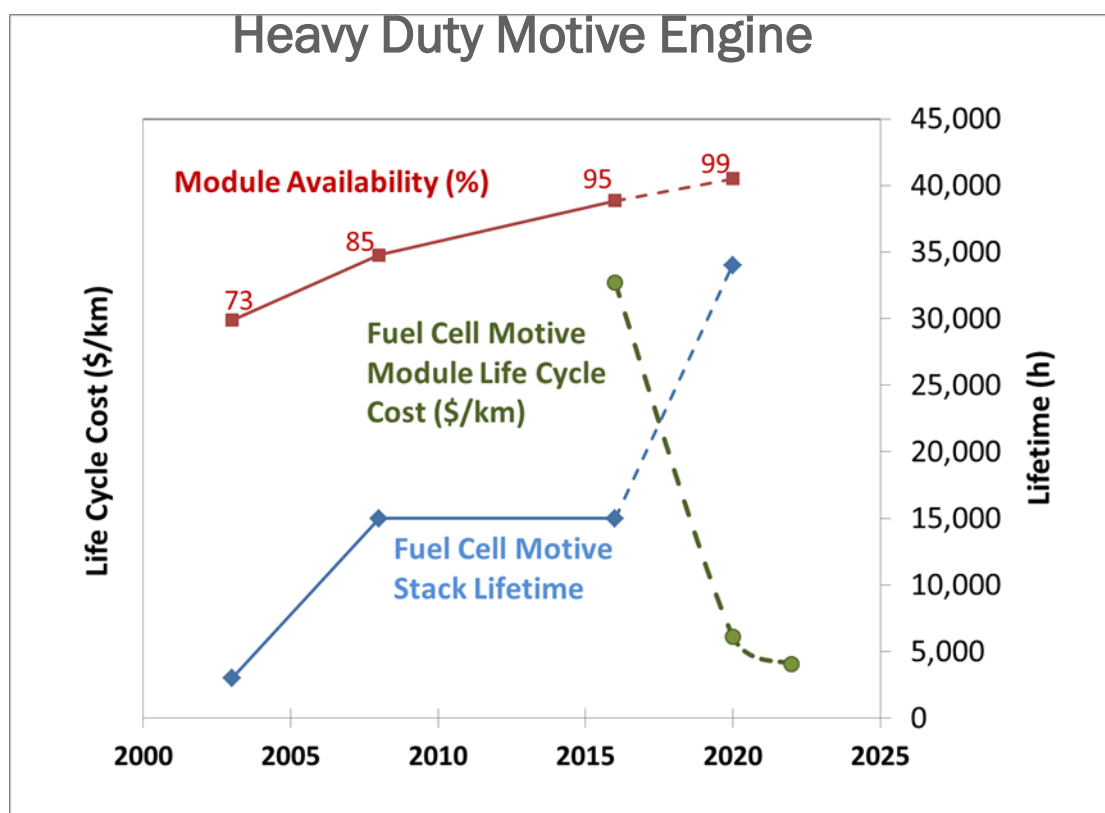
Continuous support from FCH-JU has enabled fuel cell bus commercial development



Dramatic Advances in Technology & Cost

Next generation fuel cell bus will be cost competitive with a battery powertrain and have lower operating costs than a diesel bus:

- Capital cost reduced by 40% and lifecycle cost reduced by a factor of 5x
- +33% power density
- Lifetime >30,000 hours
- Improved low-RH tolerance and increased maximum temperature operation
- Freeze-start capability



Functional improvements to durability, reliability and cost with each product iteration.

BALLARD®

We are driving fuel cell bus cost reduction with our partners to meet commercialization targets beyond 2020.



<€5/kg



7kg/100 km



< €0.35km

Less than
€450k



We believe that 30% of commercial electric vehicles will be powered with hydrogen by 2030.