

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 is in German. The top line reads 'Wasserstoff - Der Energieträger der Zukunft im ÖPNV'. Below it, in green, is 'Regionales Kooperationsprojekt für eine saubere Umwelt'. At the bottom, there is a large green '0' with 'NULL' inside it, and 'Emission' written below that. Various logos are visible along the bottom of the advertisement, including the European Union flag and logos for 'Golfand', 'Europäischen Fonds für Regionale Entwicklung', 'Land Nordrhein-Westfalen', 'EUROPÄISCHE UNION', 'Europäischer Fonds für regionale Entwicklung', 'thien-erf-kreis', and 'RIL'.

The background of the slide features a group of nine Ballard Europe staff members, consisting of eight men and one woman, standing in front of a white Ballard fuel cell bus. They are all wearing black shirts with the Ballard logo on the collar. The bus has "BALLARD" and "FUEL CELL BUS" visible on its side. A large, 3D-style graphic of a blue and grey box is positioned in the lower right, divided into four quadrants representing different business areas. The Ballard logo is also present in the top left corner.

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

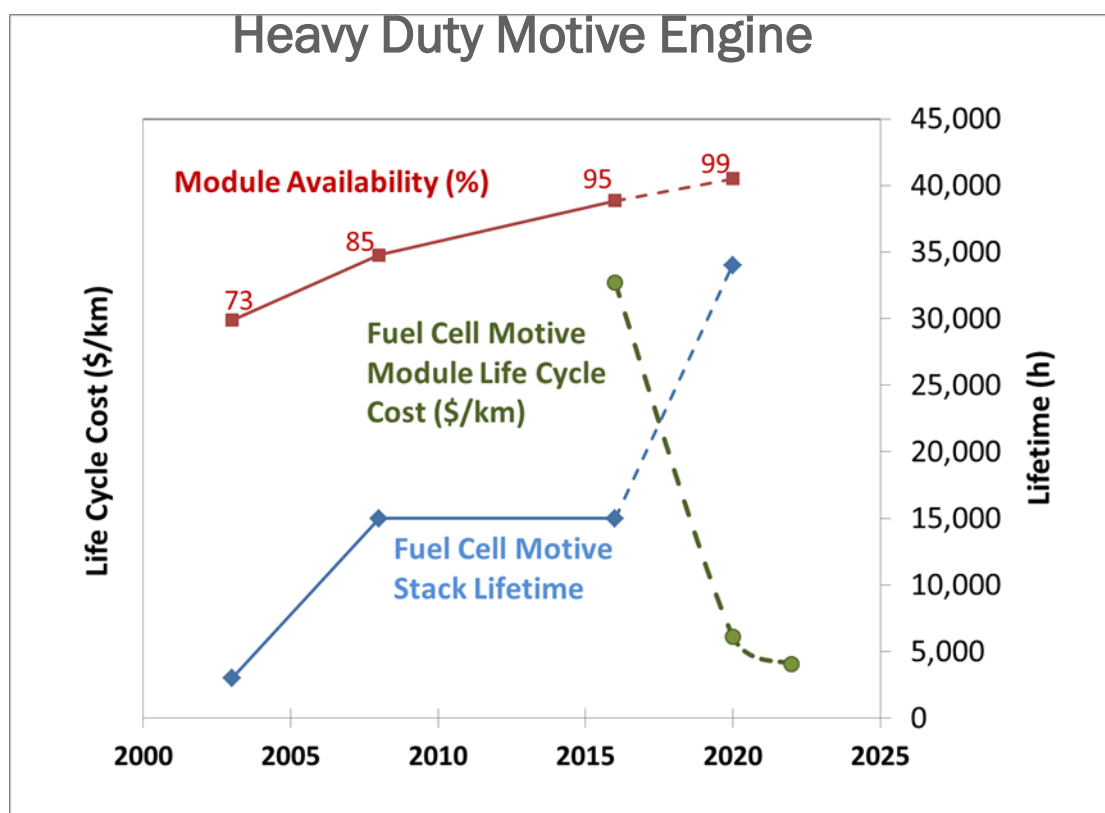
Continuous support from FCH-JU has enabled fuel cell bus commercial development



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.