

**BALLARD®**



We are Ballard  
Europe.

The background of the slide is a photograph of a silver hydrogen fuel cell bus driving on a road. The bus has a large advertisement on its side that reads "Wasserstoff - Der Energieträger der Zukunft im ÖPNV" and "Regionales Kooperationsprojekt für eine saubere Umwelt". Below this, there are logos for the European Union, the Rhine-Eifel-Ardenne region, and other partners. The Ballard logo is in the top left corner.

# BALLARD®

## Europe is a strategic market for Ballard

- 20% of global motor vehicle production (19M/year)
- Over 20,000 new buses and coaches per year
- Market leader for heavy duty vehicle OEMs
- Access to rail market and leading OEMs



## There are strong market drivers.

- Commitment to COP21 agreement
- Diesel vehicles are being banned in Europe
- Electrification of transportation
- Introduction of low emission zones in cities
- Commitment from transit agencies to move to 100% ZEB by 2025 or 2030



The image features a low-angle, upward-looking perspective of three white wind turbine towers against a bright blue sky with scattered white clouds. The towers are made of white-painted metal and converge towards the top of the frame. On the central tower, the number '220' is painted in blue. On the tower to the right, the letters 'H2' are painted in a large, stylized blue font. In the top-left corner, there is a teal square containing the word 'BALLARD' in white, bold, sans-serif capital letters, followed by a registered trademark symbol (®).

**BALLARD®**

There is an existing  
eco-system in  
Europe for hydrogen  
fuel supply and  
infrastructure  
solutions.



The background of the slide is a photograph of two scientists in a laboratory. On the right, a woman with brown hair tied back, wearing safety glasses and a blue denim jacket over a striped shirt, is focused on a task. On the left, a man in a white lab coat and safety glasses is also working. The lab is filled with various pieces of equipment, including a large blue cylindrical tank and various glassware. The Ballard logo is in the top right corner, and a text box is on the left side.

**BALLARD®**

Qualified fuel cell  
scientists, engineers  
and technicians are  
available in Europe.

# BALLARD®



FUEL CELLS  
AND HYDROGEN  
JOINT UNDERTAKING

- CHIC
- HighVLOCity
- 3Emotion
- Other
- 🚌 Planned



Continuous support  
from FCH-JU to hydrogen  
fuel cell industry



An aerial photograph of a large industrial or commercial facility. In the foreground, there is a large, long building with a grey metal roof and red brick walls. To the right of the building is a large parking lot filled with many cars. In the background, there is a roundabout with a green island in the center. The sky is clear and blue.

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## Ballard has a long history in Europe.

- Ballard has invested over €25M over the past 10 years in Europe
- Ballard has participated in 15 European funded projects.
- Long established relationships with major European OEMs
- Long-term contract with Volkswagen/Audi group

# BALLARD®



## 48 Employees in Europe

European headquarter in Denmark and represented in Germany, France and UK



## Strong European partnerships

15 projects co-financed by European Commission and in total 50 co-financed European projects with numerous partners



## Complete value chain

From R&D through product engineering, sales, manufacturing to after sales service



## 32 buses in service in Europe

52 buses in service by 2018  
>150 buses by 2020



## European competence center

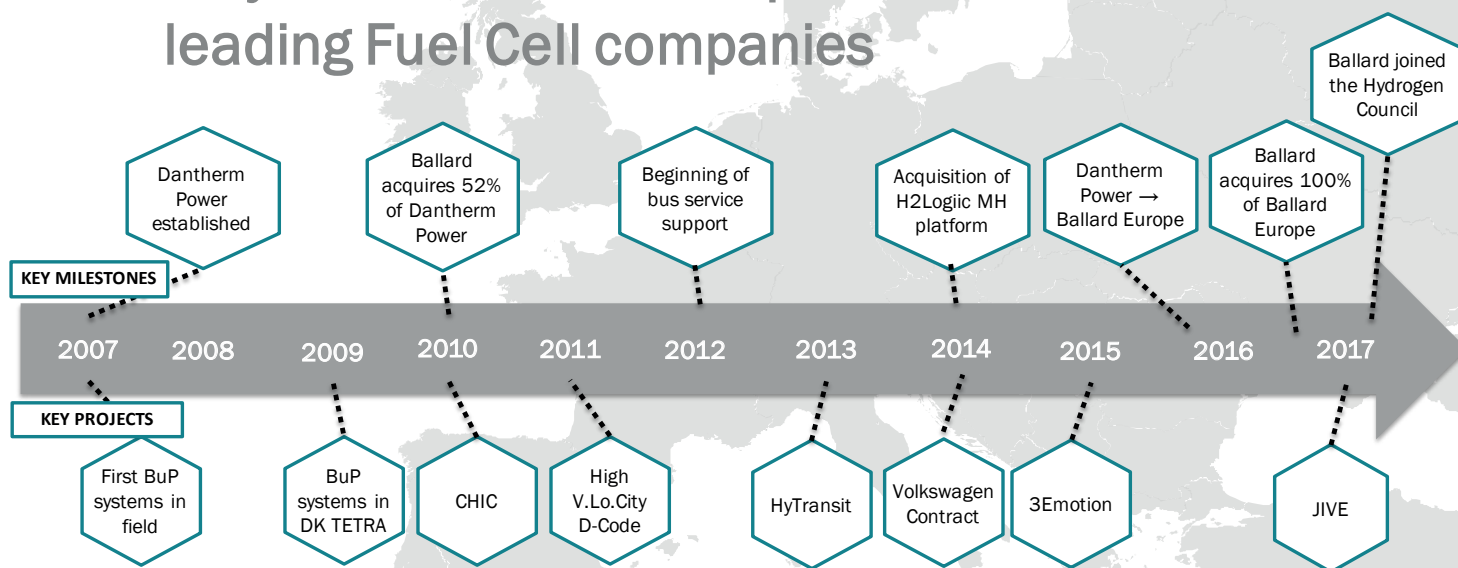
Fuel cell system development, applications engineering, business development, sales and service



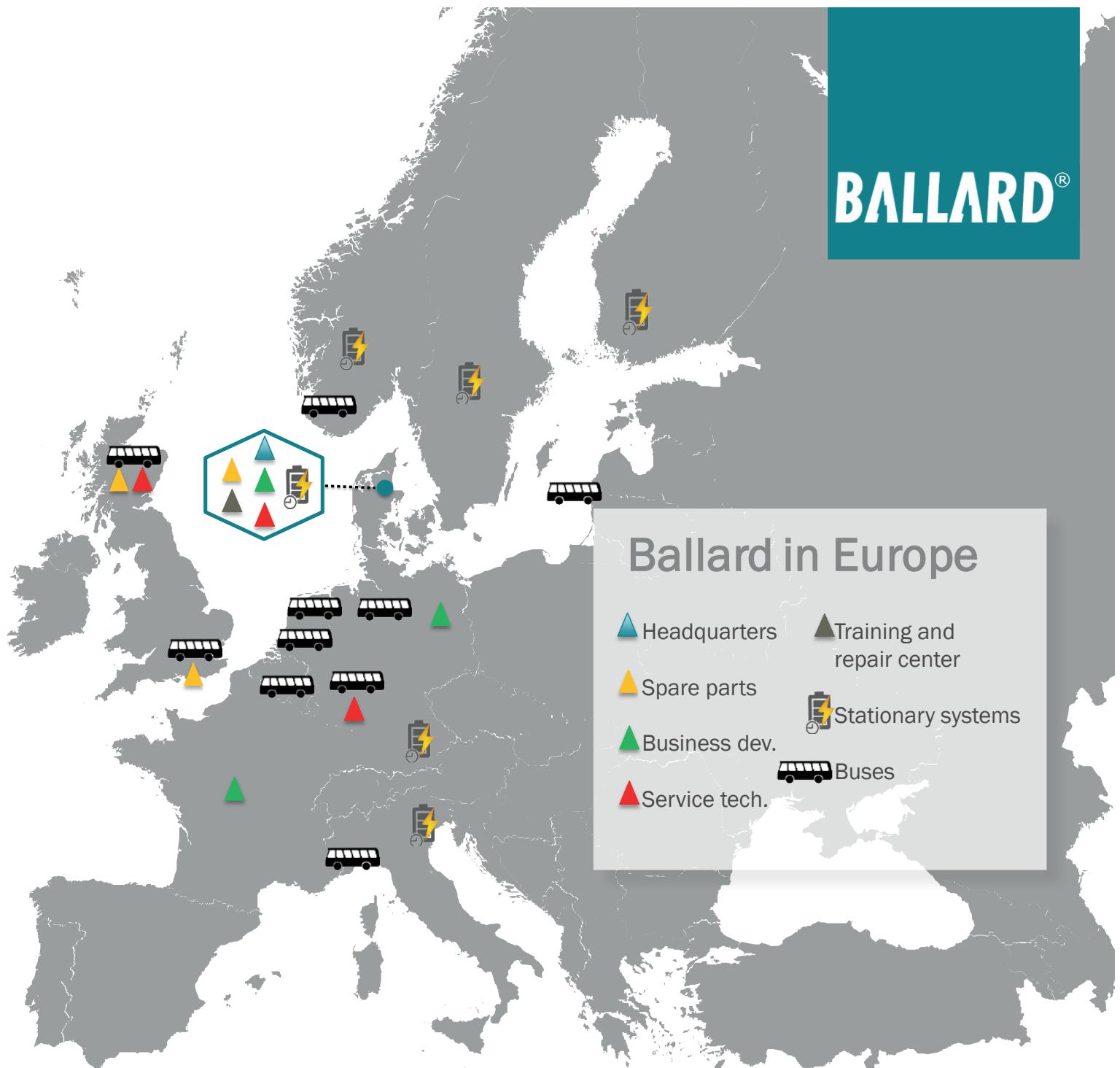
## 450 stationary systems in Europe

More than 10 years of operational experience - more than 350 systems are currently still under service contracts from Ballard Europe

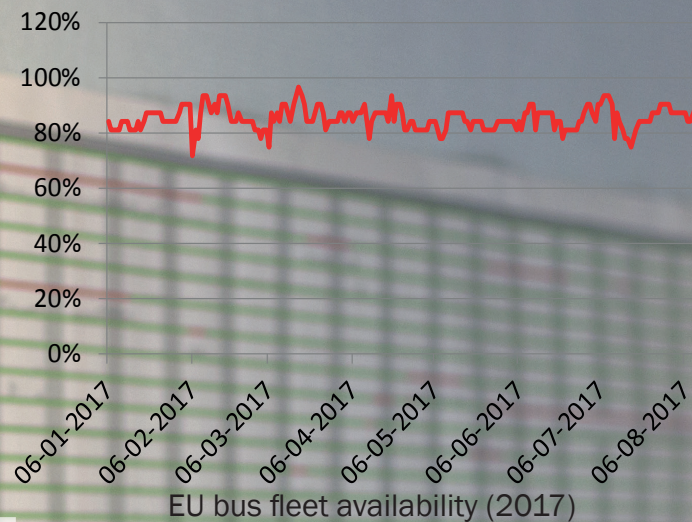
# 10 years as one of Europe's leading Fuel Cell companies







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Investment in local service centers, spare part stocks and daily monitoring has improved fuel cell bus fleet availability.



The background of the slide is a photograph of the European Union flag, featuring a blue field with twelve yellow stars arranged in a circle. The flag is waving and set against a clear blue sky with some light clouds. In the top right corner, there is a teal square containing the Ballard logo. The logo consists of the word "BALLARD" in a bold, white, sans-serif font, followed by a registered trademark symbol (®).

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## Our vision for Ballard in Europe



The background of the slide is a photograph of a multi-lane asphalt road. On the left side of the road, a white semi-truck is moving away from the viewer. On the right side, a white bus with red accents is moving towards the viewer. The road is bordered by green grass and a dense forest of tall, thin trees in the background. In the top left corner, there is a teal square containing the Ballard logo. A semi-transparent white box is overlaid on the left side of the road, containing text.

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Leverage our fuel cell bus experience to develop other heavy duty markets including truck and rail.

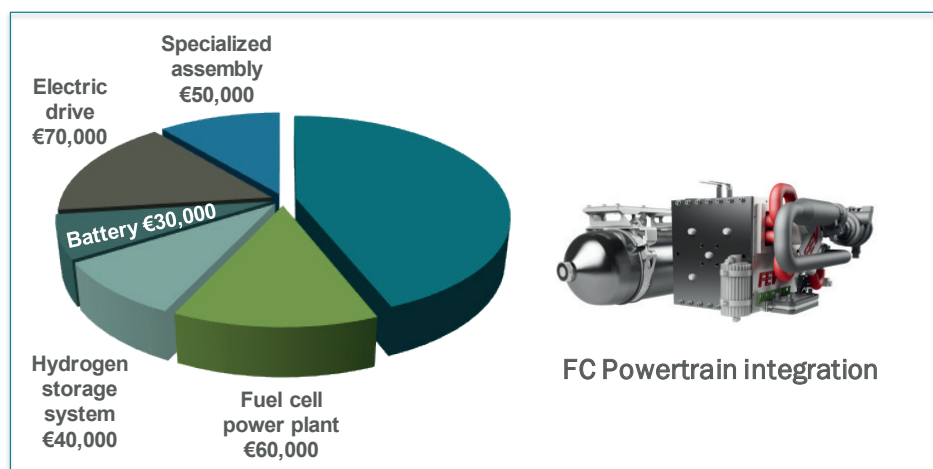


The image features two Ballard fuel cell systems. On the left is a black, rectangular unit with various ports and a 'BALLARD' label. On the right is a blue, rectangular unit, also with 'BALLARD' branding. The background is a light green and white gradient.

**BALLARD®**

Manufacture, sell  
and service fuel cell  
systems for motive  
applications and  
power backup  
applications.





Drive fuel cell bus  
cost reduction with  
our partners to meet  
commercialization  
targets by 2020.



Less than €450k



7kg/100 km



< €0.35/km



< €5/kg



A photograph of a large, grey, industrial-grade stationary fuel cell system. The system is a tall cabinet with its doors open, revealing internal components. On the left, three red gas cylinders are connected to the system. The interior shows various electronic modules, including a 'Seastorm' unit and a '230 VAC' output section. The system is mounted on a concrete base. A teal square with the 'BALLARD' logo is in the top right corner.

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# Provide stationary fuel cell systems to backup critical infrastructure

Ballard Europe is our competence centre for stationary system product development and production.



The image features a teal square in the top left corner containing the 'BALLARD®' logo in white. The background is a photograph of a factory or workshop. In the foreground, a man in a grey shirt and dark overalls is working on a white electronic device, using a screwdriver. Several other white electronic modules are lined up on a workbench. In the background, two other men are visible, one in a green shirt and another in a grey shirt, both looking towards the right. The overall scene is industrial and focused on manufacturing.

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## Grow our revenues and jobs in Europe.

- Develop sales of heavy-duty power modules to 500 units per year by 2025
- Triple revenue in Europe for product and service sales
- Grow from 50 employees in 2017 to 150 by 2025



# BALLARD®

# BALLARD®

Provide local full service for heavy duty fuel cell powertrains.

Product Repair

Applications Engineering

On-site Services

Spare Parts Logistics

Training

Performance Monitoring



Next steps



## Continue market development efforts

- Bus market: Develop partnerships to accelerate commercialization of fuel cell electric buses (FCEB)
- Develop adjacent motive markets:
  - Truck
  - Rail
  - Material Handling
  - Marine
  - UAVs
- Stationary systems: pursue sales of backup power system for critical infrastructures.





# BALLARD®

## Work with European industry to create demand for fuel cell buses

- Be the industry thought leader to drive commercialization
- Stimulate demand for FCEBs post EU funded programs
- Develop commercial offer which meet TCO targets
- Form commercial alliance (including strategic partnership venture) with bus OEMs and hydrogen solution providers





**BALLARD®**

Continue to provide  
Technology Solutions  
to leading automotive  
OEMs in Europe.





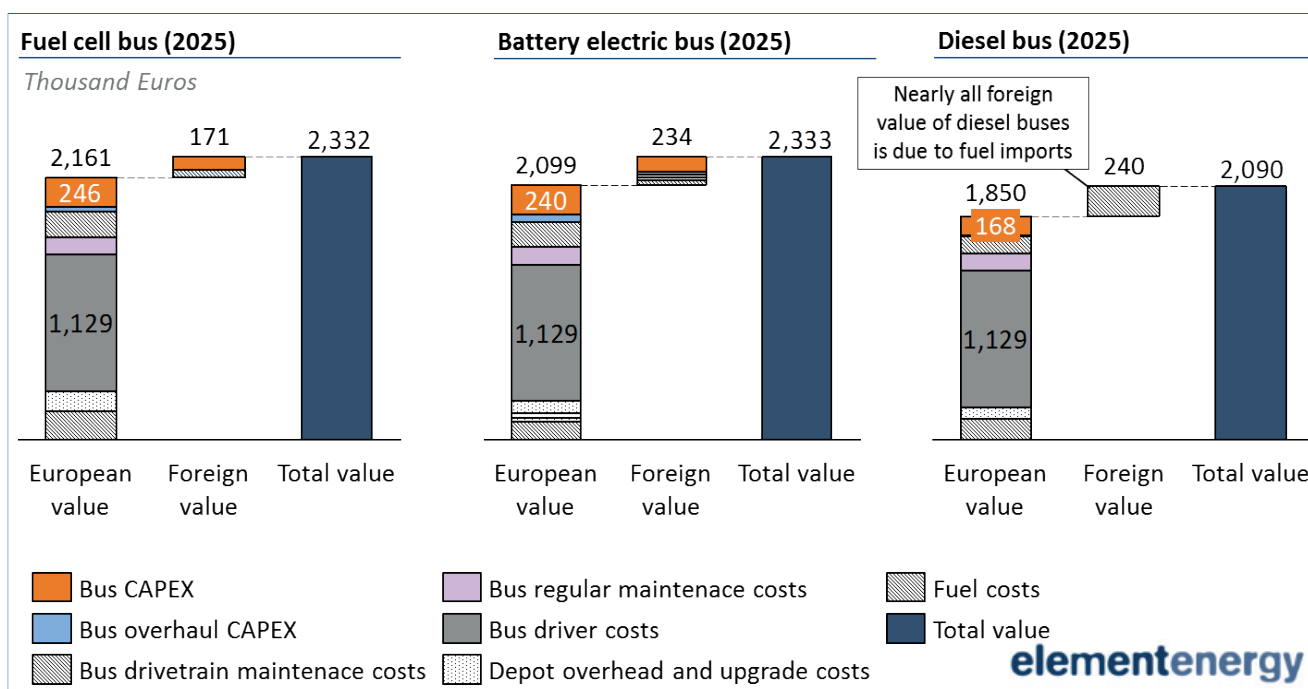
**BALLARD®**

Continue to grow our  
local service team  
to support new  
heavy duty vehicle  
deployments



- 
1. Set-up pilot FCveloCity®-HD production in Denmark in the next 24 months
  2. Set-up production line in strategic EU location once critical sales volume is achieved (>250 units/year):  
Est. €5-10M investment

## Improve European value of fuel cell electric buses



- Fuel cell electric bus creates more European value than any other bus technology.
- Diesel fuel and batteries & drive trains for battery buses are main foreign value of buses
- Objective is to increase the European value of Ballard FCveloCity® heavy duty module to 50%



The background of the slide is a photograph of a Ballard fuel cell system. It features several thick, orange high-voltage power cables connected to metal terminals. A silver metal housing is visible, and a white label with the Ballard logo and 'FC velocity' text is partially seen. The Ballard logo is also present in a teal box in the top right corner.

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## European components localization and validation

- Identify European suppliers to increase "European" content
- Test and validate components
- Compliance with European regulations (REACH)

The background of the slide is a photograph of a red hydrogen fuel cell bus. The bus is viewed from a high angle, showing its roof and side. On the roof, four large, white, cylindrical hydrogen storage tanks are visible, arranged in a row. The bus has a red body with white and blue accents. The text "H2 - zero emission bus" is visible on the side of the bus. The Ballard logo is in the top left corner.

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## Develop vehicle integration and H2 storage competence center

- Build further competence of Ballard Europe on integration of FC modules and H2 storage
- Physical integration, cooling systems, air system, DC/DC and control interfaces
- Fueling interfaces, tank control unit with safety features, certifications and approvals





European Power To  
Change The World®

**BALLARD®**

Committed to sustainable mobility  
and clean air for everyone.

