Fuel cell electric buses for sustainable urban mobility.
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
• World leader for heavy duty fuel cell engines
Ballard Power Systems Europe.

- Headquartered in Hobro, Denmark
- More than 50 people
- European service and repair center
- Applications engineering support
- Product development & manufacturing
Today fuel cell electric buses are in service operating like conventional transit buses.
Fuel cell cars are also hitting the road.
Forklifts powered by fuel cell are operating 24hrs/day in distribution centers.
Fuel cell is also powering trams and trains.
Many cities are committing to zero emission transportation.
Fuel cell electric buses provide an operable and affordable zero-emission solution for public transit.
Hydrogen fuel cell buses are electric buses.

• Same electric drivetrain as battery electric buses
• Battery-fuel cell hybrid configuration
• Fuel cell module is on-board power generator
• OEMs offer common platform for their zero-emission buses
Fuel cells improve the performance of electric buses.

- Long range (400km+)
- Fast refilling (less than 10 min)
- Recyclable
- Improve vehicle efficiency
Fuel cell electric buses can replace diesel buses without significant changes to operational requirements.

- No need to adapt routes and schedule
- Same fleet size
- No roadside infrastructure
- 1:1 replacement of conventional buses
The technology is proven with over 11M km in revenue service.
...through challenging climates and road conditions
Fuel cell electric buses have operated for 25,000 hrs with no stack replacement.
Fuel cell electric buses perform like conventional buses.
Over 1,000 fuel cell electric buses will be in service by 2020.
Fuel cell electric bus cost reduction driven by:

- Optimization of electric bus platform
- Hybridization of fuel cell with battery
- Reduction of fuel cell module size from >200kW to less than 100kW
- Integration and fuel cell system cost reduction with volume production
FCEB offers a competitive TCO compared to other clean transit options.
A fuel cell is a solid state power generator.

- High efficiency
- Quiet with no vibration
- Zero-emission
- No toxic materials
- Fuel: air & hydrogen
A fuel cell generator is simple to maintain.

**Preventive Maintenance (PM)**
- Check filters (replace as required)
- Check coolant conductivity
- Check calibration of sensors
- Check smoke detector
- Check ventilation fan
- Minimum interval of 1 month or 8,000km

**Training**
- Provided to transit operator technicians to be qualified for PM work

**PM parts**
- Source from Ballard, or
- Source directly from suppliers
We have a dedicated service and support team.

- Call center (24 hours a day, 7 days a week)
- Regional after sales service teams in UK, Belgium, Germany and Denmark
- Regional spare parts inventory (DK, Germany)
- Training center (DK)
- Repair centers (DK)
We offer comprehensive service packages.

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<tr>
<th>LONG TERM SERVICE PACKAGES</th>
<th>BRONZE</th>
<th>SILVER</th>
<th>GOLD</th>
<th>PLATINUM</th>
<th>DIAMOND</th>
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<tbody>
<tr>
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• Fuel cell electric buses provide a 1:1 replacement for diesel or CNG buses
• Fuel cell technology is well proven over several million of kilometers in service worldwide
• With standard training transit operators can maintain the fuel cell electric buses
• Ballard has the experience of deploying and supporting over 100 fuel cell electric buses
Committed to sustainable mobility, and clean air for everyone.