Common Direction
Fuel Cell Bus
Romuald Witkowski
www.solarisbus.com
Solaris Bus & Coach

- **€434 million** annual turnover (2017)
- **2500 employees**
- **1400 vehicles** annual production
- **16 000 vehicles** sold since start of production
- International presence – **32 countries**
2500 buses with electric powertrains
(including buses in production)

The map shows zero-emission buses as well as trolleybuses with batteries allowing the vehicles the autonomous drive.
Experience in Hamburg

- Solaris Urbino electric 18,75 with Fuel Cell range extender
- 2 vehicles started operation in 2015
- Line 109 in Hamburg so called „innovation line”
- Up to 300 km a day
Hydrogen

Experience in Hamburg

<15 min
Concept

Energy Storage

Batterie

Power Supply

Traction Electronic

Fuel cell

Power Generator

Electric motor

Drive Axle
Component Assembly

Driving Direction

Hydrogen tanks
Air Conditioning
Fuel Cell

Traction Electronic
Air Conditioning
Brake Resistor
Components

Hydrogen Storage

- Hydrogen storage tanks Dynatek
- 205 liter volume
- 350 bar operating pressure
- 4,96 kg of hydrogen per tank
Components

Batteries

1827x cell

24x Modul

5kWh

3x pack

40kWh

120 kWh traction batteries

Traction batteries

Plug-in
Components

Safety

» 3 hydrogen detectors
» 2 crash sensors
» 2% hydrogen content in air

Crash sensors

Hydrogen detectors
- 18.75m Low Floor chassis
- 29 kWh High Power battery
- 15 kg hydrogen storage
- 85 kW HD7 Ballard fuel cell
- AC unit
- 100km effective range
Solaris Urbino 12 fuel cell

- 12m Low Floor chassis
- 29 kWh High Power batteries
- 34 kg hydrogen storage
- 60 kW Ballard fuel cell
- ZF electric drive axle
- AC unit with heat pump

Test in Cologne planned in March 2019
Product range

Solaris E18,75 fuel cell

Solaris T18,75H2

Solaris nE12 hydrogen


prototype serial production
Why hydrogen?

A fuel cell bus offers all the benefits of electric drive while improving the bus performance with no compromise in service and operation compared to other zero-emission technologies and no road side infrastructure. Delivering the required mix of emission reduction, fast refuelling, extended range and route flexibility, fuel cell electric buses are the only zero-emission direct 1:1 replacement for diesel and CNG buses.

„Zero-emission transportation with no compromise in performance or operation“
When hydrogen?

- Daily range over 220km in every weather conditions
- Limited space in the city to place OPP chargers
- Limited space in the depot to place plug in chargers
- Limited power grid in the city
- Limited power grid in the depot
- Tight timetable to recharge buses at the end of the lines
- Limited grid capacity in peak hours

„Zero-emission transportation with no compromise in performance or operation”
THANK YOU FOR YOUR ATTENTION
Romuald Witkowski