



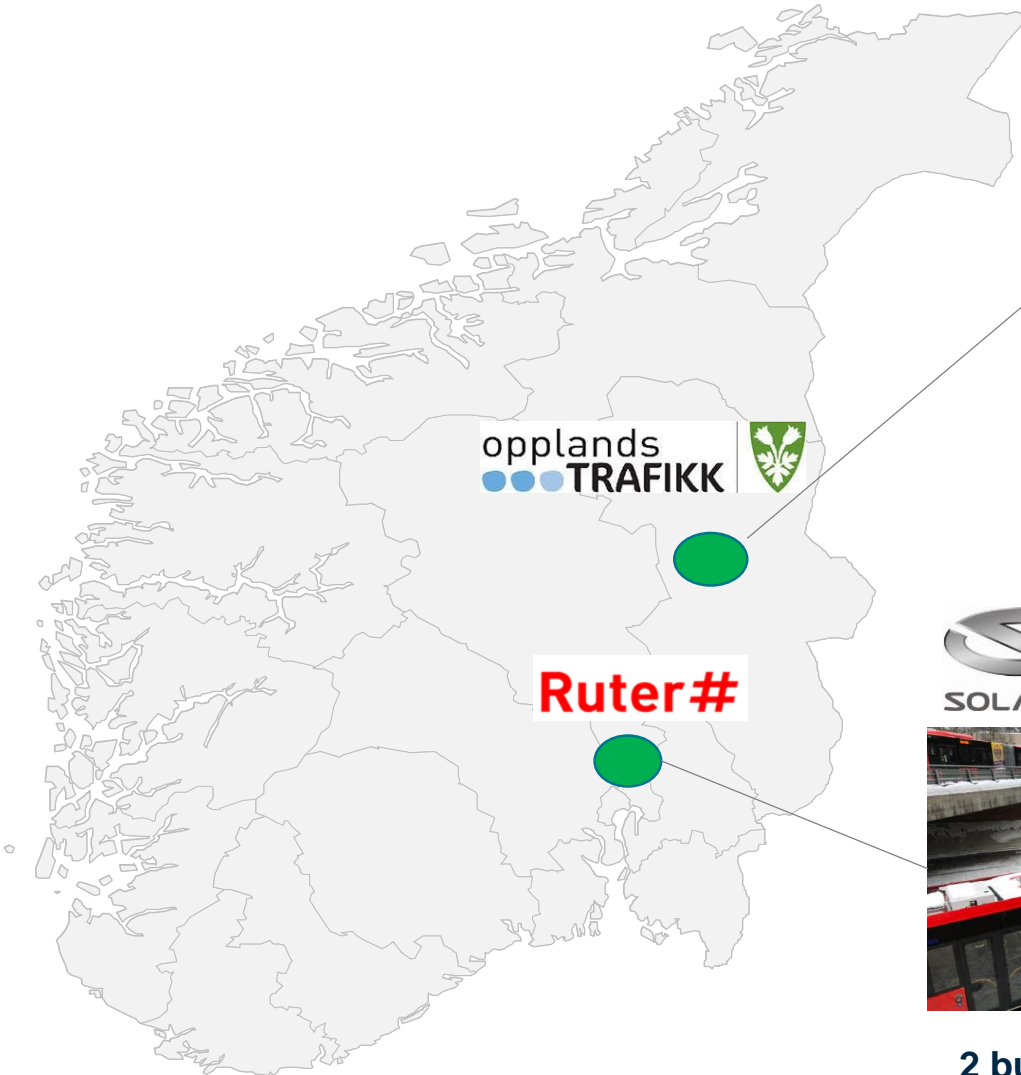
Operational Experience with Battery Electric Buses

Øystein Svendsen
CEO

Oslo, 28th August 2019

UNIBUSS

Meet The Electric Fleet



2 buses from 2019



40 buses from 2019



2 buses from 2017



5 buses from 2012



Charging Infrastructure

Alnabru



Klemetsrud/Mortensrud



Lillehammer



heliox
18 x 50 kW Pantograph
12 x 300 kW Pantograph



heliox **SIEMENS**

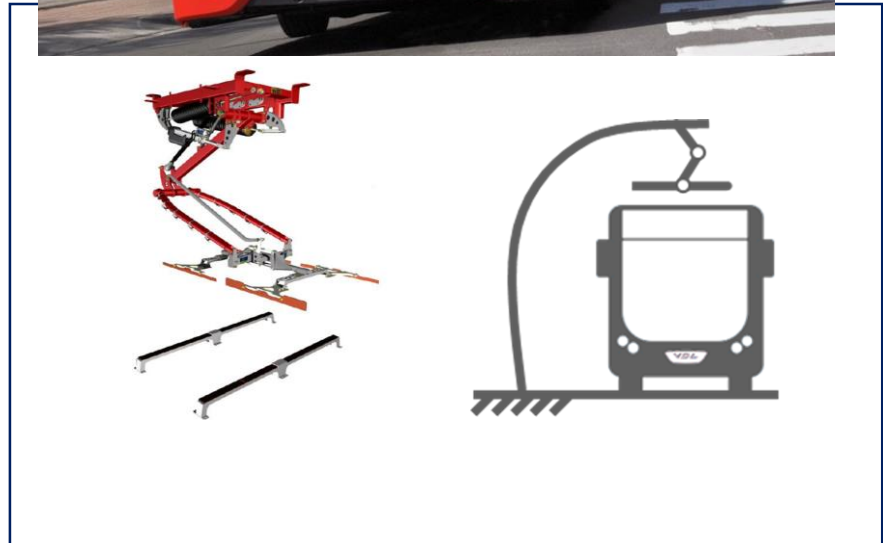
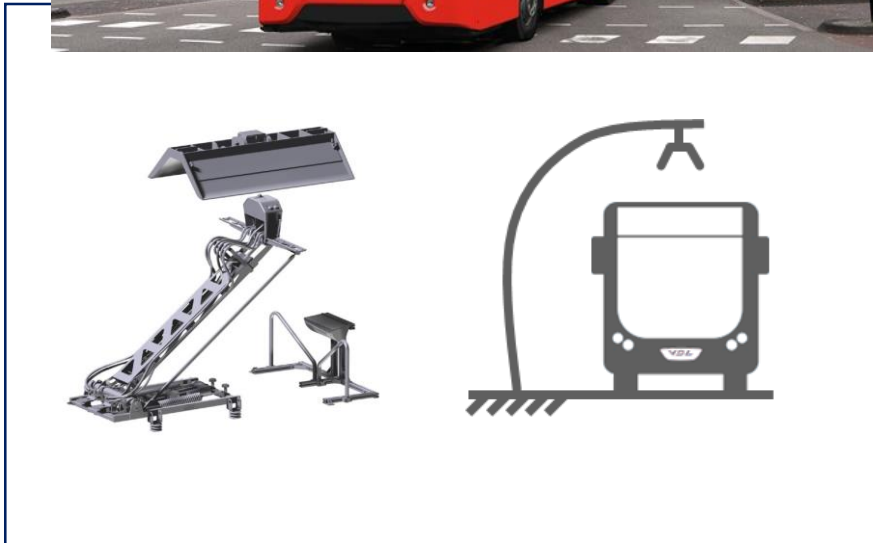
80 kW Twin Charger Plug-in
10 x 50 kW Plug-in
2 x 300 kW Pantograph

ABB
150 kW Plug-in

Charging Technology 18M



Charging Technology 12M



Operational Experience with Battery Electric Buses

- Teething problems
- Technical adjustments
- Challenge with charging transactions
 - Stability
 - Charging batteries to maximum capacity
- Complex project establishing charging infrastructure
 - Large number of partners involved
 - Coordination
 - Regulatory issues
 - Time pressure and deadlines
 - Good cooperation over all
- Power consumption lower than anticipated
- Well received by drivers- and customers
- Building while running normal business

