Using existing tram infrastructure for e-bus charging

STOAG Stadtwerke Oberhausen GmbH
Oberhausen – Location / Key Figures

Key figures city
- Inhabitants: 212,690
- City area: 77sqkm

Public transport by STOAG
- Staff: 427 (drivers: 325)
- Vehicles: 6 trams/117 buses
- Line length: 581km (tram/bus)
- Stops: 334 (tram/bus)
- Passengers: 34.5 million/year
Use Case Oberhausen

Objectives

• Reduction of dependence on fossil fuels
• Reduction of nitrogen oxide and particulate matter emissions
• Reducing of noise emissions from road transport

Implementation

• Operation of vehicles with an alternative drive concept for existing bus lines
• Use of existing DC voltage infrastructure for fast-charging of two e-bus lines
Use Case Oberhausen

Operation start: October 2015
Linie 962
15.62 km; 300 km/day
Linie 966
13.33 km; 170 km/day

- Performance (both lines from October 2015 till April 2018):
  → total distance (timetable): 417,556km
  → total driven km by buses: 231,790km
- Average energy consumption 1.3kW/h
- Charging time during operation: 10 minutes
- During regular operation charging at depot is not required

Source: STOAG Stadtwerke Oberhausen GmbH
Used Battery Bus

- SOLARIS Urbino 12 electric
- 12m standard battery bus
- Fully low-floor
- Electric air-conditioning
- Battery (A123, IMPACT) 200kWh
- Roof-pantograph (Schunk)

Source: STOAG Stadtwerke Oberhausen GmbH
Battery bus charge at the substation Neumarkt
Charging station Neumarkt with the substation in the background
Battery bus charge at the Sterkrade station
Battery bus charge at the Sterkrade station
Monitoring tool (Viriciti)
Results

Source: Games Ageddon
Results

Positive aspects:

✓ For the chosen lines the electric buses are suitable for the daily operation
✓ The technique of the vehicles is simple and reliable
✓ Staff (especially bus drivers) and passengers are very satisfied concerning the driving comfort and the interior/exterior noise emission
✓ Opportunity charging is characterized by advantageous operational stability
Results

Required improvements

- Reliability of the charger in Sterkrade
- The noise of the outdoor-charger in Sterkrade
- More detailed standards are needed
Follow-up Activities

✅ Line 962 (in operation)

✅ Line 966 (in operation)

- Line 979 (Operation of 4 additional battery buses, delivered by VDL, together with the transport company in Herten)

Source: STOAG Stadtwerke Oberhausen GmbH
Follow-up Activities

Changes required by the operation of Line 979

- The VDL buses cannot be charged without adjustments from the Solaris-supplied chargers, although this was explicitly requested in the specifications.
- Since the Pantograph is on the front of the VDL buses, a new charging mast must be installed in Sterkrade.
- Therefore, in the future, the Solaris buses can only be charged at the station Neumarkt and those of VDL only in Sterkrade.
- Adverse schedule changes were therefore required. Additional empty run for line 962 to the new charging point is needed.
- Liability issues have yet to be clarified with the system supplier Solaris regarding the charger in Sterkrade.
- Since the buses are first deposited and charged in the depot building, the necessary permits must be obtained in particular with regard to fire protection.
Follow-up Activities

Changes required by the operation of Line 979

• Risk of charging time during traffic disruption (more vehicles at the charging stations)
• Integration of the operational management (maintenance, cleaning, safety, ...) of the chargers by our energy supplier (tram network so far under supervision of ‘Ruhrbahn’)
• Passing on the costs for charging energy to ‘Vestische Straßenbahnen’ (new e-bus line 979) is difficult due to partly missing legislative basis e.g. for calibrated DC energy measurement
Follow-up Activities

Feasibility Study
- Will be carried out in autumn 2018 by the consultancy ebusplan
- Objective: examine which lines or line clusters can be electrified when and by which technology

National Funding Project 'Strategy E'
- Project partners: PT operators STOAG, Westverkehr GmbH, Kölner Verkehrsbetriebe, consultancy ebusplan & Rupprecht-Consult
- Objective: development of a planning tool for the use of electric buses (in connection with the existing IVU planning software)
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