



E-mobility II – Roll-out of charging infrastructure
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Transition to e-mobility in public transport in Hamburg

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Good practice from the **eBussed** project

- Depot charging vs. opportunity charging
- Optimised charging infrastructure



Depot charging vs. opportunity charging

Charging strategies for public transport

Depot charging | charging **overnight** and perhaps re-charging at the depot during the day. Most often by **plug-in** charging (typically 30-50 kW).

Opportunity charging | using **superchargers** en route (pantograph), e.g. at terminal stops (>150 kW); **includes overnight** charging at the depot.



Depot charging vs. opportunity charging

Careful assessment of relevant factors

For informed decision on a future charging strategy consider the following:

- Operational flexibility
- Price for infrastructure
- Impact on bus drivers
- Distances driven
- Availability of public space (for building opportunity chargers)
- Limitations in the built environment (e.g. low clearance bridges, weight restrictions on old bridges)
- Acceptance by public

Some of these aspects are in the realm of the public authority others lie with the transport operators, some need to be discussed and negotiated.



Optimising charging infrastructure...

... **according to available space** (VHH e-bus depot in Hamburg-Schenefeld)

- E-bus operations requires **more buses** and **more space** (for charging infrastructure)
- Rethink the bus **depot layout** to make it **e-bus compatible**. Due to restricted space, the plug-in charging infrastructure has been placed **overhead**.
- Power modules located in a **wall** structure between two areas of parking as a barrier in the event of a **fire**
- Investment **costs** estimated to be lower, compared to the construction of a small charging station next to each e-bus.
- Depot is **still under construction**.



- Retrofitting existing bus depot
- Overhead steel construction
- Solo and articulated buses

Visualisation of future e-bus depot in Schenefeld | Source: VHH



Another example...

... e-bus depot in Hamburg-Alsterdorf (Hochbahn)

- Built from scratch, opened in April 2019
- 45,000 square metres
- 240 buses (final stage), solo (12 m) and articulated (18 m)
- 6 carports for 40 buses each
- Green roofs (microclimate, rainwater collection for cleaning buses)
- Own transformer station



- In operation since 2019
- For the time being hosting diesel buses too

E-bus depot Hamburg-Alsterdorf | Source: Hochbahn



...at night



E-bus depot Hamburg-Alsterdorf | Source: Hochbahn



Lessons learnt

Modular construction of charging infrastructure enables flexible growth and can thus be implemented parallel to the ramp-up of the electrical fleet.



Source: Hochbahn



Optimising charging infrastructure...

... according to fire safety

- **Preventive** fire protection and **contingency** plans are a whole different story with e-buses.
- A lot of **research** needs to be done and **experience** to be gained (unfortunately!)
- There is an **upcoming thematic article** from one of the thematic working groups in our eBussed project on fire safety in e-bus depots.



Thank you!

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