



An European urban transition project towards more sustainable cities through innovative solutions, in the fields of mobility, energy and digital.

Smart City

Global project

Coordination: Cartif
European grant: 18 M€
30 partners, 6 countries
Period: Dec. 2016 - Sept. 2022
Demonstrators: Nantes, Hamburg, Helsinki

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Hamburg

Coordination: Borough of Hamburg-Bergedorf
European grant: 5,25 M€
14 partners

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Mobility

ACTION OVERVIEW



Electrification of bus lines with 10 new e-buses

This action was implemented by Verkehrsbetriebe Hamburg-Holstein GmbH (VHH) in the project area of Bergedorf, Hamburg. A full report (D3.8), written in English in November 2019, is available at <https://mysmartlife.eu/publications-media/public-deliverables/>

► OBJECTIVES

- › Procurement and deployment of 10 e-buses in the Borough of Bergedorf
- › Use of overnight charging only with renewable energy
- › Implementation of the necessary infrastructure (compare separate action)

► IMPLEMENTATION



CHALLENGE

The challenge is to procure electric buses in a very limited market considering two main aims: Achieving optimal range as well as a system, which is independent of any single manufacturer, thus ensuring the companies' possibility to scale up with a variety of e-buses in the future. The standard for plug-in charging was still evolving from a German DIN standard to the international ISO 15118 and manufacturers had not yet implemented the new standard. Due to the overnight charging system, buses must be carrying a large battery, especially in the vehicles running early in the morning. This resulted in a distinct restriction in range. The aim of the procurement process was thus to maximise the range so that each bus could be utilised at any time of the day.

Another challenge was the complexity the new technology brought to daily operations. To counterbalance the reduced range, various digitalisation projects were initiated to facilitate the transition and help the staff both plan and monitor the e-buses without loss of efficiency in the overall system. Thus, many processes had to be scrutinised and adapted. This part of the transition is still on-going as the new digital tools are being implemented over time.

PROGRESS

VHH initially suffered from some setbacks in the procurement process due to the lack of standardised charging protocol implementation with many manufacturers. The first procurement went to a small company that struggled to meet the requirements needed for a large fleet operation like VHH's, and to adapt to the constant changes in standardisation that were occurring rapidly in the early stages of electromobility.

Another requirement was the procurement of charging infrastructure independently of the bus manufacturer. The challenges here are described separately in the corresponding action.

In addition to the bus drivers, who needed high-voltage instruction to be suitable for driving electric buses, the employees in the workshops as well as the cleaning operators had to be specially trained. Since the recharging process should ideally be uninterrupted, the way the cleaners operate at night had to be reviewed and adapted. The workshop was modified to include a roof work platform to allow work on the roof-mounted batteries.

Both the routing planners as well as the operators monitoring the daily service required an upgrade to their software tools to account for the new complexity brought forward by the limited range as well as the longer charging times and the need to monitor the state of charge during operations. The changes galvanised VHH to face a transition to become a more digitised company.

VHH managed to successfully deploy 16 e-buses by the end of 2019. In the following years, more e-buses were ordered so that by the end of 2021, more than 50 e-buses were in use at VHH.

LESSONS LEARNT

- › It is beneficial to analyse the entire network of bus lines prior to starting the procurement to determine the optimal solution for the way you operate.
- › Insisting on standardised and inter-operational equipment will ensure that your system will remain operational over a long period of time and can be scaled up independently of proprietary solutions that would tie you to a single manufacturer.
- › Expect the change in technology to have a knock-on effect that will bring necessary transition to many areas of your business, not just the obvious ones.