THE MOBILITY HOUSE

Tel.: +49 89 4161430 10
Fax: +49 89 4161430 20
Email: info@mobilityhouse.com
www.mobilityhouse.com

The Mobility House GmbH
St.-Cajetan-Str. 43
81669 Munich

Functional tender contents for a smart charging management system for a battery-powered electric bus fleet

Short description

In order to optimize capital and operational costs when constructing the charging infrastructure and the upstream infrastructure, a charging management system should be used. When in operation, the system must ensure the mobility requirements of the electric buses and minimize the costs of providing the power they need. The charging management system must be able to function with different charging technologies and allow interfacing with third-party systems (e.g. bus depot management systems).

System basics

- The system should have a hardware/software solution installed on site to manage the charging operations locally. This allows the system to function autonomously even if the Internet connection malfunctions or fails. Reliable charging operation must be guaranteed at all times.
- In case of a system failure, the system should be able to provide a predefined maximum output value (fallback value) to the charging stations
- Can be operated with buses from different manufacturers
- Can be operated with charging stations from different manufacturers
- Integration of various AC/DC charging stations should be possible under the following basic conditions
    - Charging stations have a local Ethernet interface
    - Charging stations can communicate with a backend using OCPP 1.6 JSON or higher. The charging stations ideally have an *OCCP 1.6 Full Certificate* issued by the *Open Charge Alliance* or fulfill the requirements
- Dynamic interface with third-party systems, e.g. a bus depot management system for bidirectional data transfer (departure times, energy requirements, malfunctions, etc.)
- Identification/authentication of the buses using their MAC addresses (for DC charging stations) or using RFID cards (for AC charging stations). Immediate activation of the charging process after successful authentication
- Online access (web UI) via desktop computer and mobile devices
- Continuous maintenance and software updates

Monitoring and operational functionalities

- Visualization of the charging processes in real time
- Allocation of the charging power to the vehicle and charging station
- Downloads of statistics of charging events in web UI
- Fault display in web UI and email notification in case of malfunction
- Restart charging stations in web UI (hard reset & soft reset if supported by the charging stations)

Functional scope of the charging management system

- Objectives: Minimization of the overall charging power or peak load (peak shaving)
- Factors to be considered for charging optimization:
    - Available overall power (kW)
    - Maximum charging power per charging station
    - Real-time charging power for each bus
    - Departure times for each bus
    - State of charge (SoC) for each bus
    - Energy requirements of each bus
- Integration of the power drawn by additional consumers and dynamic management of the charging processes depending on the real-time power draw at the site / power supply / transformer
- Consideration of additional power requirements to pre-condition the buses. Automatic transmission of the preconditioning settings from the backend to the bus (depending on the electric bus and its configuration), if necessary
- Management of the ongoing charging processes with minimal to no interruptions, to provide smooth operation of the charging infrastructure and buses
- Manual user prioritization for each charging station or vehicle must be possible at all time
- For charging stations with multiple charging ports, the charging management system should be able to control the power output for each charging point (if supported by the charging station).

Operational support

- Technical support via telephone and email (German and English)
- 24x7 active system monitoring
- Remote restoration in case of faults

Further development and expandability

- Easily scalable system to allow integration with more charging stations
- Modular system for subsequent expandability and availability of replacement parts
- Expansion of the interfaces to other providers and systems should be possible on request
- It must be possible to retrofit the ability to react to external control commands (e.g. signals from a ripple control receiver or from direct interfaces to the distribution system operator)
- Open interfaces compliant with market standards
- Further development to OCCP 2.0
- Further development to V2G applications

Acceptance criteria

- References of existing customers
- Price or system amortization
- Scalability
- Operational safety / availability
- Quality