CarMedialab

Operational reliability through charge management

How to reliably master the operation of electric buses

Introduction

E-mobility requires operational transformation

The electrification of bus fleets is more than just a technological change—it is an operational transformation. Today, transport companies are faced with the task of putting their electric vehicles on the road in a planned, efficient, and reliable manner—despite growing electricity demand and rising energy prices, complex duty rosters, and increasing sustainability requirements.

But when is a bus really ready for service?

Only if it is charged at the right time, is technically sound, and has sufficient charge for the upcoming route. This is exactly where CarMedialab's systems come in.

With MOBILEcharge, the intelligent charging management system, and MOBILEvhm, the real-time monitoring system for vehicle status, transport companies get a solution that goes far beyond basic monitoring of vehicles and charging stations. You can control charging processes strategically, detect errors early on, and improve the operational stability and cost-effectiveness of your e-bus fleet.

This whitepaper shows how public transport companies are using CarMedialab's solutions to overcome specific challenges in the operation of their electric buses – with a clear application exampleand practical recommendations for action.

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1 Key challenges in the depot

The operation of electric buses differs fundamentally from refueling conventional vehicles. Charging points must be coordinated in terms of time and electricity, turnaround times are tight, and grid fees and electricity price fluctuations have a massive impact on operating costs. At the same time, batteries must be treated in such a way that their capacity and range remain stable over many years.

The biggest challenges at a glance:

Complexity of charging processes

- Different route lengths, route profiles, and vehicle types require individual charging requirements.
- Without intelligent control, there is a risk of inefficient charging distribution, missed departures, or unnecessarily high energy costs.
- Electricity tariffs and grid capacities must be taken into account—manual management is hardly possible with an increasing number of electric buses in operation.

Susceptibility to faults and lack of transparency

- Charging processes can be interrupted for a variety of reasons: communication errors, power fluctuations, hardware problems.
- It often remains unclear why a bus has not been charged – the result: ad hoc rescheduling, additional maintenance, uncertainty in operation.
- Depots need a clear overview of which vehicles are currently being charged and at what speed.
- Without meaningful dashboards, reports, and analyses, operations remain reactive rather than proactive.
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Risk of peak loads and high operating costs

- Without charge management, expensive peak loads occur, which strain the power grid and lead to high grid fees.
- Infrastructure is oversized as a precautionary measure, resulting in avoidable investments.

Lack of integration with depot and vehicle data

- If charging processes are not linked to circulation schedules, telematics, or vehicle statuses, data silos are created that are not connected to each other and therefore offer no added value.
- Maintenance is carried out reactively, even though many faults could be detected early on if charging processes were monitored and analyzed.

Conclusion: Electric bus operations require more than just charging stations. They need an intelligent system that:

- Automatically controls charging priorities
- Detects and rectifies faults early on
- Analyzes consumption data and presents it transparently
- Is networked with schedules, energy suppliers, and vehicle data

2 The solution for your depot

MOBILEcharge was developed specifically for the requirements of public transport – with the aim of not only automating charging processes, but also controlling them strategically. This involves not only the flow of energy, but also the intelligent interaction of charging requirements, timetables, energy prices, and depot logic.

The advantages for public transport companies at a glance:

1. Reduce costs through optimized charging strategies

- Battery-optimized charging: reduces degradation, extends battery life
- Tariff-optimized charging: takes advantage of low-cost time slots in electricity tariffs
- Schedule-optimized charging: prioritizes vehicles with upcoming assignments
- Interoperability guaranteed: open standard interfaces (VDV, OCPP) allow a wide variety of vehicles and charging hardware to be integrated—regardless of manufacturer

2. Simplify charging processes through intelligent monitoring and reporting

- Real-time monitoring of all charging points and vehicles in the depot
- Notifications in the event of malfunctions, delays, or deviations
- Manufacturer-independent reporting for operational control and strategic evaluation

3. Make operations more robust with operational security features

- Energy planning and load management: prevents overloads in the depot
- A local controller ensures autonomous operation in the event of grid failures
- Automatic restoration of interrupted charging processes
- Boosting function: prioritized fast charging for vehicles with critical State of Charge (SoC)
- Preconditioning of vehicles: for energy-efficient start-up in both winter and summer operation

3 A morning at the depot – how smart charging works thanks to good software

First fault detected – automatically resolved

4:30 AM

A bus shows a charging interruption. In the past, this would have meant manually detecting the fault and restarting the system. Today, the software recognizes the problem, reports it immediately via notification, and automatically attempts to restore the system—successfully. The charging process continues, and no further action is required.

4:45 AM

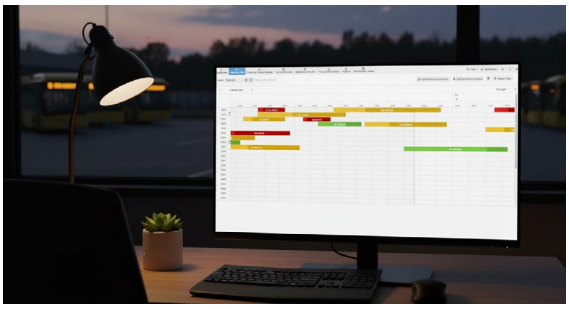
Preparation phase in the depot

The depot awakens. The buildings are still dark, but the systems are already running in the background: the software monitors all charging points in real time. On the operations manager's screen: a clear overview – which bus is charged, which is malfunctioning, which still needs charging.

Preconditioning activated

5:00 AM

In addition to charge management, MOBILEcharge has activated preconditioning on several buses: heating at an outside temperature of -4 °C. Not only does this ensure that drivers find a warm vehicle, it also significantly reduces energy consumption during the first few kilometers.



5:15 AM

Prioritization according to circulation schedule

Now things are getting tight: a route starts in 45 minutes, and the assigned bus only has 58% SoC. MOBILEcharge automatically recognizes the urgency and prioritizes the charging station—at the expense of a vehicle that is not needed until noon. The bus gets a boost and reaches its scheduled departure time with 87% charge—enough for the route.

Data flows into MOBILEcharge

5:30 AM

At the same time, MOBILEcharge checks the system data of all electric buses: SoC, battery temperature, error messages, performance deviations. One bus shows unusual temperature peaks in the battery. Fleet management receives an automatic notification: “Suspected battery fault – maintenance check recommended.”

6:00 AM

Start of operations

All vehicles scheduled for early shift duty are ready to go – charged, pre-conditioned, and operational. No charging failures, no ad hoc rescheduling, no rush. Transparency across all systems ensures safety and reliability.

Conclusion: What used to require complex manual analysis and troubleshooting is now a clearly structured, data-driven process. This makes your daily work routine organized and predictable.

MOBILEcharge and MOBILEvhm enable operational reliability, energy efficiency, and transparency—in day-to-day business and strategic planning.

MOBILECHARGE IS THE PROVEN SOLUTION:

1.250+ integrated charging statioms
2.000+ electric busses charged regularly

Innovative Software - Made in Germany

Contact Us

Would you like to learn more about intelligent charge management?
Then please contact us: info@carmedialab.com

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