



WHITE PAPER

Introducing a Charge Management System: Three Success Factors Gained from Project Experience

Introduction: The goal is an intelligent charging concept

The **INIT Group** supports transport companies who want to convert to electromobility. They offer solutions such as an Intermodal Transport Control System tailored to electric bus requirements, a planning and depot management system and a range prediction system. And, not least, their subsidiary **CarMedialab** offers a sophisticated charge management system. With its software application **MOBILEcharge**, CarMedialab has been involved in a range of projects since 2019. An increasing number of transport companies are beginning to realise that controlling a fleet of electric vehicles is so complex that they need the help of an intelligent charging system. CarMedialab has managed a range of projects, from a relatively small fleet of five electric buses to a fleet of over 250 electric vehicles in several different locations, and they all have one thing in common: An intelligent charging concept which ensures that all vehicles are charged as needed, as cost effi-



CarMedialab has wide-ranging project experience. This shows **GUB** (Gamla Uppsala Buss, © Jonas Bilberg)

ciently as possible while being gentle on the battery, preconditioned if necessary and ready to go with the correct amount of charge when it's time to move out. CarMedialab has been able to gather valuable experience over the past three years, balancing the complex interplay between charging and IT infrastructure and vehicles. So, what factors need to be taken into account for successful charge management projects?

1. Iterative approach and good communication between all parties involved

One thing is certain: Transport companies are breaking new ground by entering into the world of electromobility. They don't have much experience to fall back on, so all parties involved need to be in close contact and exchange information at regular intervals. Each project is a new challenge to meet the most diverse system requirements, in particular in regard to the IT network for introducing a charge management system. In addition, they need to set up complex data communication to deal with the process chain of vehicle, charging infrastructure, charge management and, where relevant, downstream customer systems (depot management and planning systems). They should plan the implementation from the outset using number of iteration phases. If there are any errors, this will pick them up quickly. To ensure a smooth process, CarMedialab gets involved early on to advise and support not only transport companies but also other partners, such as charging infrastructure manufacturers who play important roles as additional parties in the project process.

2. Interoperability of system components

Complex data communication requires that each of the system components involved in the charging process be based on certain standards. Some of these have been developed to deal with the increasing importance of electromobility over the past number of years.

To date, FMS (Fleet Management Standard) regulates communication between vehicle components. A consortium of vehicle manufacturers developed this protocol to ensure that vehicle data can be transferred consistently to any on-board computer regardless of manufacturer. Standards for regulating communication between vehicle and external components include:

- **OCPP** (Open Charge Point Protocol), an application protocol that standardises the data transfer between charging stations and a charge management system
- **ISO 15118** for communication between charging station and vehicle
- The interface for preconditioning based on **VDV** (Association of German Transport Companies) specification 261 and communication between the charge management software and the vehicle via the charging station..

The VDV advises and supports its member companies and politicians, supports the exchange of experience and know-how between the members and prepares technical, operational, legal and economic principles. Just last year, CarMedialab collaborated on VDV specification 463 for communication between the external components, depot management and the charge management system.

These interfaces enable the different system components to interoperate and are essential for the exchange of data.

However, another factor also frequently complicates matters. Within a project, vehicles and charging stations are often made by different manufacturers and spread over different locations. A central charge management software has to map and manage these components.

3. Involving experienced project partners

Even though these standards are in place, a charge management system cannot simply be “plugged and played”. The greatest challenge faced in any project is establishing high quality and standard compliant communication between the components. A good charge management provider will have expertise in implementing these standards correctly to ensure the data content has sufficient availability and depth of detail.

Whereas communication using OCPP often works well, “preconditioning the vehicle” as required by VDV specification 261, still requires a considerable amount of implementation work. CarMedialab collaborates with a range of vehicle manufacturers to support implementation and ensure correct preconditioning. Adopting ISO 15118 (communication between charging station and vehicle) also requires a great amount of detail and a high level of expertise coordinating with vehicle manufacturers.

The standardised FMS interface for transferring vehicle data to the on-board computer is another standard which is important to ensure the smooth operation of electric buses and to determine certain vehicle conditions at all times, such as the charging status and the remaining battery capacity. Data availability and the



An intelligent charge management system ensures that all vehicles are charged as needed, cost-effectively and in a way that conserves batteries (© Ulrike Kabel/INIT)

quality of data transferred are hugely important as the range is limited by current battery capacities and doesn't allow reserves for several days of operation. A whole range of factors determine the energy consumption of electric buses (such as the topology of the route, the driving style, and especially, air conditioning the vehicle) and the range does not decrease linearly as a result. Unfortunately, not all vehicles have these to a sufficient degree. In addition, the FMS interface which was originally developed for diesel motors does not yet have enough e-mobility parameters. Providers therefore need a detailed standard, which should be regulated by the pending VDV 238 specification. Until then, a partner who is competent in implementing charge management systems should support the data transfer.

Conclusions

Introducing electromobility successfully will require a charge management system as a central system. The system will regulate the interaction of different components including the electric bus, operating conditions, charging infrastructure and, where relevant, depot management. The standards which have been established over recent years have made important progress in terms of interoperability. However, in many areas, the standards are not specific enough or take a long time to implement. In addition, most transport companies do not yet have enough experience with electromobility. As a result, the project partners need to coordinate closely and establish an iterative approach for each phase of the project. All parties involved in the project must also be well acquainted with the requirements of norms and standards and implement them accordingly; a charge management provider with solid project experience and precise knowledge of the standards is indispensable. ■

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