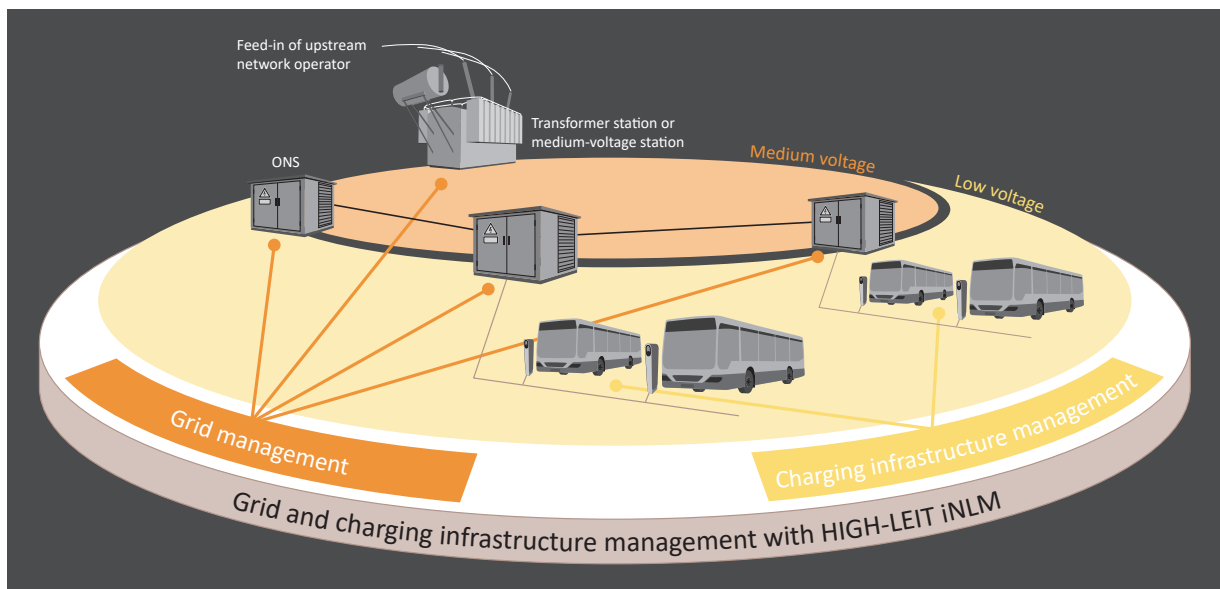# VIVAVIS

DECODING THE FUTURE

HIGH-LEIT iNLM

Intelligent power grid and charging infrastructure management for closed distribution systems of electronic bus depots

Full power for e-Mobility

The transition from internal combustion engines to electric drives aims to reduce harmful emissions, particularly in cities and urban areas. This also includes public transport. In contrast to public charging infrastructures, electronic buses are supplied with energy in the depots of public transport operators. The necessary charging capacities require closed distribution systems whose security, availability and grid compatible operation must be ensured by the particular public transport company. Intelligent systems are needed to fulfil these requirements and make optimum use of the available feed-in capacity. These systems relieve power grids as they offer automated processes and thus make sure that e-mobility does not run out of power.

Feed-in of upstream network operator

Transformer station or medium-voltage station

ONS

Medium voltage

Low voltage

Grid management

Charging infrastructure management

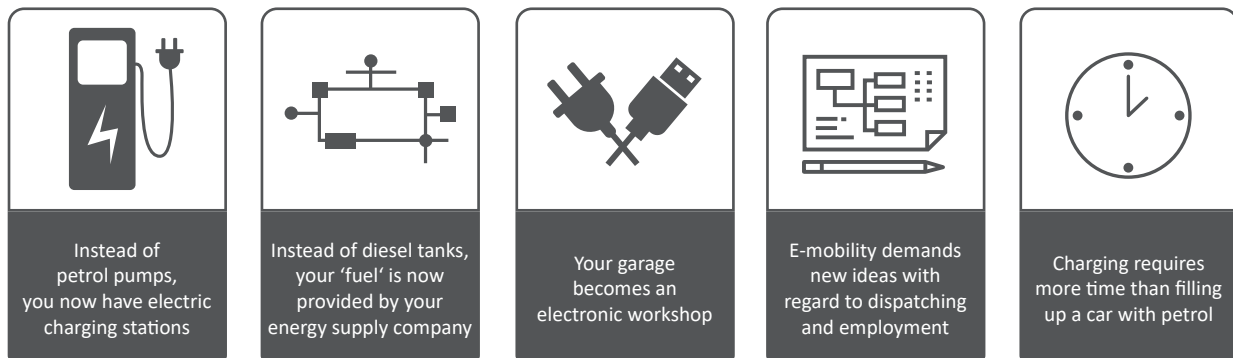Grid and charging infrastructure management with HIGH-LEIT iNLM

Your tasks

Electricity for your charging infrastructure is usually supplied by an upstream medium voltage distribution system – ie by public utilities. The system determines the maximum transfer capacity. Based on this you have to

- distribute power and monitor loads to ensure that the current charging capacity of all charging points never exceeds the transfer capacity at the feed-in point. This may prove challenging, but automated load management helps you to face this challenge successfully.
- monitor operations and distribute loads to avoid selective overloads of system components such as cables and transformers.
- assume duties. As 'independent' closed distribution system operator you are responsible for
    - the security of people and installations,
    - the availability of your network and
   - the stability of the power grid.

Our solution

With **HIGH-LEIT iNLM**, controlling and monitoring can be realized easily. Our solution combines the grid control system **HIGH-LEIT** with RTUs from the **ACOS 7 series** and compact protection/control devices from the **ACOS 300 series**. Charging points are connected to the integrated charging infrastructure management system via OCPP (Open Charge Point Protocol).

This enables simple and efficient control as well as monitoring of your closed distribution network and helps you to avoid exceeding the permitted feed-in capacity.

| Instead of petrol pumps, you now have electric charging stations | Instead of diesel tanks, your 'fuel' is now provided by your energy supply company | Your garage becomes an electronic workshop | E-mobility demands new ideas with regard to dispatching and employment | Charging requires more time than filling up a car with petrol |

HIGH-LEIT iNLM offers interfaces to exchange data with other systems. This enables forwarding required information via data interfaces in case services, maintenance and/or grid management are carried out by external service providers. Furthermore, you can use these interfaces to connect existing depot management systems via individually designed communication routes.
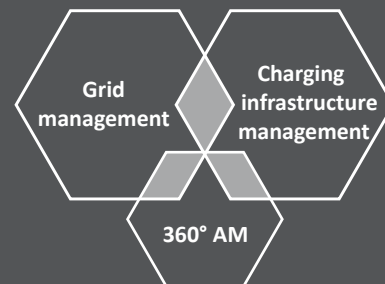
*In a nutshell – our complete solution*

Our answers to your questions

- Where can I find a charging point and is it available?
  - A geographic map shows all charging points and indicates their availability with traffic light colours (green, yellow, red).
  - **HIGH-LEIT iNLM** also records important information such as status and charging current of the charging point.
- Is charging still possible or have I already reached the allowed total capacity?
  - **HIGH-LEIT iNLM** records load flows, aggregates them for the particular charging point and sends alarms if limits are going to be exceeded. In case further charging would exceed the agreed capacity, the charging request will be denied or charging capacities of other charging points will be reduced proactively.
- What can I do in case of a bottleneck?
  - Our solution automatically clears local bottlenecks of the power grid by reducing the charging capacity and sends a corresponding message.
- What is the status of my network and of my installations?
  - Be it control gear, protection devices or the charging infrastructure – **HIGH-LEIT iNLM** monitors your system components, reports problems and helps you to eliminate faults.
  - Faults in the network are detected by, for example, protection equipment and the affected network section is switched off. Integrated control features of **HIGH-LEIT iNLM** offer remote control and thus enable recovery as quick as possible.
- How can I invoice the charging of buses?
  - **HIGH-LEIT iNLM** logs the individual charging processes and helps to invoice charging point users or evaluate the costs related to an accounting unit.
- When do my charging stations have to be serviced?
  - We offer you the option to digitize some of your systems and assets or even all and integrate them into our **360° asset management system**. This will facilitate planning, execution and documentation of maintenance work.

What do you see?

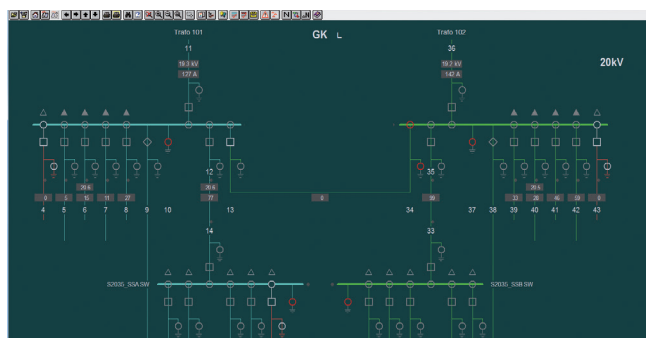**Where is the charging station? Is the charging point available?**

The system automatically updates the colouring of system components and thus the status of charging points (and possible charging clusters) is visible at all times. Dispatchers are therefore able to direct vehicles that need charging to the respective stations.
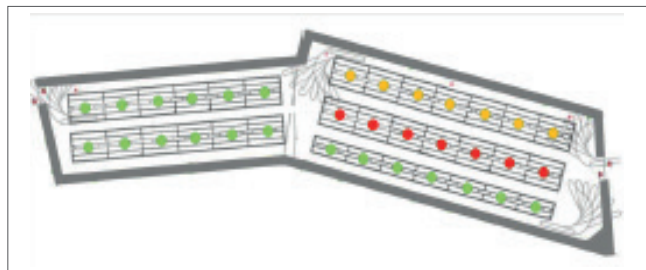
Example: site plan of a depot, showing charging points and their availability within the system (availability may vary for systemic or operational reasons).

What is the current state of the power grid? Did faults occur or are there any limitations of availability?

Network and installed components are monitored via individually generated displays, which do not only show schematic overviews of the grid but also switching states of all primary switchgear (power switches, disconnectors, earth electrodes, etc) and related measured values. You can control primary switchgear directly via dialog boxes on the screen.

Example: Overview of a medium-voltage grid

What kind of faults or events occurred?

All operational as well as system events are logged chronologically in the **Event log**. The **Alarm list** gives an overview of all pending faults/alarms. **Event log** and **Alarm list** are sorted automatically and provide numerous filter as well as setting options.

Example: Event log

Which load flows have been recorded in the past?

All recorded measured values are archived and permanently available for subsequent evaluations.

Example: load flow of charging current

Where can I find an overview on available information?

The charging infrastructure management is responsible for all data exchange with the charging infrastructure. The charging infrastructure management provides status details (charging point status, fault alarms), control information (eg about commands to reduce load or remote access for fault clearance), user information (number of charging processes and consumption), as well as authorization details and an overview on how the charging infrastructure is linked with market partners (access rights, billing) if applicable. Data is provided in spreadsheet format, via dashboard or data exports.

Example: charging data