E-Mobility Solutions

WAGO Load Management Application

E-Mobility as Part of the Energy Transition – More Than Just a Charging Station

E-mobility requires more than just a charging point – closely interlinked components combined in a complete package are essential to the goal of promoting zero-emission driving.
For electromobility to succeed, charging a vehicle needs to be as easy as pumping gas. To achieve that, we will need one million public charging points by 2030. The German Fast Charging Act (Schnellladegesetz), passed in 2021, paves the way for wide coverage and a demand-driven approach to supplying charging power. The German Building Electromobility Infrastructure Act (GEIG) also provides for the optional construction of charging points on non-residential building and private residential buildings. And last but not least, Section 14a of the German Energy Industry Act (EnWG) impacts the expansion of charging infrastructure. Therefore, the legal requirements necessitate a smooth, closely coordinated interplay among the individual components that charging infrastructure needs in order to function.

From a Power Grid to an Energy System

Professional planning ensures the necessary balance in the power grid. This requires the expertise of facility managers, industrial and electrical installation companies, and grid operators alike. An overarching perspective on load management is essential in order coordinate individual components with foresight, ranging from the possibility of integrating renewable energies, to the connection to the grid operator; from assessing the possibility of integrating storage systems, to dynamic load management at the individual charging points. The results of this interplay are laying foundation for a reliable supply in the future. Only once this foundation is secure can the power grid truly become a complex, smoothly functioning energy system.

Dynamic Load Management

During operation, it needs to be possible to dynamically determine, continuously adjust and optimize the charging capacity of an infrastructure as a function of the total load. Continuous adaptation – which includes incorporating and making use of all available capacities – is the only way to achieve integrated and, ultimately, cost-conscious energy management. In achieving this, the range of options available for measurement, control and regulation will determine the quality of the charging infrastructure. Therefore, WAGO controllers not only regulate the power supply to the charging stations – they also establish the conditions necessary for maximum transparency and ease of use, such as remote access to the parameterization interfaces, for instance. The overall concept behind WAGO components is based on an outstanding variety of different interfaces and brand openness. These features expands the components' range of possible applications: from new construction, to flexible retrofitting, to upgrading existing charging infrastructure, whether at public charging points or private wallboxes.

Communication protocols facilitate straightforward interchange with building control systems, inverters, battery storage systems, back-end systems for billing and server databases – in the cloud or the substations. Controllers like the WAGO PFC200 programmable logic controller offer a wide variety of interfaces with protocols such as Modbus TCP, SunSpec, Modbus RTU and OCPP 1.6. Telecontrol protocols like IEC 60870 and others allow integration of all the assets an intelligent solution needs for load management. In the future, this will be expanded by a BSI-compliant CLS interface in the control boxes for the smart meter rollout for low-voltage connections with annual consumption over 6000 kWh, for example. Sophisticated load management is indispensable for intelligent use of available energy and is essential if e-mobility is ever to gain traction. WAGO components help link limited resources intelligently.

Integration of renewable energies

Integration of Renewable Energies

When it comes to green charging stations in particular, load management does not end at the charging station – especially in configurations involving simultaneous supply of renewable energy to buildings and production facilities or charging of storage systems. WAGO components integrate all the relevant factors into a single intelligent energy system.

Connection to the Grid Operator

Customer substations play an important role as a connection point between the grid operator and the charging infrastructure vendor. Before a decision is made to expand – often an expensive choice – even small charging points can allow fast charging at any scale.

Grid Stabilization via Energy Storage

Battery storage systems offer a sustainable solution for expanding existing capacities. Either electricity is drawn from the grid and stored in battery systems, or a renewable energy system is integrated into the energy concept for targeted e-vehicle charging with up to 100 % renewable energy.

Dynamic Load Management

Dynamic load management keeps the charging processes aligned with the energy capacities. To achieve this, the loads are measured continuously and adjusted automatically. This not only avoids load spikes, but also allows charging based on economic criteria.

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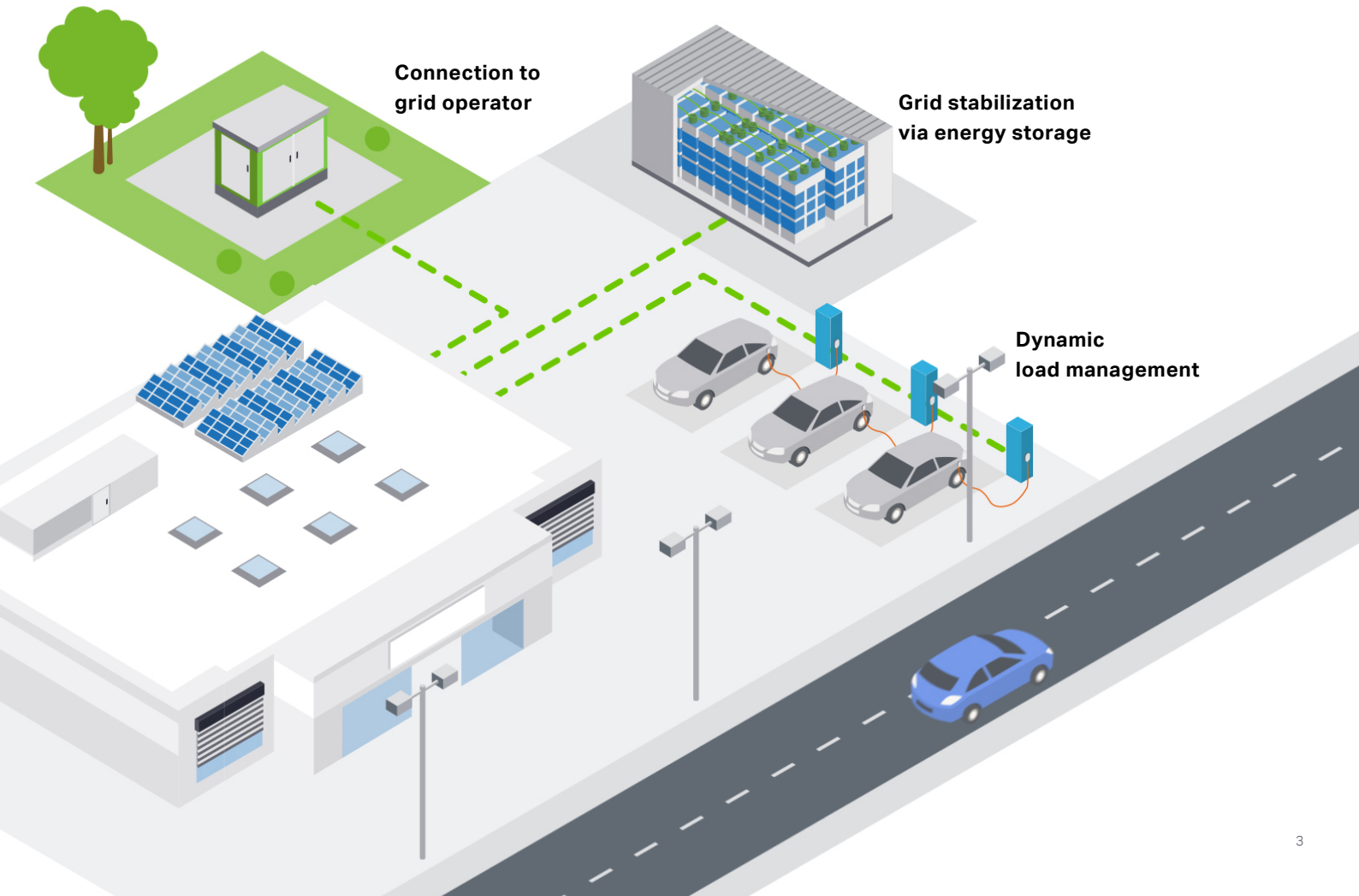


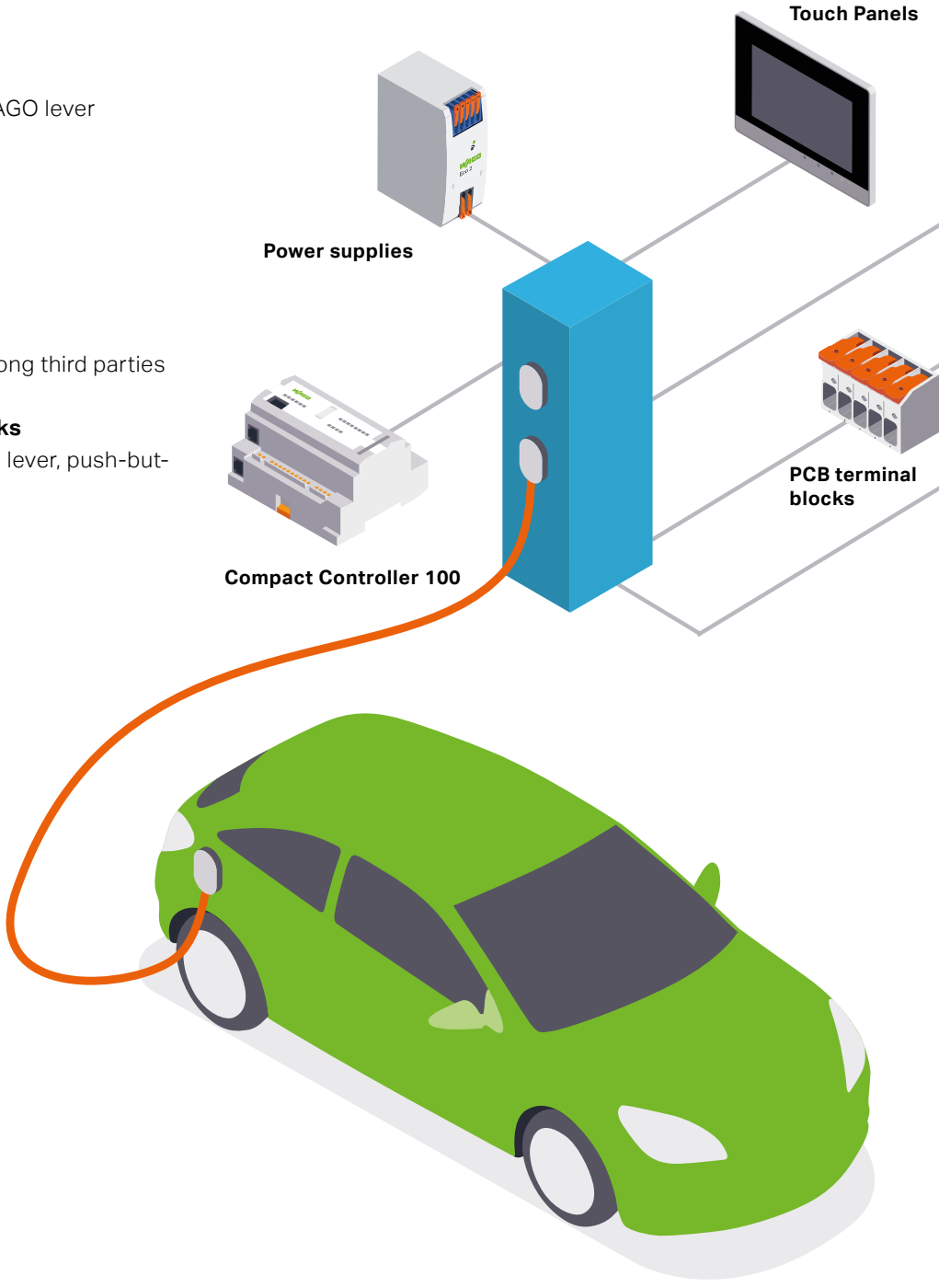
Components for Charging Infrastructure

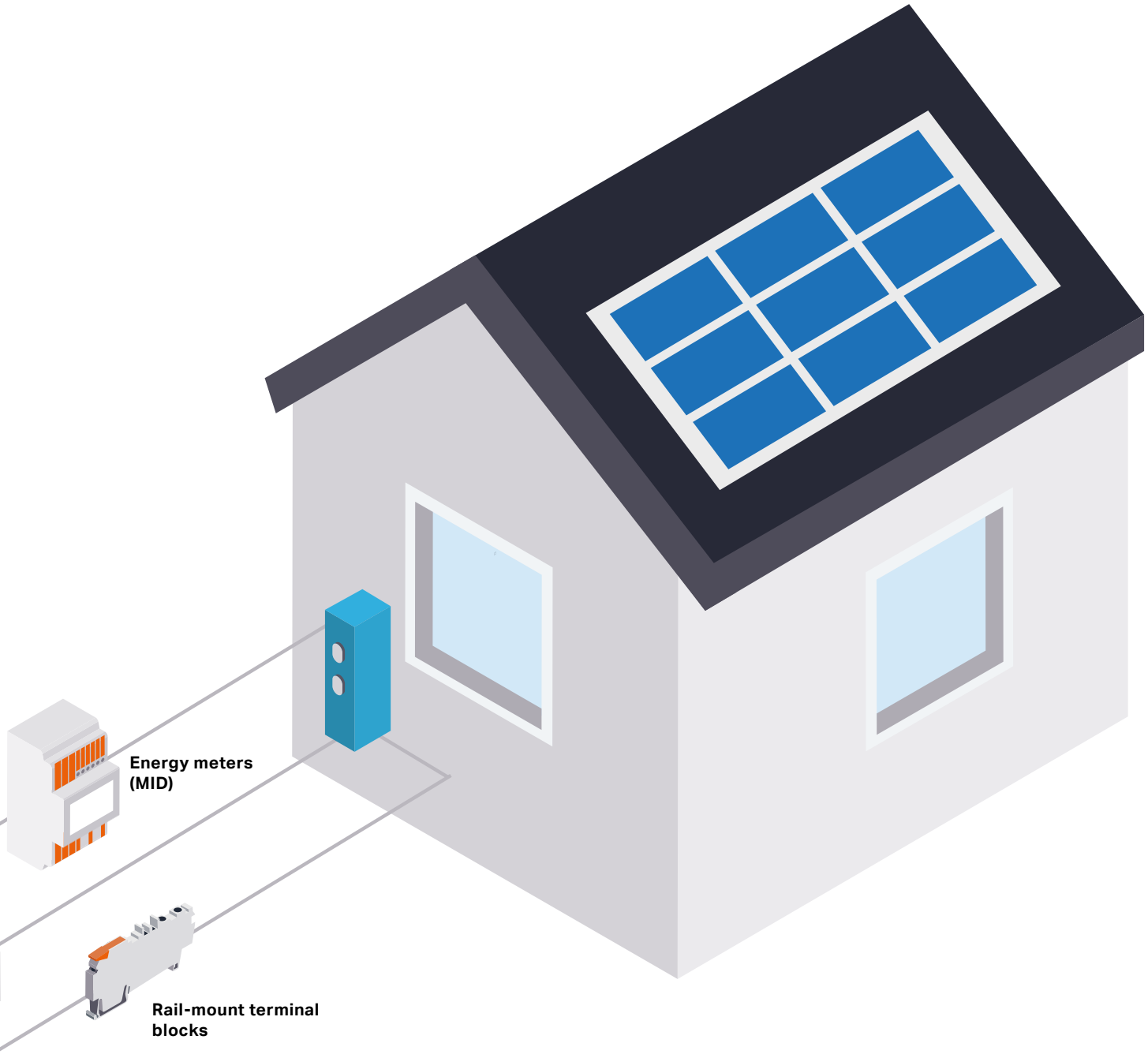
WAGO offers not only software solutions for managing e-charging parks, but also a wide range of components specifically for charging points and charging stations. These components include the following WAGO products: power supplies, energy meters, Touch Panels, rail-mount terminal blocks and the Compact Controller 100. With this variety of high-quality components, WAGO supports manufacturers in implementing efficient, reliable charging solutions for electric vehicles.

Eco 2 Power Supplies
- Push-in technology and integrated WAGO lever
- Compact design
- Fast, reliable, tool-free connection
- High efficiency

Energy Meters (MID-compliant)
- Compact design and fast installation
- Easy commissioning via app
- Allocation of energy consumption among third parties

TOPJOB® S Rail-Mount Terminal Blocks
- The right actuation variant at all times: lever, push-button or operating slot
- Quick wiring via push-in termination
- Multifunctional jumper range





Touch Panels

- High-performance Cortex A9 multicore processor
- Standby function saves energy with proximity sensor
- Openness and flexibility: IEC-61131 programming and a variety of interfaces

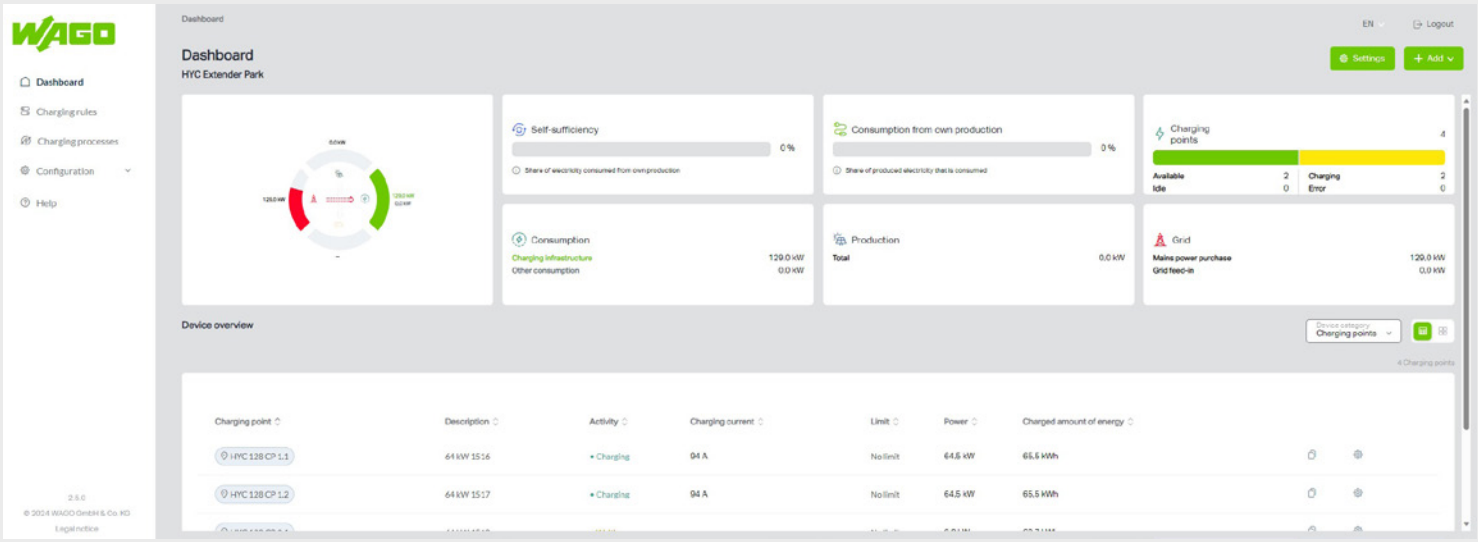
Compact Controller 100

- Compact controller with integrated I/Os, DIN-rail-mount enclosure
- Flexible charging regulation using digital inputs
- Optional: pre-installed WAGO Load Management application

PCB Terminal Blocks

- Compact PCB terminal strips with push-buttons
- Push-in termination of solid and fine-stranded conductors with ferrules
- 45° conductor entry angle supports compact, convenient wiring

Software



Load Management for Charging Infrastructure

WAGO Load Management Application

A charging station does not exist in a vacuum. Before you know it, there are two, then three – and in the end, with so many charging points, it is high time for intelligent load management. The software provides the necessary dynamic properties for charging management – even when added later. With a variety of different interfaces and brand openness, the application's focus is on compatibility and interoperability with standard wallboxes and charging stations, with Modbus®-capable meters and Docker®-capable controllers. In practical operation, the application automatically compares the current demand at the moment with the available capacity.

It is also possible to integrate EEG systems for mixed parks according to the grid operators' technical connection rules (TCRs). At the same time, this lays the foundation for preventing grid overloads and making sure load spikes never even occur in the first place. The grid connection capacity can be expanded dynamically with the WAGO Load Management application to increase the charging capacity.

Easy Integration into Existing Infrastructure and Expansion of Grid Connection Capacity

Key features of the WAGO Application Load Management:

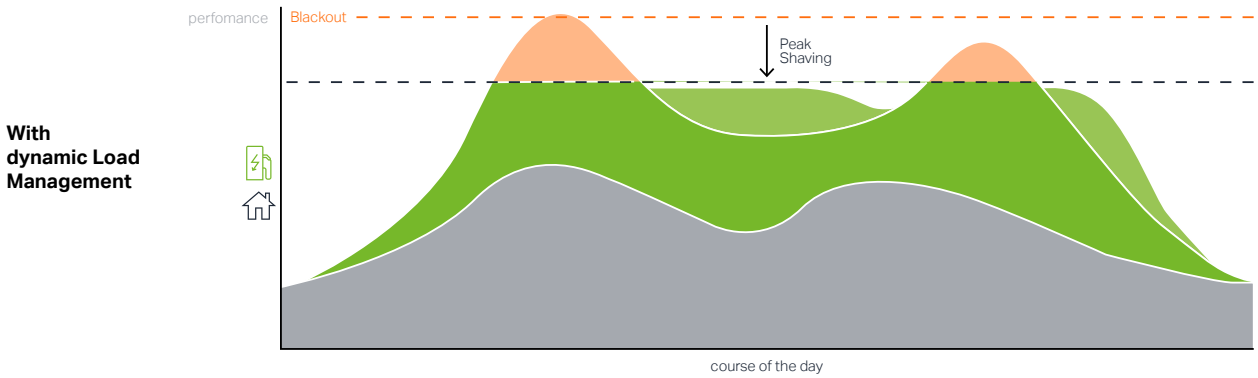
- Technological interoperability
- Ease of integration into existing charging infrastructure
- Takes renewable power plants, additional loads and storage systems into account
- Optimal utilization of existing grid connections

The Benefits for You:

- Maximum compatibility and scalability
- Optional offline operation if needed
- For mixed parks: Combine AC and DC chargers
- Load spike prevention
- Expand grid connection power through intelligent load management

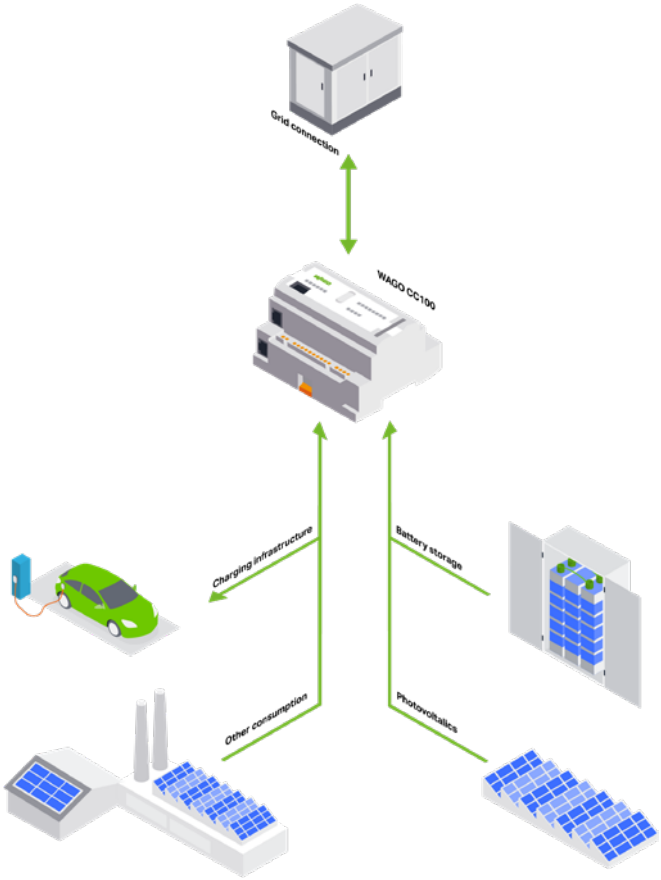
Dynamic and Static Load Management

WAGO Application Load Management supports intelligent, sustainable e-vehicle charging. It works continuously to dynamically determine and optimize the charging capacity of the charging infrastructure as a function of the total load at the location and continually adjusts the power using all available capacities.
This prevents load spikes, which, in extreme cases, can overload the grid and lead to long-term cost explosions, even if the load limit violation is minimal. The application's control options benefit charging parks of any size.
A native MQTT interface supports connection to the WAGO Solutions Platform or other cloud-based platforms.



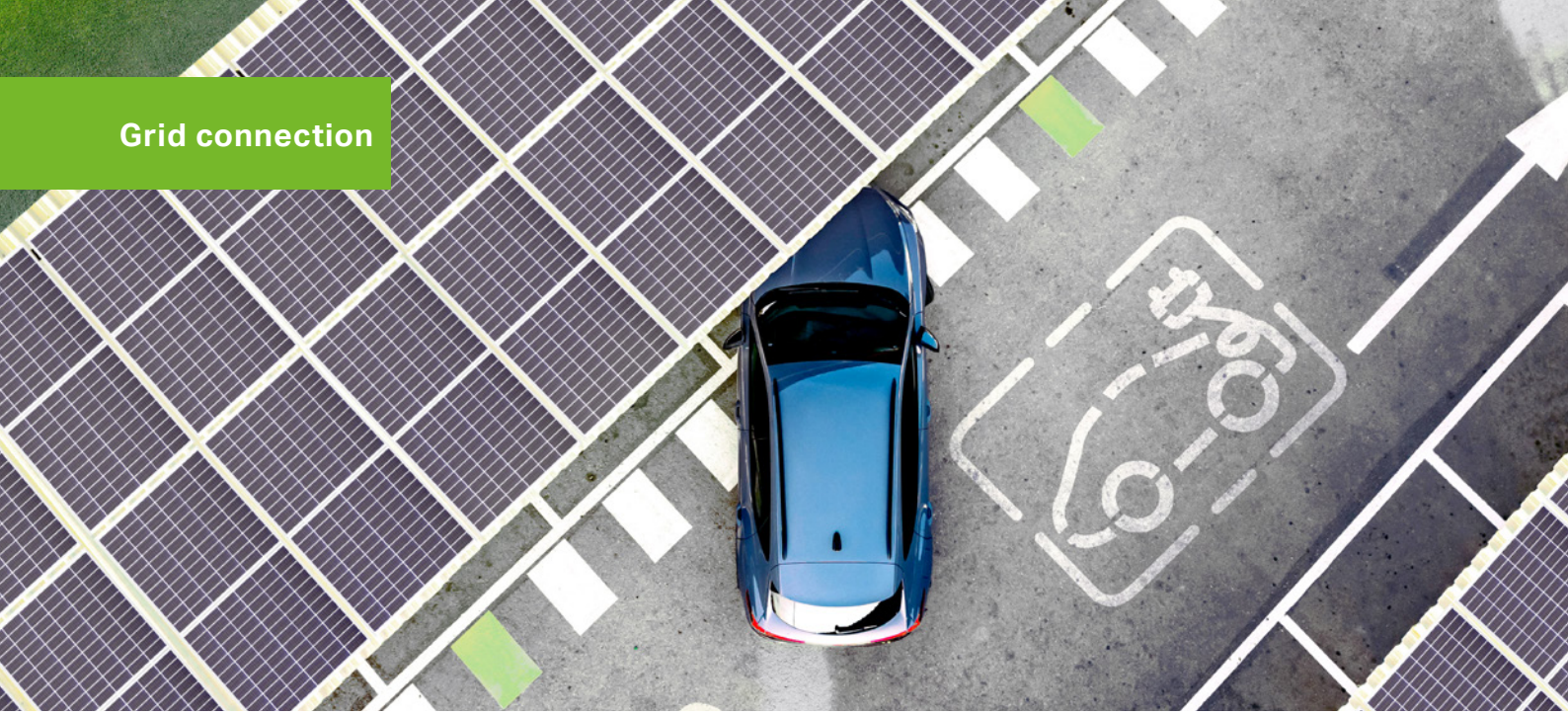
A Single-Source Solution

The solution can run on the following Docker®-capable WAGO controllers: the WAGO Compact Controller 100, WAGO Edge Controller, second-generation WAGO PFC200 and WAGO Touch Panels 600. The Compact Controller 100's design makes it particularly well-suited for integration into existing control cabinets. WAGO Application Load Management is compatible with standard Modbus®-capable power measurement modules and smart meter gateways. Data can be exchanged via a wide range of communication protocols, including OCPP 1.6, Modbus® and others. Since application configuration and management are performed via a Web interface, these processes are location- and software-independent.



More information on the solution and all compatible charging stations, wallboxes and meters

www.wago.com/e-Mobility



E-Mobility, Renewable Energy and Grid Connections

WAGO Customer Substation Application

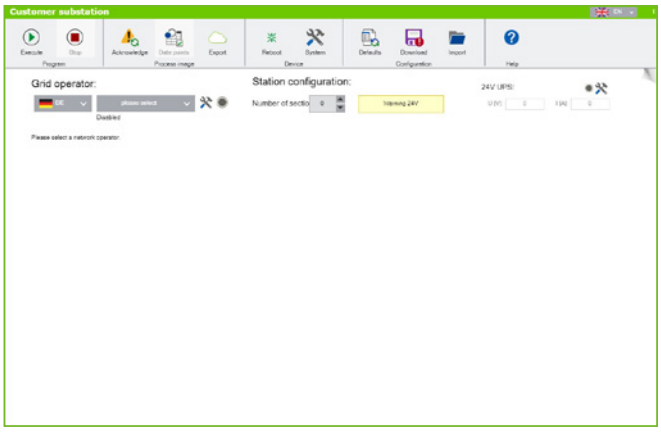
Like all other load customers who draw power from the medium voltage grid, charging parks are also bound by their grid operators' specific technical connection rules (TCRs).
If they feed in more than 135 kWh of renewable energy, the standard stipulates that the system can be regulated using a special feed-in management system. If decentralized power plants are connected, additional protective devices and energy measurement at the grid connection point are required.
New customer substations must be prepared for these requires right when they are constructed, and existing ones need to be retrofitted accordingly. WAGO has developed a hardware and/or software solution for each of these cases: the WAGO Customer Substation application. Many TCRs are already available in the basic version – others can be included upon request. All the required components are combined with the control technology in just one cabinet.

WAGO Application Load Management's capabilities accelerate fast, TCR-compliant expansion of the charging infrastructure. The application supports dynamic load management by controlling energy flows and preventing grid overloads, thanks to intelligent use of the total available energy. The WAGO components this requires can also be integrated later at low cost.
The software solution is connected via telecontrol technology and features a low-threshold visualization.

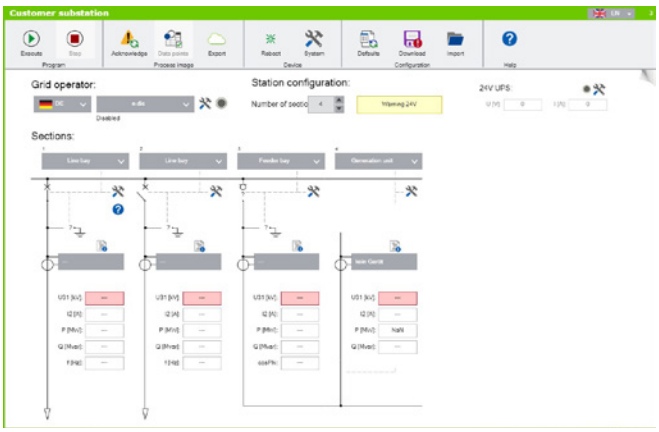
If dynamic load management is relevant for the grid operator, this visualization can be extended to the customer substation. Operators can generally access data from the customer substation via a telecontrol gateway. In the future, battery storage systems will offer promising opportunities for energy services, helping compensate for fluctuations in the grid as these become more and more dynamic.
WAGO represents a single-source provider that offers planning and implementation of the automation and required control cabinets – while also accounting for grid all operator requirements.

The Benefits for You:

- Standards-compliant communication of customer systems with the regional grid operator (control system)
- Determination and monitoring of measured values
- Automatic mapping of data points according to grid operator's TCRs
- Direct marketer interface available
- Communication templates stored for easy configuration
- Optionally, data can also be transmitted to a cloud (MQTT)



Simply select the specific grid operator's technical connection conditions (TCRs) from the drop-down menu. The data points the TCRs require are stored automatically.



Easy station parameterization according to customer requirements

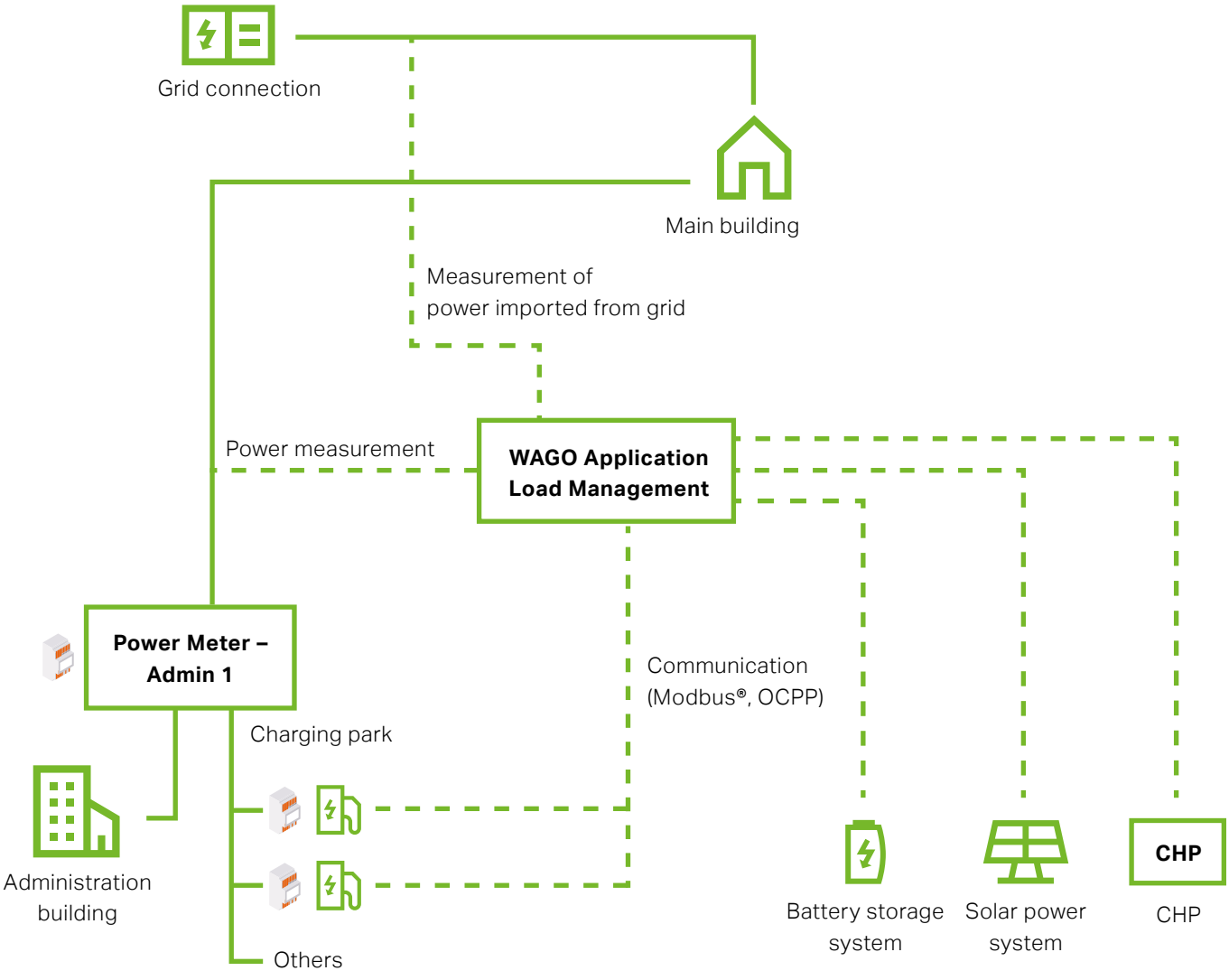
Learn more in the video and view the detailed list of grid territories!

Example of a ready-made control cabinet solution with grid and system protection

Pre-configured control cabinet or custom solution

Application Example – Dynamic Load Management

The focus of this application is dynamic load management of charging infrastructure: WAGO Application Load Management, which establishes a connection to the feed-in suppliers, the grid connection and the storage system, as well as all defined load groups. The main building is divided into two load groups: the administrative building and the charging park.
The application allows targeted determination of consumption for each load group, so a precise amount of energy can be allocated to the charging park, for example. In addition, renewable generation systems like solar power systems and CHPs can be integrated seamlessly into the application to ensure an optimized energy supply.
Including the MID meters allows precise allocation among third-party suppliers and further calculation of energy flows. It also allows flexible adaptation to the specific conditions, so dynamic load management can forward limiting values to predefined loads, such as the charging infrastructure, and regulate them accordingly.
In addition, the application offers the option of implementing specific charging rules, for example, charging exclusively when there is a solar surplus, or basing charging on the exchange price to ensure a cost-effective energy supply and conserve resources.



Customer Applications

Enercity

Hanover, State Capital of Lower Saxony, Promotes E-Mobility

Hanover is promoting e-mobility. Together with their partner enercity AG, they have created a dense network of charging stations in recent years.
The HAJ airport is following suit: the number of charging points will total 72 once the project is completed. To build them, the airport is also drawing on the successful collaboration with enercity. There are quick charging points in the outdoor area in front of the terminal and charging points in the parking garages. These are mainly used by business travelers, who, after traveling all day, want to head home with their vehicle fully charged.
Dynamic load management and innovative technologies from WAGO ensure smooth operation. Learn more about the planning, the launch and security aspects of a challenging project that underscores the importance of e-mobility in Hanover.

www.wago.com/global/energy/customer application-energy-technology/customer-application-haj

Charging Park at WAGO

E-Mobility at the WAGO Site

Learn how WAGO has focused consistently on e-mobility since 2021 and revolutionized its fleet of company cars with its “Green Car Policy.” With electric vehicles accounting for more than 72 %, the company is setting a remarkable standard of sustainability. Join fleet manager Dietrich Schlichter on his mission to create a low-emissions fleet and discover the key role played by WAGO Application Load Management, supported by WAGO’s dynamic load management. The integration of energy sources like solar power generation and intelligent energy management provide the foundation for sustainable operation. Learn how a trainee project and innovative functional expansions are optimizing communication with the charging infrastructure. The openness to different charging stations from various manufacturers guarantees the interoperability and brand-openness of WAGO’s approach. Immerse yourself in the experiences, challenges and successes that have shaped WAGO’s path to e-mobility, and get a glimpse of the future of sustainable mobility at WAGO.

www.wago.com/global/energy/e-mobility/customer-application-the-signs-point-to-electricity

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