ElaadNL

Providing insight, accelerating and better utilizing available grid capacity

Mobility and energy transition assignment

- Accelerating electrification and relieving pressure on the electricity grid
- Investments of very large scale and social importance

ElaadNL support DSOs by:

- Insight, investment security, and system resilience
- From construction to improved utilization: flexibility and control
- Accelerate

Strategic activities ElaadNL

- Data and insights
- Accelerated implementation of charge infrastructure
- Grid-aware charging and OpenADR
- Connected assets and smart homes
- Charging for logistics and construction
- Cybersecurity
- The Test Lab
- Bidirectional charging (V2G/V2X)
- Policy support and vision development

Insights

Combining logistics charging demand with local generation and storage shows strong potential (Jan. 2026)

Researchers at ElaadNL have mapped the potential of Charging Energy Hubs. In these hubs, charging electric vehicles in the logistics sector is combined with local energy generation and storage.

READ MORE ABOUT THIS RESEARCH (DUTCH)

Insights: outlooks

ElaadNL Outlooks

In the Outlooks, ElaadNL looks ahead to expected developments in electric mobility and their impact on the electricity grid. Below you'll find the editions published in recent years.

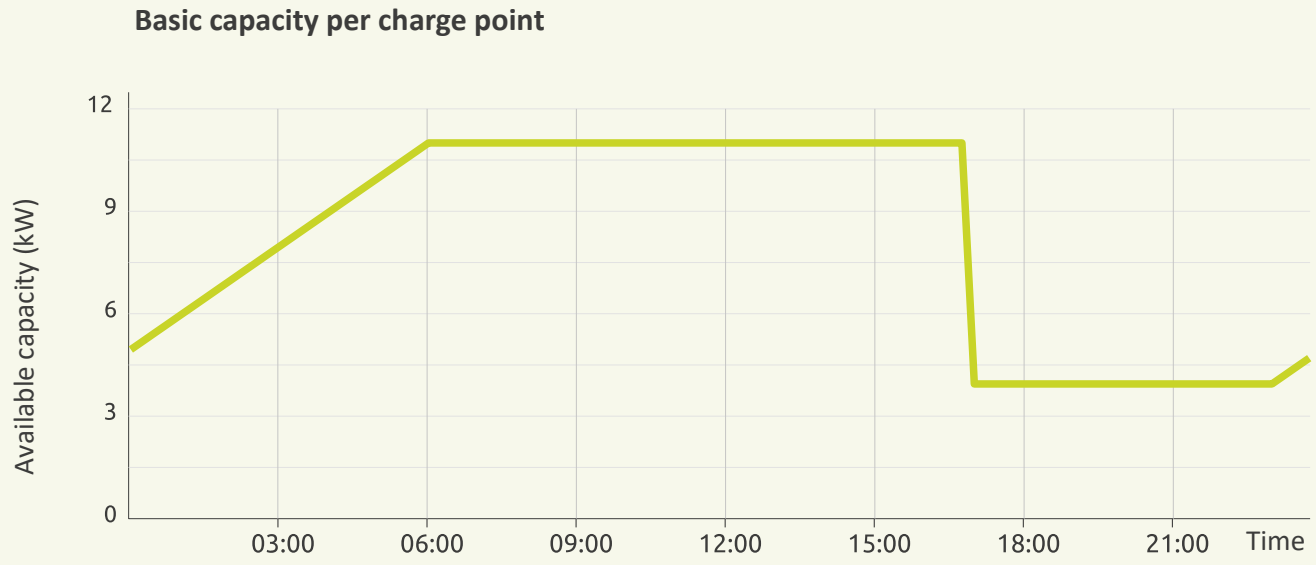
- Charging Energy Hubs: combining logistics charging demand with local renewable energy (Q1 2026)
- Logistics Outlook – 2025 Update (Q1 2025)
- Construction & Charging Outlook – ZE Construction Update (2024)
- Electric driving for everyone – Passenger Car Outlook update (Q1 2024)
- Conventional and grid-aware charging (Q1 2023)
- Business parks in transition – electrification of vans and trucks on business parks through to 2050 (Q2 2022)

Accelerate

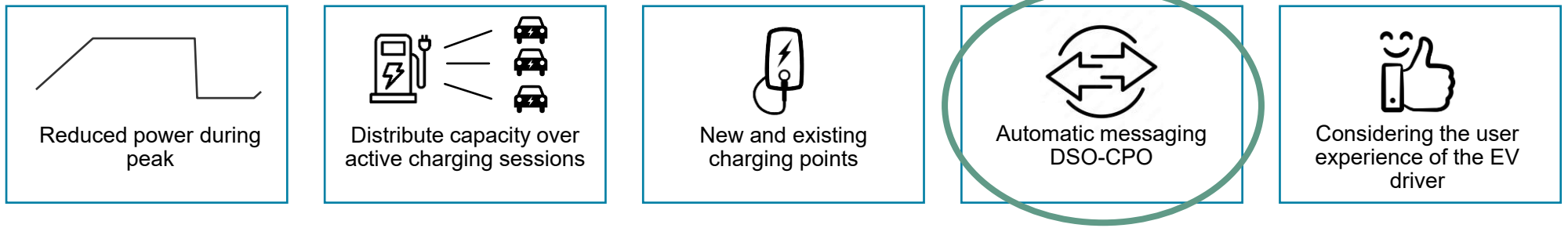
ElaadNL Innovation

Interoperability through open standards
Cybersecurity
Power Quality

Grid Aware Charging with OpenADR



Grid Aware Charging with OpenADR



Based on the 'Grid-aware Charging Guidelines' (May 2024):

- Reduce available capacity when and where necessary
- Capacity framework for charger clusters
- Minimum guaranteed capacity
- Agreements between DSOs and CPOs in a capacity-limiting contract

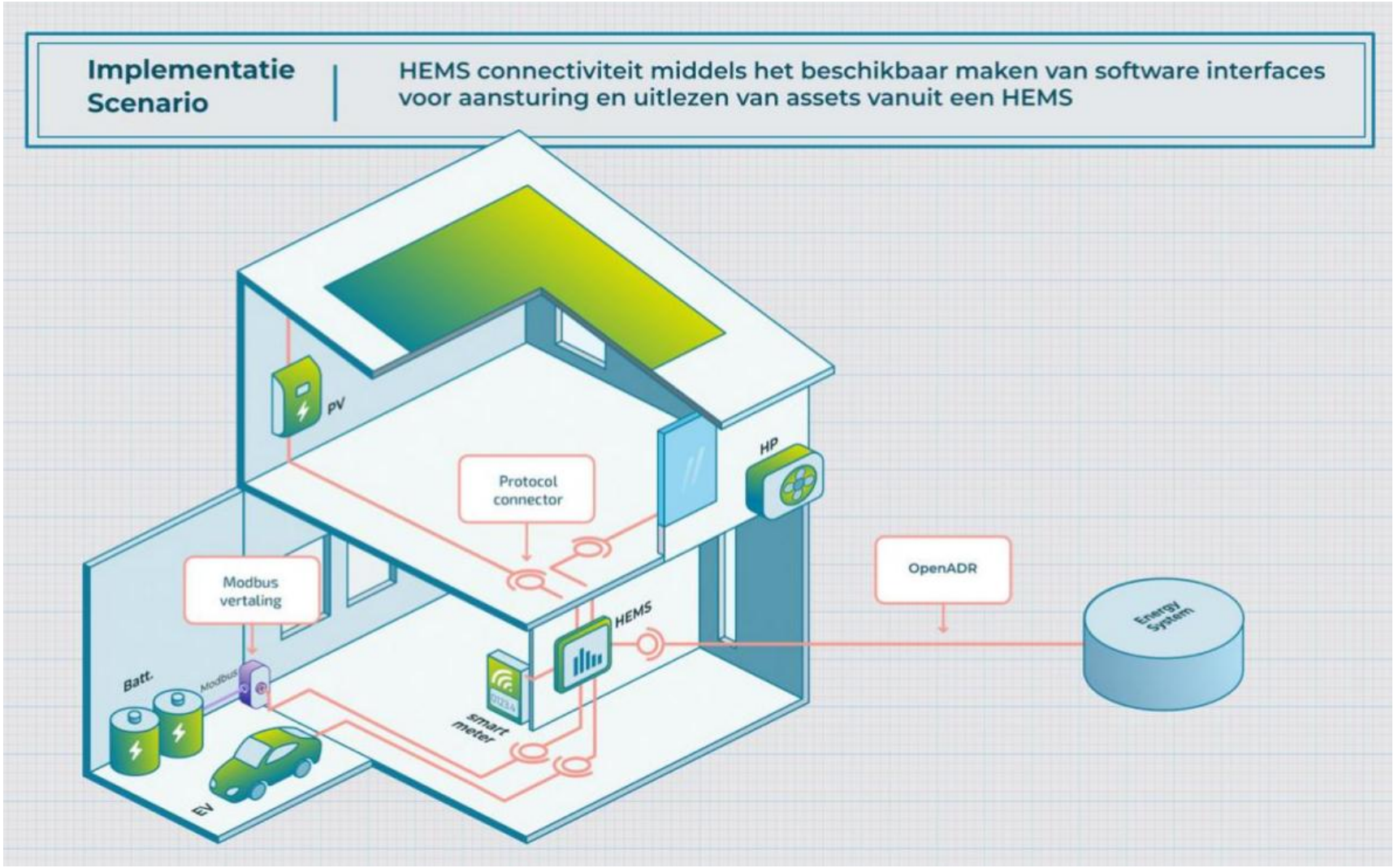
Residential flexibility

- 26 different communication protocols and methods
- The most commonly used protocol in homes is Modbus (RTU/TCP), but implementations vary by vendor and project, meaning connectivity exists without a shared semantic language.
- Interoperability is essential
- EEBus, Matter, S2, OCPP

Development of open source connectors for future-proof protocols for in-home connectivity

Residential FLEXIBILITY

Residential flexibility



Logistics & construction: New MV grid contracts

Non-firm Connection and transport agreement

Only right on transport capacity if it is available on the grid.

Lower tariff than usual.

The discount can be up to 50%.

Alternative transport right based on duration

Agree to use less than a maximum of 15% transport capacity during peak times. HV level.

50% discount on the regular rate.

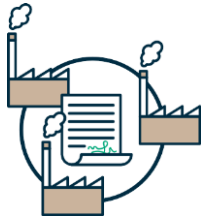
Alternative transport right based on time blocks

Agree to use the grid only at pre-agreed times. MV level.

The discount on the tariff depends on the actual capacity you have purchased and the associated tariff category.

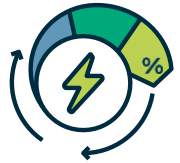
The discount can be up to 50%.

Group- transport agreement



In a Group Transport Agreement, a group of companies jointly requests a specific amount of power from the grid operator. They coordinate among themselves how that power is distributed.

Companies and grid operators experiment with this under the collective name 'Energy Hubs'.



The more optimal the distribution, the greater the chance of a rate advantage.

Logistics & construction: New MV grid contracts

SEMS

SEMS forms the connecting layer between charging infrastructure, stationary storage (BESS), bidirectional charging (V2G/V2X) and grid capacity constraints.

- Technical Operation and Optimization
  - Research into the optimal use of SEMS for grid congestion relief.
  - Field validation of SEMS in combination with:
    - Smart charging (heavy-duty)
    - Stationary batteries
    - V2G/V2X
  - Optimization of control logic for multimodal charging and energy management.

- Interoperability and Standardization

(EV) Cybersecurity

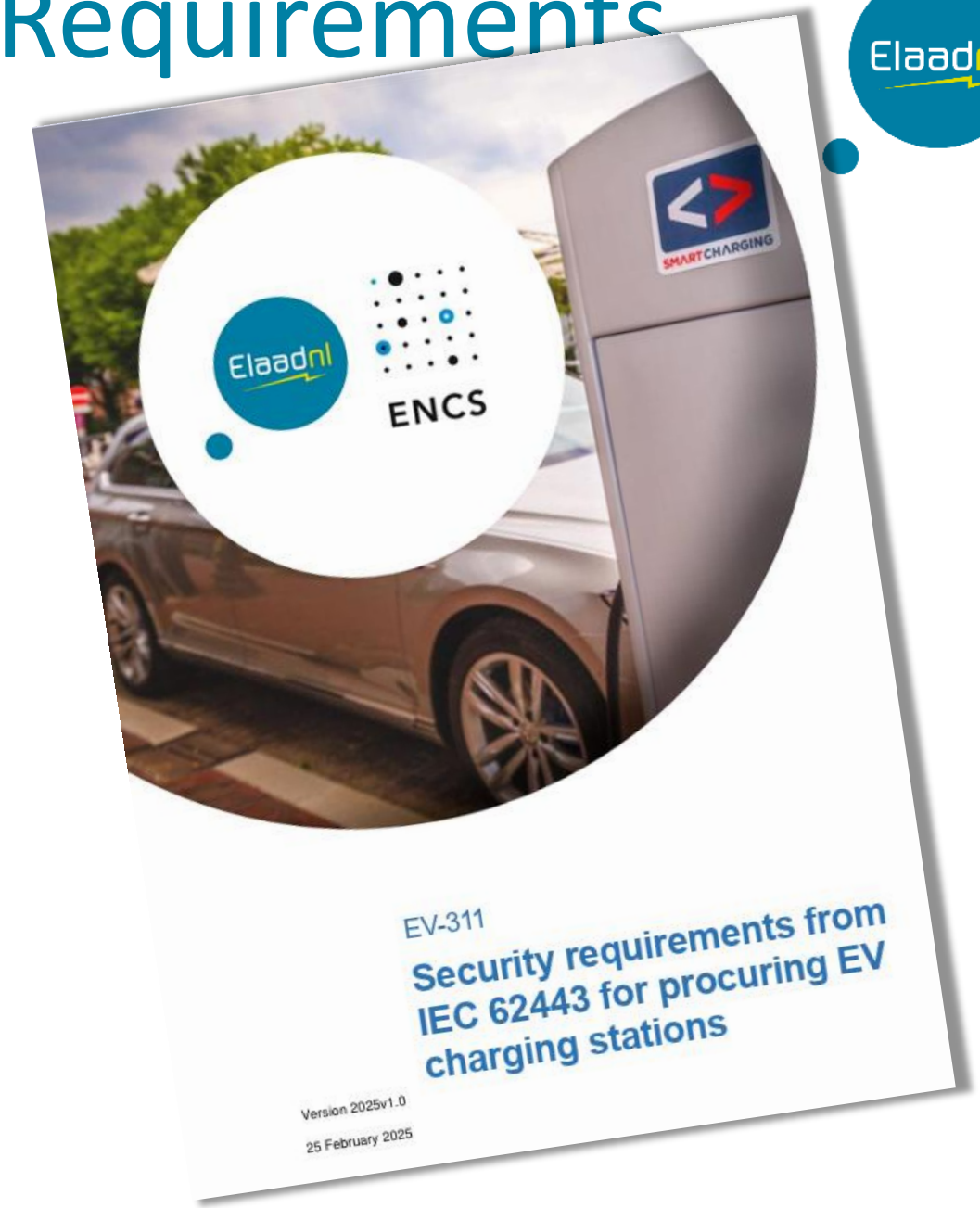
- Grid operators have implemented robust risk management systems, including those for cybersecurity risks (e.g., ISO-55001, ISO-27001).
- These management systems work well for assets owned by grid operators, such as substations and SCADA systems for control centers.
- Charging stations are not owned by DSOs or TSOs, but large-scale hacking does pose a risk to their networks.

- Further development and management of joint cybersecurity requirements for charging infrastructure
- Application of these requirements in inspections and validations
- Ensuring cybersecurity in legislation and regulations
- Development of an integrated, applicable certification system

ENCS/ElaadNL Security Requirements

The EV charging security requirements are available:

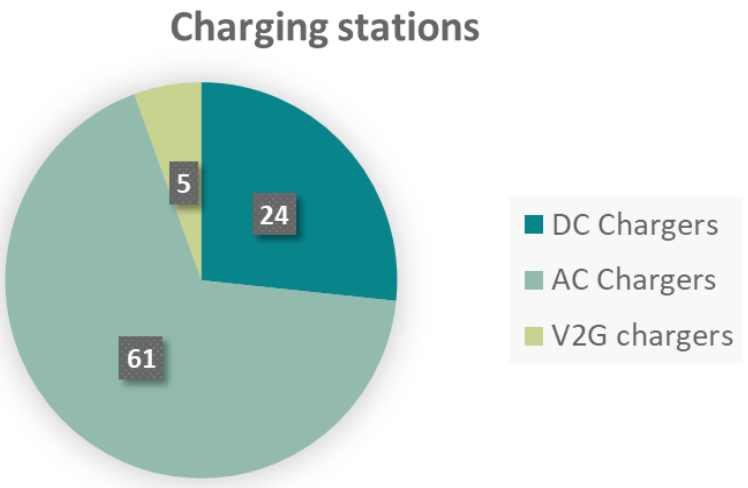
- Free of charge via ENCS: https://encs.eu/resources/security-requirements/#electricvehiclecharging
- Ready to use, it saves manufacturers and buyers time and resources in developing robust cybersecurity requirements.
- Creates a level playing field by providing a common, agreed-upon minimum set of cybersecurity requirements.



ElaadNL testlab

- Open test lab aimed at improving grid integration of e-mobility and grid-intensive devices
- Focus on interoperability, controllability, power quality, grid codes, and cybersecurity
- Pre-certification, pre-normative, field testing
- Specific advice for manufacturers, general findings for grid operators, and development of standards and certification

- Focused on scale, both in terms of capacity and number of (simultaneous) tests.
- Various types of AC, DC, and V2G chargers, heat pumps, (home) battery systems, and PV inverters.
- Visited by all types of EVs, including trucks, construction vehicles, buses, and even aircraft.
- Various measurement and test setups, including a 360 kW bidirectional test system with grid emulators.



PQ challenges: Gridaware norming

EVs (SEs) and grid-intensive equipment can cause power quality disruptions. We provide insight into these disruptions and mitigate them through grid-aware standards.

Much attention to grid capacity, limited attention to grid quality.

The grid operator is also responsible for grid quality. There are clear indications that quality disruptions are increasing due to more active components (inverters) in the grid. Grid-aware standards provide direct insights for grid operators, manufacturers, and standards committees.

What happens if we don't?

(Supra)Harmonic distortions shorten the lifespan of grid operators' assets, generate additional noise, and potentially disrupt/defect their equipment. There is an increase in these distortions on the electricity grid. Further research is needed to understand this trend and prevent further deterioration.

Questions?

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