Exchange experiences on controlled and bidirectional charging

Marisca Zweistra

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056874

SCALE in a nutshell

- **Mass deployment of electric vehicles** and the accompanying smart charging infrastructure.
- **User-centric approach**, systematically collecting knowledge, removing existing acceptance barriers and developing solutions.
- Open system architecture for smart charging & V2X which ensures **interoperability**, connectivity, the openness of the system and **fair market conditions.**

The overall goal is to reduce the need for grid reinforcement, leveraging the existing grid better.

- **Smart charging and V2X testbeds** across seven countries to bring standards, protocols, tendering and infrastructure to the next level
- **V2X Alliance**

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29 Partners across Europe

OEMs	ABB, Renault, Polestar, Hyundai, VDL
E-mobility fleet & software	We Drive Solar, Current, eMobility Solutions, GoodMoovs.com, enervalis, dbh Serviced Office
Research & knowledge institutes	Chalmers University of Technology, FIER Automotive & Mobility, CERTH Centre for Research & Technology Hellas, Utrecht University, RI.SE, UEMI, Elaadnl, Rupprecht Consult Forschung & Beratung GmbH, Trialog, bayern innovativ
Cities & associations	Gemeente Utrecht, AVERE The European Association for Electromobility, Norsk elbilforening, POLIS Cities and Regions for Transport Innovation
DSOs & TSOs	LVN, Enedis L'électricité en réseau, Equigy crowd balancing platform

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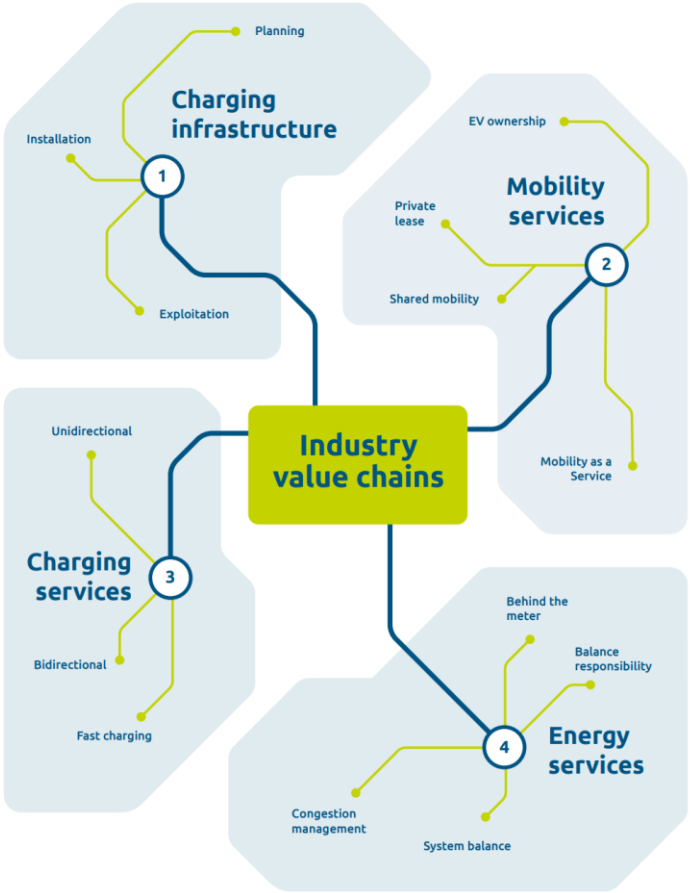
Results & Outcomes



D1.1 - Report on consumer behaviour (1st edition)	Download 1 MB
D1.1 - Report on consumer behaviour (2nd edition)	Download 429 KB
D1.2 - Stakeholder Analysis	Download 4 MB
D1.2 - Short Read - Stakeholder Analysis of smart charging ecosystems	Download 1 MB
D1.3 - Report on city needs & challenges in integrated planning for smart charging and V2X services	Download 9 MB
D1.5 - Analysis of hard- and software requirements	Download 1 MB
D2.2 - Specifications and IT Use-Case definition for V2X services	Download 1 MB
D3.1 - Use Case set-up reports	Download 4 MB

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https://scale-horizon.eu/publications/

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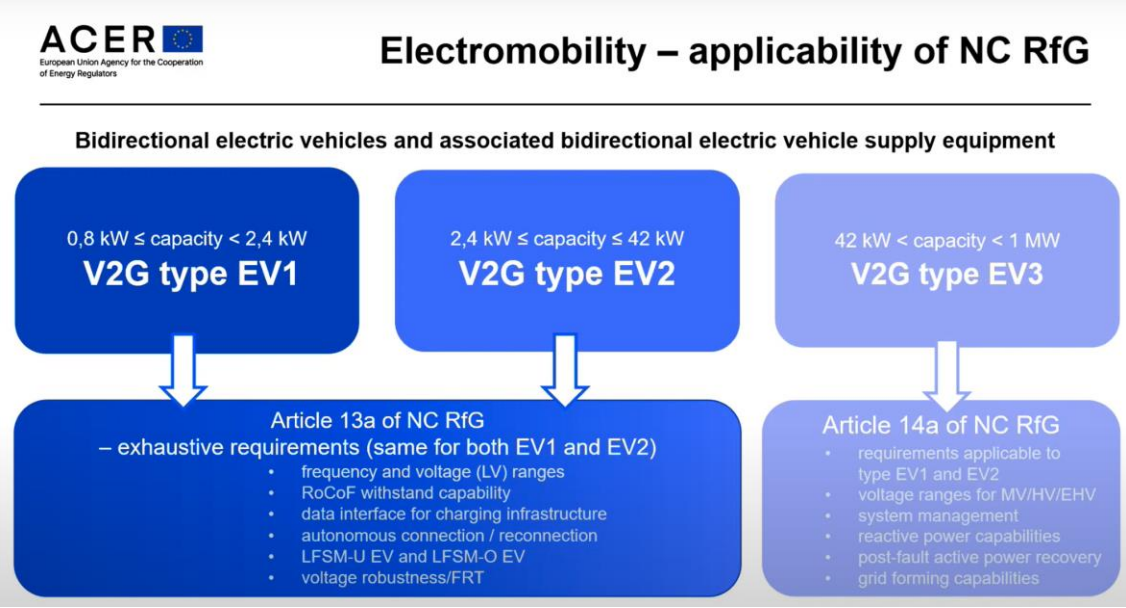
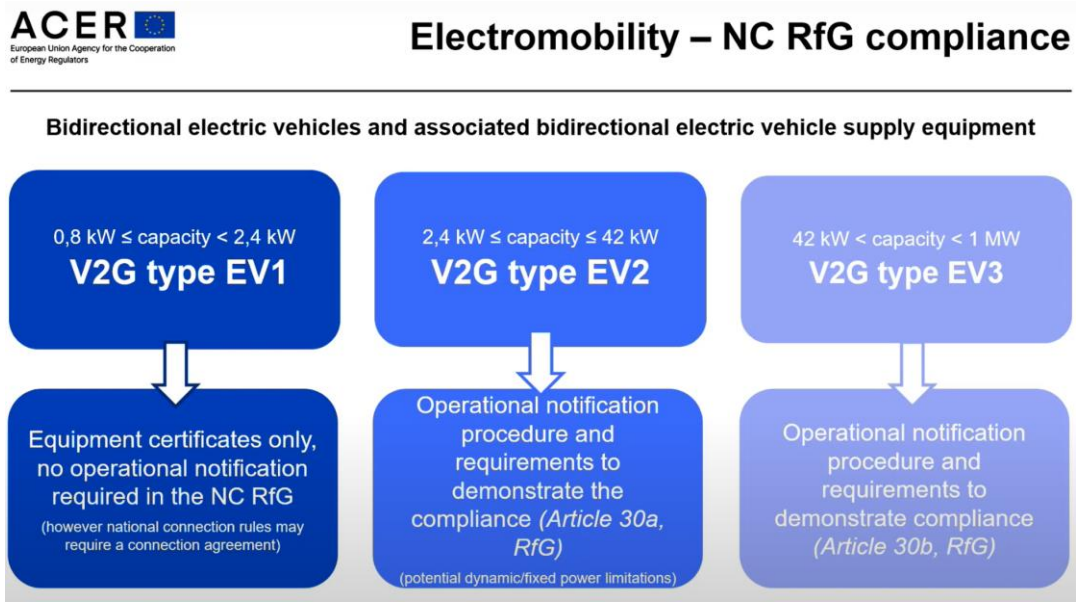
RfG Regulation

RfG Regulation - By the end of 2023 ACER submitted to the European Commission proposed amendments to the network code on requirements for grid connection of generators which establishes common standards that generators must respect to connect to the grid.





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https://acer.europa.eu/electricity/connection-codes

ACER webinar on amendments to the European electricity grid connection network codes - YouTube

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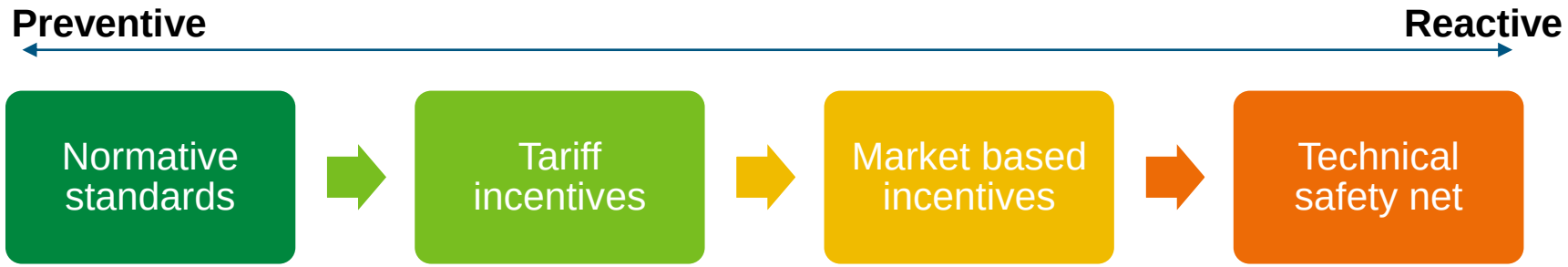
DSO perspective: Sequence for optimizing power grid usage and maintaining safety & quality



Setting standards & adjust net codes
to guarantee devices are flexible, like smart and bidirectional charging ready vehicles and chargers

Adjusting the LV tariff system
to give customers incentive to use the power grid at the right times

Prevent overload of power grid
with market-based incentives (day-ahead/intraday)

Direct intervention
to prevent local power outages, as a last resort

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Pilot example: Utrecht

Goal: Create a virtual power plant (VPP) with

- **650 AC-bidirectional charging stations**
- **3.000 shared cars**
- **25 IONIQ 5 with V2G-technology**

The virtual power plant will:

- **Maximize utilization of renewables by EV's**
- **Minimize charging cost via Time-of-use price**
- **Support Power Grid by**
  - **Congestion services**
  - **Grid balancing services (via Day Ahead / FCR / AFRR)**

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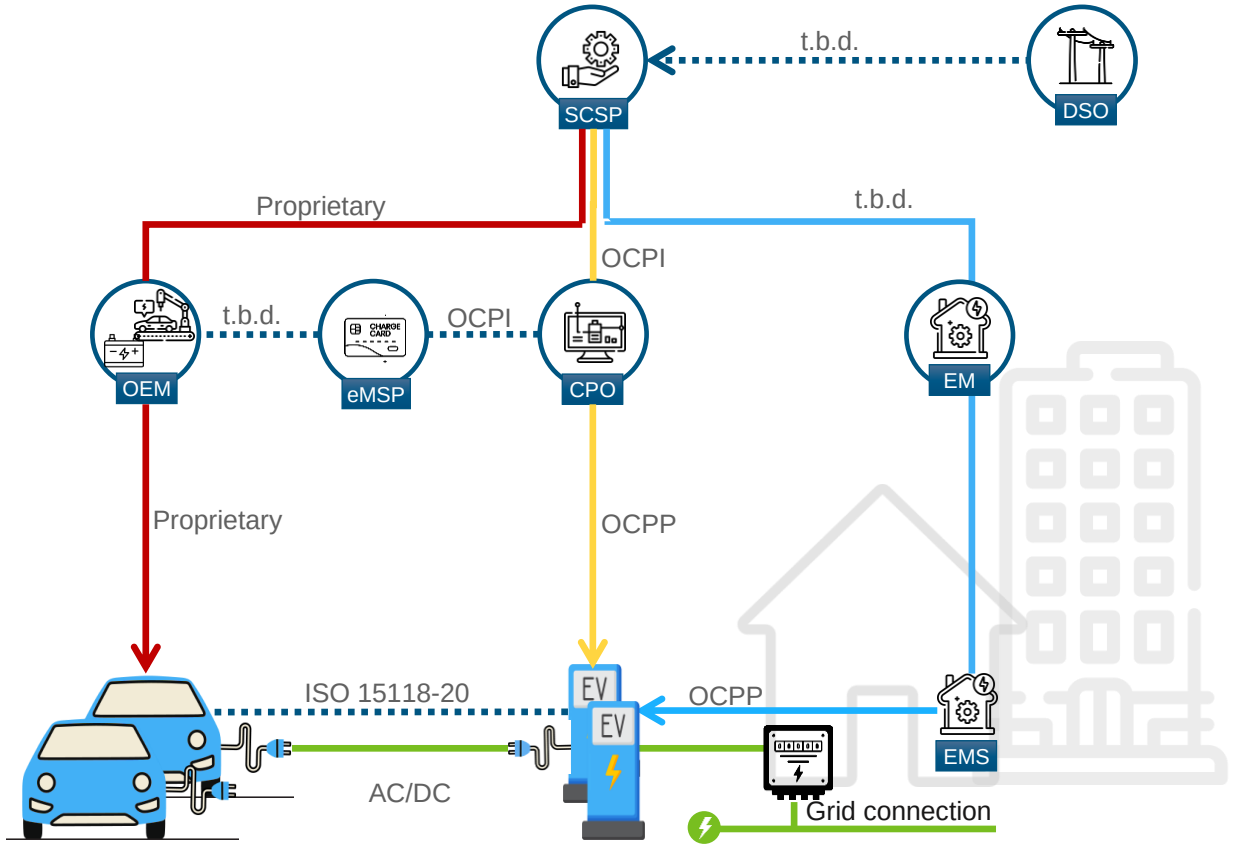
Common protocols between actors and assets



	Power
	Car centric
	Charger centric
	Site centric
	(Other) information/data exchange
OEM	Vehicle manufacturer (OEM)
eMSP	E-Mobility Service Provider
CPO	Charge Point Operator
EM/EMS	Energy Manager / Energy Management System
SCSP	Smart Charging Service Provider.
DSO	Distribution system operator (grid operator)

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150 vehicles to be tested

- ISO 15118-20
- General set-up
- Certificates
- EIM charging vs Plug & Charge
- Smart (dis)charging
- Power Quality (Emissions & Immunity)
- Grid codes

RfG NC ISO 15118-20:2022

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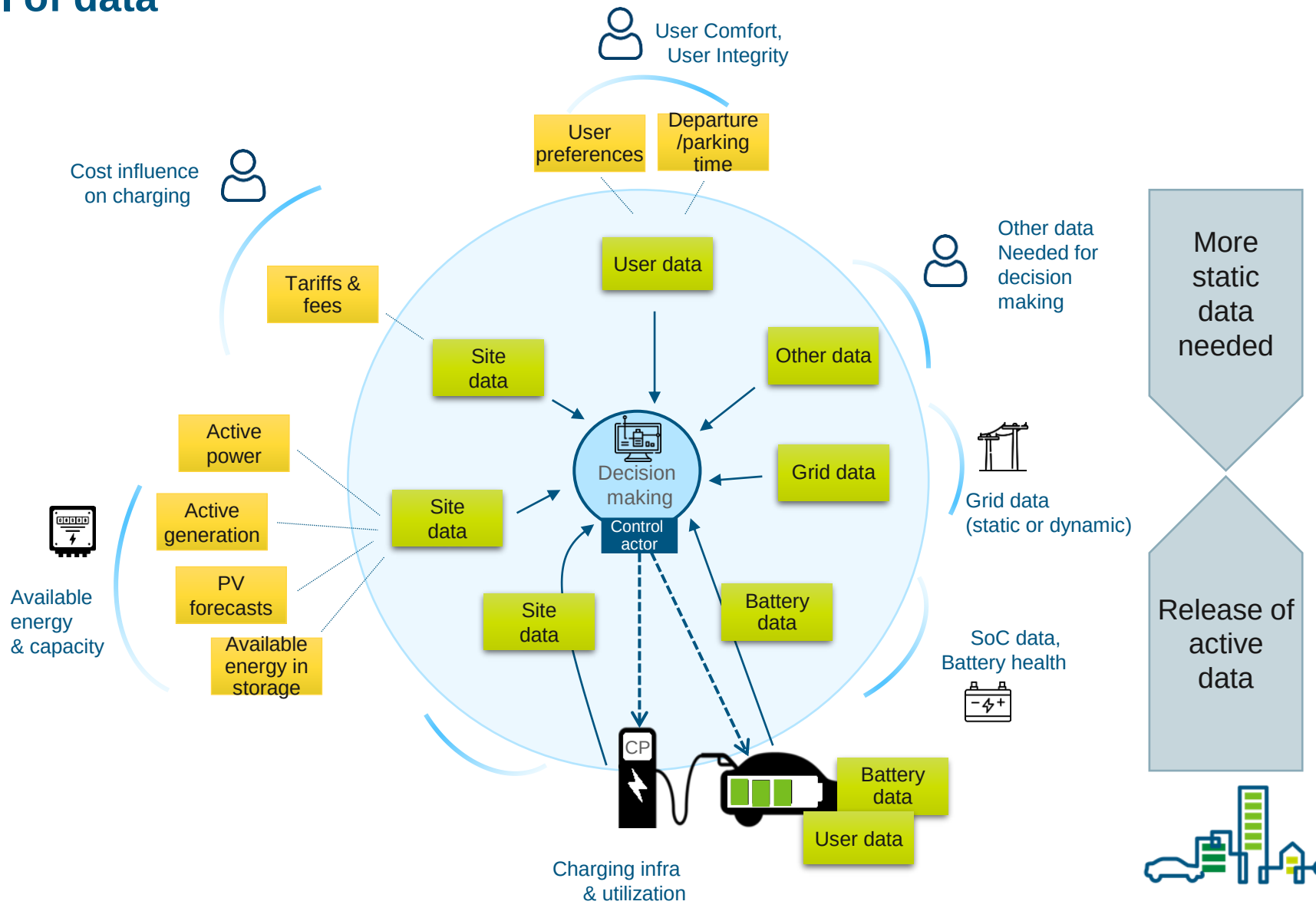
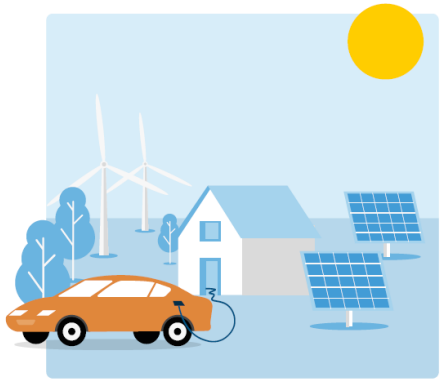
Control of data



Analysis of the behavior and costs of 100,000 customers with dynamic prices



Smart charging of the electric car at home: 61% lower charging costs

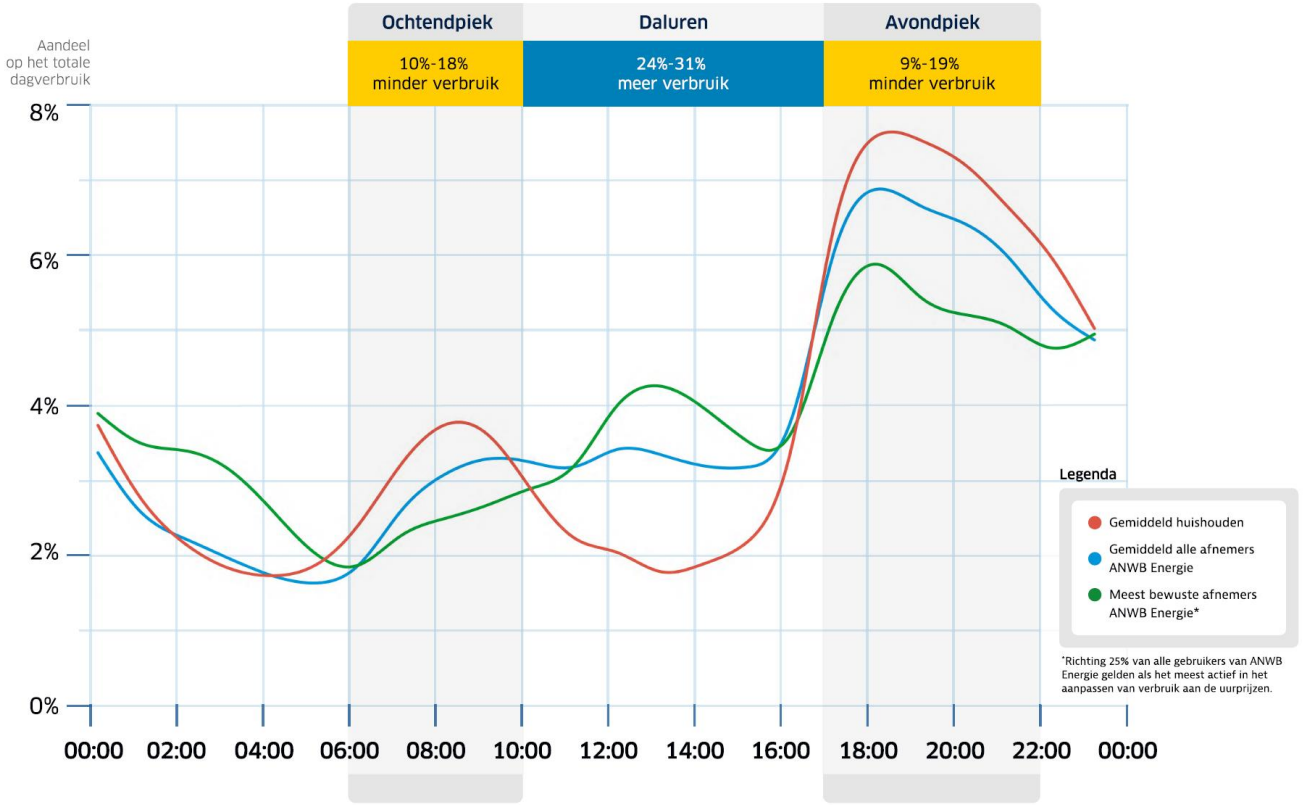
Users can save up to **€730* per year** on their charging costs. This leads to up to **61% lower cost** compared with a fixed or variable contract.

Contact type and situation	Average cost Per charge session	Annual costs
Fixed or variable prices	€ 26,68	€ 1.200,60
Fixed or variable prices + PV	€ 26,18	€ 1.178,10
Fixed or variable prices + PV + SC	€ 25,65	€ 1.154,25
Dynamic prices	€ 23,59	€ 1.061,55
Dynamic prices + PV	€ 23,18	€ 1.043,10
Dynamic prices + SC	€ 12,48	€ 561,60
Dynamic prices + PV + SC	€ 10,46	€ 470,70

*O.b.v. Volkswagen ID.3 58 kWh, € 0,40 per kWh vast of variabel (prijsplafond), een eigen laadpaal (11 kW), 15.000 kilometer per jaar, 10 zonnepanelen en 15% laadverlies.

*Based on Volkswagen ID.3 58 kWh, € 0.40 per kWh fixed or variable (price cap), own charging station (11 kW), 15,000 kilometers per year, 10 solar panels and 15% charging loss.

Customers use up to 19% less electricity during the more expensive peak hours than an average Dutch household and use up to 31% more cheaper electricity during the day.



https://www.anwb.nl/over-anwb/nieuws/2023/oktober/anwb-energie-bewuster-gebruik-door-dynamische-uurtarieven

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Thank You!

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