EV charging flexibility and integration to the energy markets
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Connect with Glenn
The EV charging platform of choice for large-scale EV Charging Providers
Trusted by customers worldwide

120+ Customers
65K+ Charge Points
4.6M+ Charging Sessions in 2022
90+ Team Members
16M EUR in funding in 2022 ensures we will keep growing with our customers.
We cover all charging use cases

- Single-family homes
- Multi-unit dwellings
- Workplace charging
- Destination charging
- On street charging
- Fast charging
- Fleet charging
AMPECO and OpenADR

Utility Systems
- Logic defines when and where to call events or send price signals

OpenADR VTN
- Registers VEN's and sends/receives Open ADR messages

VEN
- Receives VTN communications and passes through to device controls systems

Device Control System
- Controls individual devices

Controlled devices shift energy
- EV Chargers
- Batteries
- Lighting
- HVAC
- Water heaters
- Heat pumps

Utility / grid operator, or load aggregator acting on their behalf

Translation between existing system and OpenADR

Translation between existing system and OpenADR
Partner (API) integrations bring ecosystem benefits
## EV charging interoperability aspects

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Standards/Protocols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charger-to-EV</td>
<td>ISO15118-20</td>
</tr>
<tr>
<td>Charger-to-charger network</td>
<td>OCPP 1.6J, 2.0.1</td>
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<tr>
<td>Charging network-to-charging network</td>
<td>OCPI 2.1.1, 2.2.1</td>
</tr>
<tr>
<td>Charging network-to-grid</td>
<td>OpenADR, IEEE2030.5 or similar</td>
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Levels of grid integration

**Level 1 - V1G Controlled Charging**
- EV and EVSE are compliant with the local requirements, guidelines and regulations.
- This level only considers charging events from grid to EV.
- The charging power is below thresholds, requiring controllability/ load management by the DSO.

**Level 2 - V1G/H Cooperative Charging**
- The charging event can be influenced regarding the charging power and can be shifted in time remotely by DSO (with highest priority), CPO, EV user, EV or home energy management (HEM).
- The EV is capable to wake up for defined start/stops.
- Reaction timings are defined.
- EV/VSE, HEM consider variable power settings.

**Level 3 - V2H Bidirectional Charging**
- EV and EVSE negotiate a charging profile based on various drivers (monetary incentives or grid constraints) mainly w/o user interaction (also aggregation, tariff tables etc.
- Mobility need taken into account
- Aggregation(local, per charging spot)

**Level 4 - V2G Aggregated (bidirectional) charging**
- The EV and the EVSE fulfill functions that go beyond the customer’s own energy system (bidirectional energy transfers, aggregators qualification, full balancing market services, economic interests of the EV owner).
- Supports in front of the meter (FTM) use cases
- Supports behind the meter (BTM) use cases

- Various local regulations per country (e.g. grid codes, IEC61851-1, IEC 60364 series, ...)
- Local regulations EV and EVSE
- PMW signal, IEC 61851
- DIN SPEC 70121 (for DC)
- EVSE and grid (utility, CPO, ...)
- OCPP 1.6
- Demand-response
- Opt-out possibilities

- Local regulations EV and EVSE
- ISO/IEC15118 Ed1
- Telematics
- EVSE and grid
- OCPP 1.6
- See level 1
- TSI

- Local regulations EV and EVSE
- ISO/IEC15118-20
- EVSE and grid
- See level 2
- EBus
- Many requirements still missing

- Local regulations EV and EVSE
- See level 2
- EVSE and grid
- See level 3
- Many requirements still missing

EV = electric vehicle, EVSE = electric vehicle supply equipment, DSO = distributed system operator, CPO = charge point operator
Energy markets integration
Static scheduling examples

- Schedule is set by the EV Driver (usually) or via the operator (rare)
- Usually takes into account peak, off-peak, shoulder
- In UK - predefined hours by the regulators as a default setup for all charge
- In Israel - different prices during time of day and varies during period of the year
**Agile Tariff for EV Charging**

- AMPECO reads pricing data via API every day for next 24h
- EV Driver sets preference based on price threshold
- AMPECO platform modulates the charging process based on the set parameters
- EV Drivers benefits directly via reduced energy bill
Schedules based on ToU tariffs
Day-ahead & Intraday rates

- AMPECO partnering with NordPool in Europe
- Day-ahead dynamic electricity rates via API
- AMPECO ability to auto-optimize charging at lower costs
- Network operators using AMPECO platform can bill EV Drivers based on market price + markup
- Becoming the norm in the Nordics - Denmark, Sweden, Norway and the Baltics
Let’s connect!

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LET’S CONNECT
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