THE MOBILITY HOUSE
Energy

Facts on Vehicle-to-Grid (V2G)

Zero Emissions, Zero Cost

Bidirectional Charging allows an electric vehicle - unlike conventional charging - not only to draw energy but also to feed stored energy back into the public grid via the charging station.

Vehicle-to-Grid (V2G) is an advanced form: Energy from the vehicle battery is not only returned to the grid but can actively participate in the energy market. This turns the vehicle into a mobile energy storage unit that can provide energy to the grid when needed or absorb excess energy.

This is crucial for a future consistent supply of renewable energy, as:

- EV batteries provide the necessary flexibility to balance fluctuations in the power grid caused by the weather-dependent feed-in of solar and wind energy.
- This facilitates the integration of renewable energy sources: price spikes on the electricity market are smoothed out, the merit order functions more efficiently, and expensive fossil-fuel-based peak-load power plants are used less frequently.

The potential of the technology is evident in this example:

2025

100 GWh storage capacity
The storage capacity of approximately 1.65 million Battery Electric Vehicles (BEV) approved by the end of 2024 in Germany exceeds that of all German pumped storage power plants built in the last 150 years (40 GWh) twice with over 100 GWh.

2030

15 times as much storage capacity
With an estimated 10 million BEVs by 2030, there would already be 15 times as much storage capacity available. These vehicle batteries could therefore, supply all German households with electricity for one night - electricity that was charged during the day using solar power - and they would not even be half discharged.

What benefits does it offer to the energy system?

- **Energy system stability:** In the electric energy system, electricity generation must be in line with electricity demand. Flexibility is required in both directions. V2G-capable electric vehicles can feed energy into the grid when demand is high and absorb energy from the grid when demand is low, thereby improving the stability of the energy system.
- **Integration of renewable energies:** The ability to charge and discharge vehicle batteries facilitates the integration of wind and solar energy, balancing their fluctuations in energy supply. This reduces the need to start up fossil gas or coal-fired power plants, resulting in significant CO_2 savings.
- **Reduction of peak loads:** Electric vehicles can pause charging during peak load times or even feed energy back into the grid to help meet demand. This reduces the need for grid expansion and the construction of conventional power plants. Additionally, grid expansion and redispatch costs can be significantly reduced through intermediate energy storage, thereby lowering overall electricity costs and grid fees.
- **Economic savings potentials:** Vehicle-to-Grid (V2G) can reduce electricity costs by lowering the need for expensive peak-load power plants and costly grid interventions such as redispatch - especially when large amounts of renewable energy are being fed into the grid. This not only eases the burden on the power grid but also benefits the overall economy. Stationary battery storage projects are currently expanding rapidly for precisely these reasons.
- **Self-consumption optimization with V2G and V2H:** V2H (Vehicle-to-Home) enables electricity from the vehicle battery to be used directly in the household - similar to home battery storage systems - for example in the evening when the sun is no longer shining. This allows self-generated energy (e.g., from a PV system) to be optimally stored and consumed. V2G (Vehicle-to-Grid) also supports self-consumption optimization by intelligently distributing surplus electricity between the vehicle, home, and the power grid. Both technologies help reduce energy costs, relieve pressure on the grid, and improve the integration of renewable energy sources.

Status Quo:
Automotive industry
Charging Hardware Manufacturers

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Where do we stand in 2025?

- **European level: RED III & AFIR:**
  - Renewable Energy Directive (RED III) in Article 20a calls on member states to ensure equal competitive conditions („level-playing field“) and to enable non-discriminatory participation of small and mobile energy systems in electricity markets. Member states are required to implement this provision by May 21, 2025.
  - Alternative Fuels Infrastructure Regulation (AFIR) sees the systemic benefits of bidirectional electric vehicles and, in Article 15, calls for a regular assessment of the extent to which (V2G) contributes to reducing system costs and increasing the share of green electricity in the energy mix. Based on this evaluation, member states must derive specific measures (such as support programs) to improve the availability and geographical distribution of bidirectional charging points.
- **Automotive industry & charging station manufacturers:** : In October 2024, Renault launched its first customer offering in France with the Renault 5, while BYD partners with Octopus Energy in UK. Volkswagen vehicles already support bidirectional charging, and many others - including BMW, Mercedes, Citroën, Hyundai, Kia and almost all Chinese manufacturers - have announced similar capabilities. The first wallbox manufacturers (Mobilize, Ambibox, E3/DC) are already offering bidirectional charging stations.
- **Aggregation and commercialization:** Technology companies, such as The Mobility House Energy, are specializing in the aggregation and commercialization of decentralized fleet of EVs and their specific characteristics - including customers' mobility needs, compliance with grid operator requirements, and battery warranty conditions set by automotive manufacturers. Energy providers like Octopus and OVO in the UK are already offering the first electricity tariffs tailored to this model.
- **Section 14a German Energy Industry Act (EnWG):** The revision of §14 allows grid operators to temporarily reduce the power consumption of controllable devices such as heat pumps and EV charging stations in order to maintain grid stability. In return, EV owners benefit from reduced grid fees. This approach marks a shift toward smart grids and smart metering. Combined with the **smart charging tariff eyond** from The Mobility House Energy, EV drivers can already save up to €400 per year. With V2G, this value could be significantly increased - up to €800 per year for customers.

Further Reading:

Study „Plugging Into Potential“, Eurelectric & EY (2025)

Whitepaper „V2G Integration in Europe“, FfE (2025)

Whitepaper „Bidirectional Charging - Worth the Hype?“, P3 (2025)

Study „Batteries on Wheels: The Untapped Potential of EVs“, Fraunhofer Institutes ISI & ISE (2024)

Bidirectional Charging - Recommendation from the NLL (GER)

Study „Klimaneutrales Stromsystem 2035“, Agora energy transition (2023) (GER)

Final Report: V2G Funding Project FfE (2023) (GER)

Study „Assessment of the regulatory framework of bidirectional EV charging in Europe“, Smart EN Study (2023)

V2G Projects by The Mobility House

How Renault drivers in France drive for free - while helping to stabilize the power grid

The new Renault models - R5, R4, Scénic, Mégane - are capable of bidirectional charging in France. The Mobility House Energy markets the vehicle batteries on the intraday and capacity markets, generating **€0.11 per plugged-in hour** for customers. With an average of 13 plugged-in hours per day, drivers save around **€40 per month** - effectively allowing them to drive approximately **10,000 kilometers per year for free.** This is made possible by a five-year government exemption. The result demonstrates that Vehicle-to-Grid is practical, economically viable, and relieves both the power grid and household budgets - provided the regulatory framework is supportive.

What needs to be done now?

- ☑ Resolving the dual burden of stored electricity in mobile vehicle batteries, aligning it with stationary large-scale storage solutions.
- ☑ Introduction of smart meters designed to be customer-friendly, uniformly efficient, and digital.
- ☑ Market-driven procurement of flexibility by distribution grid operators in competitive markets and the implementation of dynamic grid fees.

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