

## **Bidi 4 free, or: How the Real Energy Transition Works**

The energy transition is leading to a dramatic increase in the demand for energy storage. In 2023 alone, over 10 TWh of renewable energy were lost in Germany due to a lack of storage capacity. According to Fraunhofer ISE, by 2030, over 100 GWh of battery storage will be needed to balance out energy volatility, but currently, only about 14 GWh is installed.

In the German government's "Masterplan Ladeinfrastruktur II," measures are defined to utilize the flexibility of electric vehicles (EVs) through bidirectional charging (Bidi-Charging). Bidi-charging will enable EVs to act not only as means of transportation but also as mobile energy storage units. Through Bidi-charging, EVs can absorb excess electricity and feed it back into the grid when needed, contributing to grid stabilization. However, attractive incentives for end users will be essential to make this vision a reality.

By 2030, it is estimated that 10 million EVs will be in Germany, with about half potentially being capable of bidirectional charging. With battery capacities ranging from 50-100 kWh, each EV could provide an average of 10 kWh daily for grid stabilization. This could amount to 5 million Bidi-EVs contributing 50 GWh of storage capacity daily, meeting half of the required 100 GWh, in addition to the already installed 14 GWh.

A study by Nobis and Kuhnimhof in 2018 found that about 75% of all cars in Germany are parked on private properties, standing still 97% of the time, of which 84% are parked at home and 7% at work.

Attractive incentives for consumers can be swiftly implemented through the "abacus system": the electricity provider could use the EV's battery to discharge slightly less in the evening than was charged at midday. This would allow the EV owner to drive mostly for free without having to deal with taxation on income from selling electricity. Additionally, users could benefit from reductions in grid fees or operator-specific stability bonuses.

For example, if an EV with 40 kWh in its battery is charged by 15 kWh at noon and discharges 10 kWh in the evening to stabilize the grid, the remaining 5 kWh could be used for free by the owner, equivalent to 12,000 km/year at 15 kWh/100 km.

This system benefits all parties: the electricity provider can stabilize the grid without the need for large-scale energy storage infrastructure, transmission network operators can offer immediately available capacity on the reserve energy market, and EV owners can drive for free. Furthermore, the country can save on subsidies for gas power plants and electric vehicles, as more people would opt to purchase an EV with the prospect of free driving.

Clarifications regarding grid fees, taxes, and surcharges for the 10 kWh used by the EV owner might still be needed to ensure the system's efficiency and promote the increase in EV ownership, which would help stabilize the grid. This would be a far cheaper solution than subsidizing power plants or electric vehicles!

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