Washington
Green Transportation Program
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Vehicle-to-Grid Battery Energy Storage Systems

What is vehicle-to-grid (V2G) technology?

Vehicle-to-grid technology in electric vehicles (EVs) allows energy stored in an EV battery to be returned to the grid to balance intermittent generation and help meet load requirements. Unlike smart charging, which offers no additional benefits to a utility once the vehicle is fully charged, V2G capabilities enable EVs to help balance electrical loads while the vehicle is plugged in.

It's important to ensure that the V2G-enabled EV retains enough energy in the battery so the driver can use the vehicle. Controls are available so the driver can specify a minimum default charge that must be maintained in the vehicle and identify the times when energy can flow from the vehicle to the grid.

V2G capability is estimated to add only $200 to $400 to the price of a vehicle. And V2G chargers can have charging power up to 15 kW.[1]

The amount of electrical energy storage available in EV batteries depends on:

- How many EVs are equipped with V2G technology and
- How many owners are willing to send electricity stored in their EV batteries back to the grid.

Utility V2G programs can encourage more EV owners and fleet operators to participate.

Can energy from an EV battery also be used to meet energy needs in buildings?

Yes. Vehicle-to-building-or-grid allows energy stored in EV batteries to be used to reduce peak building demands and provide energy during utility power outages.

Are at-home Level 2 chargers configured for two-way transmission?

A 10 kW (Level 2) direct current bi-directional charger may cost $4,500 to $5,500. This type of charger is configured for two-way transmission: owners can charge their EV from the grid or sell energy stored in their EV battery back to the grid by bypassing the car's unidirectional onboard charger.[1]

V2G for grid balancing is on the way, with many demonstration projects taking shape across the nation. To attract EV owners to participate in V2G programs, utilities must offer incentives to reduce the total cost of ownership of the vehicle.

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[1] EV Industry Blog. "Everything You Need to Know About Vehicle-to-Grid (V2G)." February 1, 2023.

WASHINGTON STATE UNIVERSITY
Energy Program

Green Transportation Program
Washington State University
Energy Program
905 Plum Street SE
P.O. Box 43165
Olympia, WA 98504-3165

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Updated May 2025. Content developed by Gil McCoy, principal, and Melinda T. Spencer, technical education