



Building a better working world

Can EVs become mobile energy distribution systems?

The better the question. The better the answer. The better the world works.

Vehicle to Everything (V2X)

Vehicle to Everything (V2X) operates on the principle of smart charging and bidirectional power flows. V2X encompasses available options including V1G (Unidirectional Smart Charging), V2G (Vehicle to Grid), V2B (Vehicle to Building), V2H (Vehicle to Home).

V2G will transform the customer experience between an EV driver and their utility company. V2G allows storage capacity of EVs to serve as distributed energy and grid resources: vehicles can be moving power plants.

V2X encompasses new operating models, revenue potential and grid solutions, but requires a great deal of coordination across industries and stakeholders.

~600 GWh

of electricity can be generated if 5% of global EV battery capacity (available by 2030) was used for V2G

Source: "Vehicle-to-Grid: Energy Storage on Wheels," European Battery Alliance, www.eba250.com/vehicle-to-grid-energy-storage-on-wheels/, October 12, 2020.

Top considerations for utilities

Readiness

Preparing for V2G proliferation by investing in required technology (like batteries on the customer side of the meter) and adopting up-to-date standards and practices.

Reliability and stability

Focusing on grid flexibility and deployment of smart meters allows for more information on grid status for utility companies.

Sustainability

New digital platforms allow V2G adaptation. Utilities can enable zero emission electricity using battery and distributed generation technology. Strategies to overcome battery degradation need to be considered.

Energy transaction model

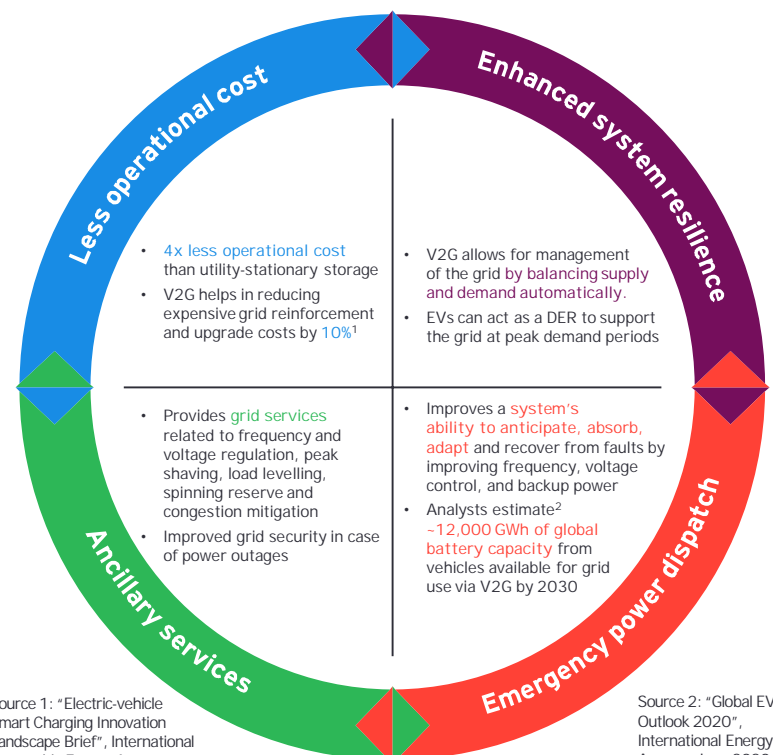
Monitoring the flow of information and tracking the energy micro transactions (via blockchain) to prevent decentralization of accountability.

Affordability

V2G returns will lower total cost of EV ownership (TCO) in the future and promote large scale V2G adoption, according to EY analysis.

V2G may transform the energy industry into a more integrated ecosystem

Utilities can monetize on potential V2G value propositions while ensuring grid resiliency and stability.



Source 1: "Electric-vehicle Smart Charging Innovation Landscape Brief", International Renewable Energy Agency, September 2019;

Source 2: "Global EV Outlook 2020", International Energy Agency, June 2020

The road to V2G



Do we have the required technology for V2G?

- Bidirectional charging station
- Battery technology advancements
- V2G compatible EV charging software



Can we integrate?

- Technology standardization
- Robust transaction model
- Smart grids
- Utilities and EV owners/ fleet operator collaboration
- DER management system
- Partner with software/ technology providers to develop smart digital platform



Can we scale?

- Scale pilot projects to validate technology, and explore value proposition
- More V2G compatible vehicle
- Balanced grid system
- V2G Standards (front-end and back-end protocols)
- Incentives for EV owners and other players in V2G value chain

Key challenges

Removing barriers to adoption requires a reach beyond internal stakeholders. To be successful you must include your customers, external stakeholders and develop relationships with OEMs and charge point operators. EVs are challenging traditional business models and require multiple industries working together for a successful transition.

Technology barriers

- Common standards and protocols
- EVs compatibility
- Battery degradation
- Power loss in bidirectional charging
- Cybersecurity

Social barriers

- Concerns about technical challenges
- Lack of consumer awareness

Regulatory barriers

- Double taxation (battery charging/ discharging)
- Data privacy
- Inconsistent V2X policy frameworks

Economic barriers

- High cost (customers/ V2X tech providers)
- Higher upfront capital expenditure for V2X capability
- Warranty compatibility

Contact the team for more information.



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