

Parked EVs as Grid Assets: Barriers to V2G Adoption

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Vehicles spend most of their lives parked. Vehicle-to-Grid (V2G) technology allows Electric Vehicles (EVs) to send electricity back to the grid through bidirectional charging, turning parked cars into mobile energy resources. This capability provides backup power during outages, helps reduce peak demand, and lowers energy costs. Despite this potential, commercial-scale V2G remains rare in the United States and is far less familiar here than in places like the United Kingdom and the Netherlands.

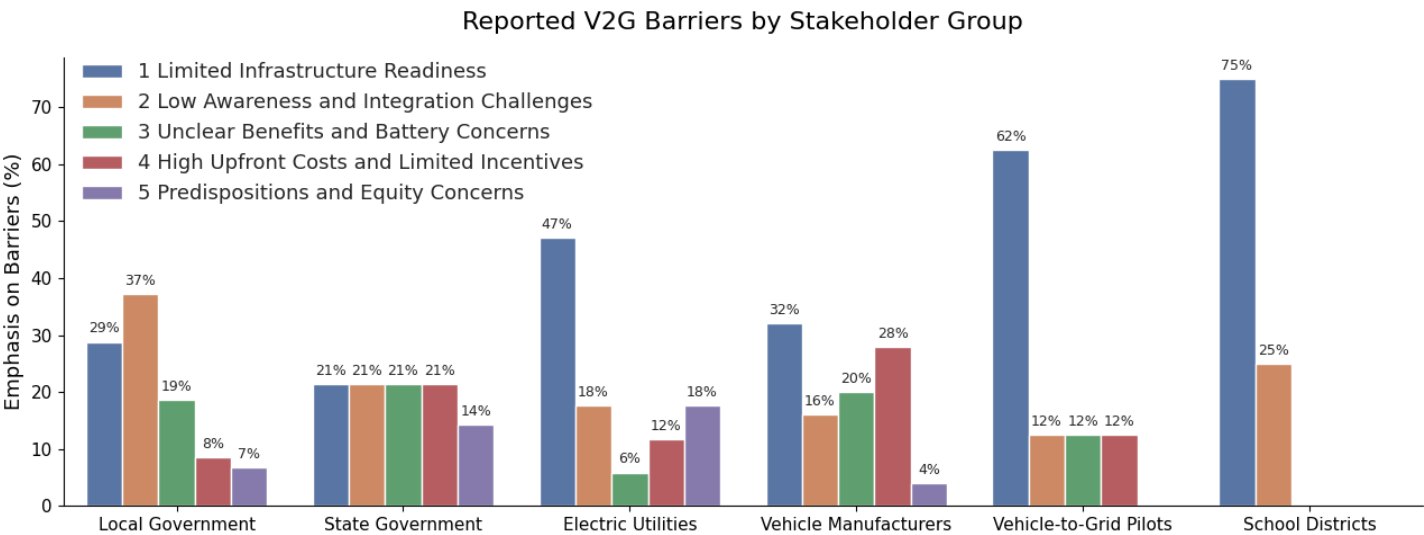
Objectives

To examine the barriers to V2G adoption in the United States, we spoke with 42 practitioners across utilities, automakers, governments, school districts, and pilot programs. Their insights show a consistent theme: V2G is technically feasible, but adoption struggles with infrastructure readiness and with day-to-day challenges such as fleet scheduling, system compatibility, and the reliability of early-stage technology.

Findings

Barrier 1 Limited Infrastructure Readiness

- **Few V2G-capable vehicles and warranty risks.** Only a small number of models currently support bidirectional charging, and some stakeholders worry that participation could affect warranties, which limits near-term adoption for fleets and municipalities.
- **Missing standards, certifications, and interconnection clarity.** Lack of clear component certifications and communication standards makes integration uncertain across vehicles, chargers, utilities, and aggregators; interconnection and local grid capacity can also be a constraint.



Barrier 2 Low Awareness and Integration Challenges

- **Limited awareness and complex systems.** Interviewees noted that many staff in local governments and utilities have little familiarity with V2G, and the lack of standardization between chargers and vehicles makes it difficult to know what equipment will work together.
- **Difficult to fit into daily operations.** Fleet managers, such as local transit planners, emphasized that V2G often conflicts with their operating schedules, and added concerns about cybersecurity.

Barrier 3 Unclear Benefits and Battery Concerns

- **Concerns about battery wear.** Stakeholders worried that frequent charging and discharging could shorten battery life or void warranties, even though evidence of actual damage is limited. These concerns were often raised on behalf of potential EV owners.
- **Unclear financial benefits.** Interviewees questioned whether V2G offers enough value to make participation worthwhile. Utilities noted difficulties in determining how to price exported power, and vehicle manufacturers expressed skepticism about investing in V2G when the larger EV transition remains their main priority.

Barrier 4 High Upfront Costs and Limited Incentives

- **High upfront costs for vehicles and chargers limit adoption.** Stakeholders described the steep price of electric fleets and home charging systems as major barriers. Without economies of scale, these costs remain out of reach for many households and public agencies.
- **Lack of financial support reduces market appeal.** Without grants, tax credits, or utility programs, V2G projects are often passed over in favor of other infrastructure needs. The absence of reliable incentives discourages investment and makes it harder for early adopters to justify the expense.

Barrier 5 Predispositions and Equity Concerns

- **Partisan views of EVs.** Interviewees described EV adoption as a politically charged issue, with limited policy support in some states. These dynamics may influence how communities perceive V2G as the market develops.
- **Seen as a technology for the wealthy.** Local government officials noted that EVs are often viewed as accessible only to higher-income households. This perception raises equity concerns and makes it harder to position V2G as a community-wide benefit.

Recommendations

1. **Set clear standards and provide institutional support.** Common technical standards for components and communication, consistent interconnection processes, and stronger institutional backing are essential for V2G to scale beyond pilots. Without these, integration across vehicles, chargers, and utilities remains uncertain.
2. **Develop utility programs and compensation.** As utilities wait for more V2G-capable vehicles, EV users wait for clear programs and payment structures. Targeted pilots, transparent valuation of grid services, and fair compensation for participants can break this cycle and encourage adoption.
3. **Address the warranty and battery concerns.** Automakers remain cautious about V2G because of concerns over battery degradation, warranty risks, and uncertain market value. Clear performance data, stronger warranty assurances, and supportive policies can build their confidence to expand V2G-ready models.

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