3 December 2025

Unlocking the grid potential of EVs

Future Grid Summit 2025

Australian Government
Australian Renewable Energy Agency

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Presentation by
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ARENA acknowledges the Traditional Custodians of Country across Australia and their continuing connection to land, sea and community. We pay our respects to Elders past and present.

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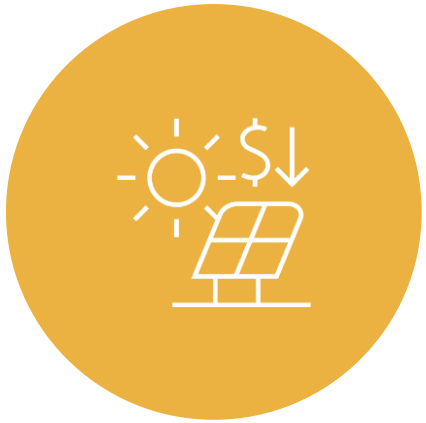
V2G is already here

Product availability and interoperability are key to achieve scale

ARENA'S Mission

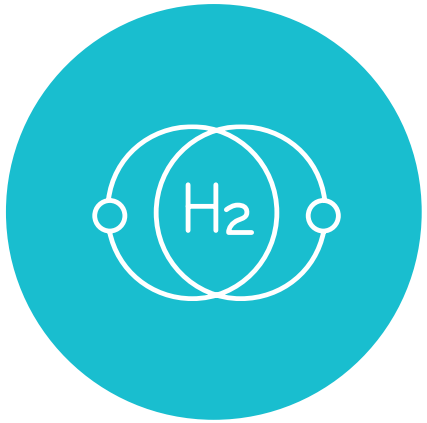
Our mission is to support the global transition to net zero emissions by accelerating the pace of pre-commercial innovation, to the benefit of Australia.

Strategic priorities

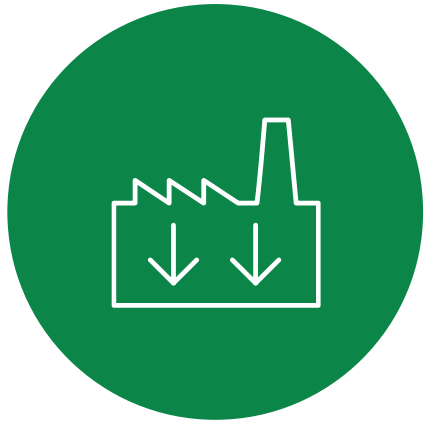


Unlock ultra low-cost solar

Optimise the transition to renewable electricity



Commercialise renewable hydrogen



Support the transition to low emissions metals

Decarbonise transport

V2G is widely considered the most valuable and scalable bidirectional use case

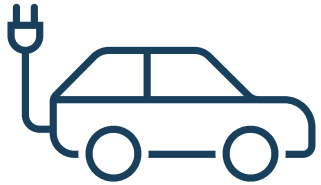
- **Vehicle to grid (V2G)** - EVs supply power to a mains electrical circuit that is electrically connected to the grid. This includes export limited cases.
- **Vehicle to homes and buildings (V2H/B)** – EVs supply power to local electrical distribution system that is electrically separated from the grid, such as off-grid or during a power outage.
- **Vehicle to load (V2L)** – EVs supply power directly to one or more electrical appliances.

	Grid islanded	Grid connected
Power converter external to EV	DC V2H/B	DC V2G
On board power converter	AC V2H/B AC V2L	AC V2G

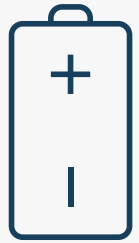
EVs are going to be carrying the largest battery in the house

"It's such a big battery and you haven't really paid for it. You've paid for it as a car."[1]

On average, a 3-person **household uses ~18kWh** per day.



On average, an **EV battery is ~60kWh.** This is increasing.



This is **3x** the typical households requirement!

If **10% of the EV battery is used** for V2G this can cover a third of daily use over the most expensive evening periods, saving >$1,000 per annum.

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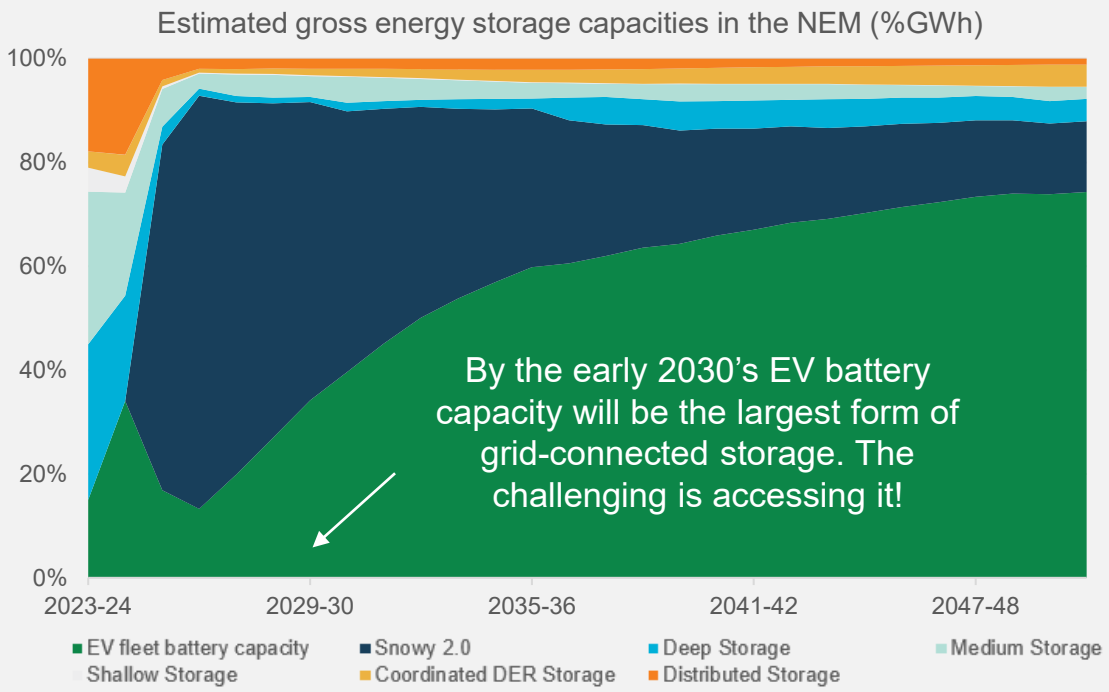
1. https://www.abc.net.au/news/science/2024-11-15/vehicle-to-grid-v2g-electric-vehicle-technology-soon-here/104498552

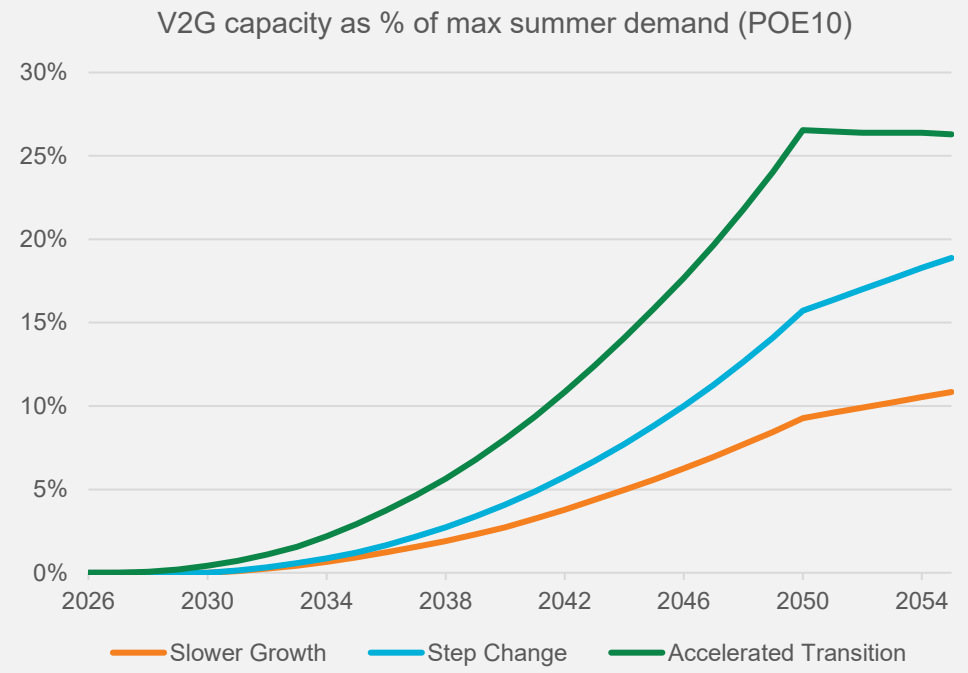
V2G Opportunity

Total cost savings from V2G could be **~$5 billion**[1]. The **challenge is accessing the available capacity** from the EV fleet to realise these benefits.

V2G provides cheap storage for the grid …



… and could meet~1/4 of peak demand by 2050[3]



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1. Endgame Analytics (2025) National Roadmap for Bidirectional EV Charging: V2G Energy Market Modelling Report. Available at: https://arena.gov.au/assets/2025/02/National-Bidi-Roadmap-MARKET-MODELLING-REPORT-2025-02-12.pdf
2. enX, 2023, V2X.au Summary Report – Opportunities and Challenges for Bidirectional Charging in Australia. Available at: https://arena.gov.au/assets/2023/06/v2x-au-summary-report-opportunities-and-challenges-for-bidirectional-charger-in-australia.pdf
3. ARENA analysis based on AEMO 2025 ESOO (OPSO, Summer, POE10) and IASR (V2G capacity).

National Roadmap for Bidirectional EV Charging

Bidirectional charging is readily available to provide high-value services across the Australian economy by 2030, with several products available by 2027.

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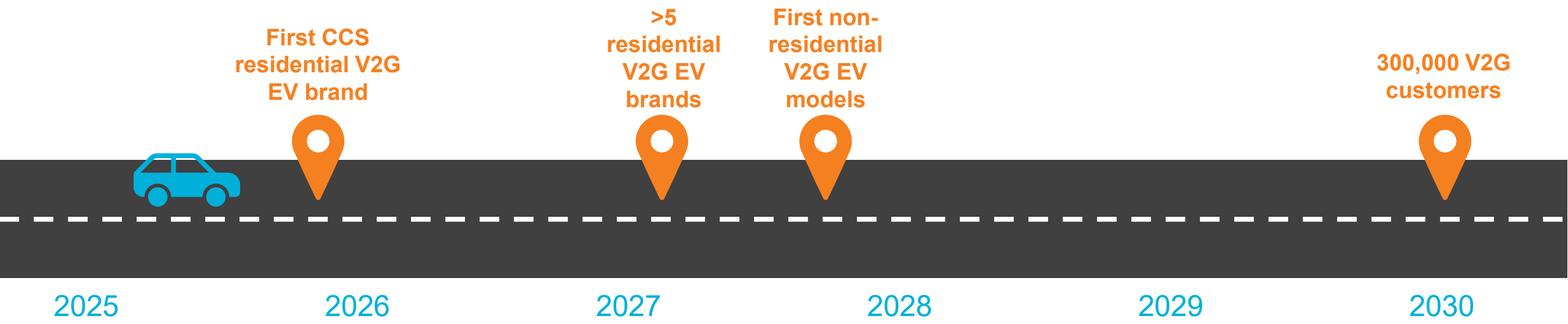
Available at: https://arena.gov.au/knowledge-bank/national-roadmap-for-bidirectional-ev-charging-in-australia/

The Roadmap set four key development milestones to reach V2G at scale



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V2G at scale requires several key components ….

Demand

Hardware

Communication

Grid Compliant

Interoperable

Customer demand is the foundational building block to a scaled V2G future

Value streams

- Backup power
- Behind the meter optimisation
- Market participation

Regulatory and market enablers

- Tariff reform
- Retail products
- Market access

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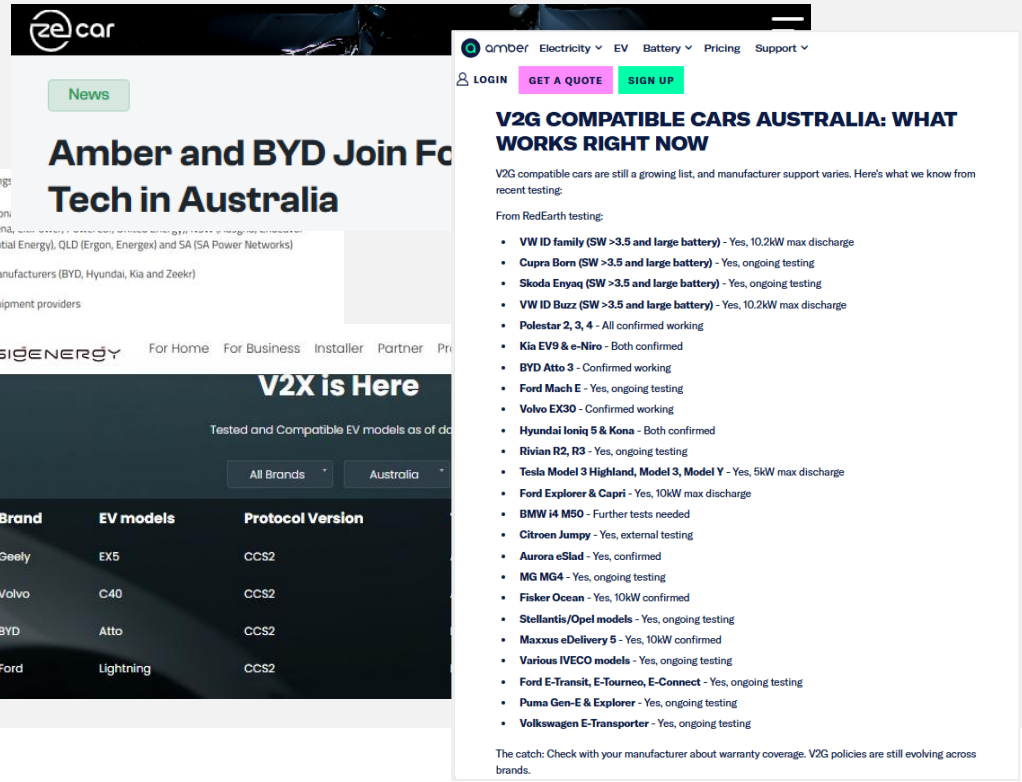
Hardware needs to allow for bidirectional power transfer

Electric Vehicle

- Plenty of EVs have been tested for bidirectional capability.
- The catch: outside of limited trials, warranty coverage is not offered for V2G.



Electric Vehicle Supply Equipment

- Several V2G capable EVSEs in development or on the market.

SIGENERGY
StarCharge
RedEarth ENERGY STORAGE
V2GRID AUSTRALIA
Fronius
OCULAR
ENPHASE.
wallbox

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Images sourced from:
- https://www.sigenergy.com/en/index/v2x_compatibility
- https://www.amber.com.au/blog/v2g-v2h-explained-using-your-ev-to-power-your-home
- https://next.agl.com.au/agl-v2g-trial
- https://zecar.com/resources/amber-byd-join-to-push-v2g-tech-in-australia

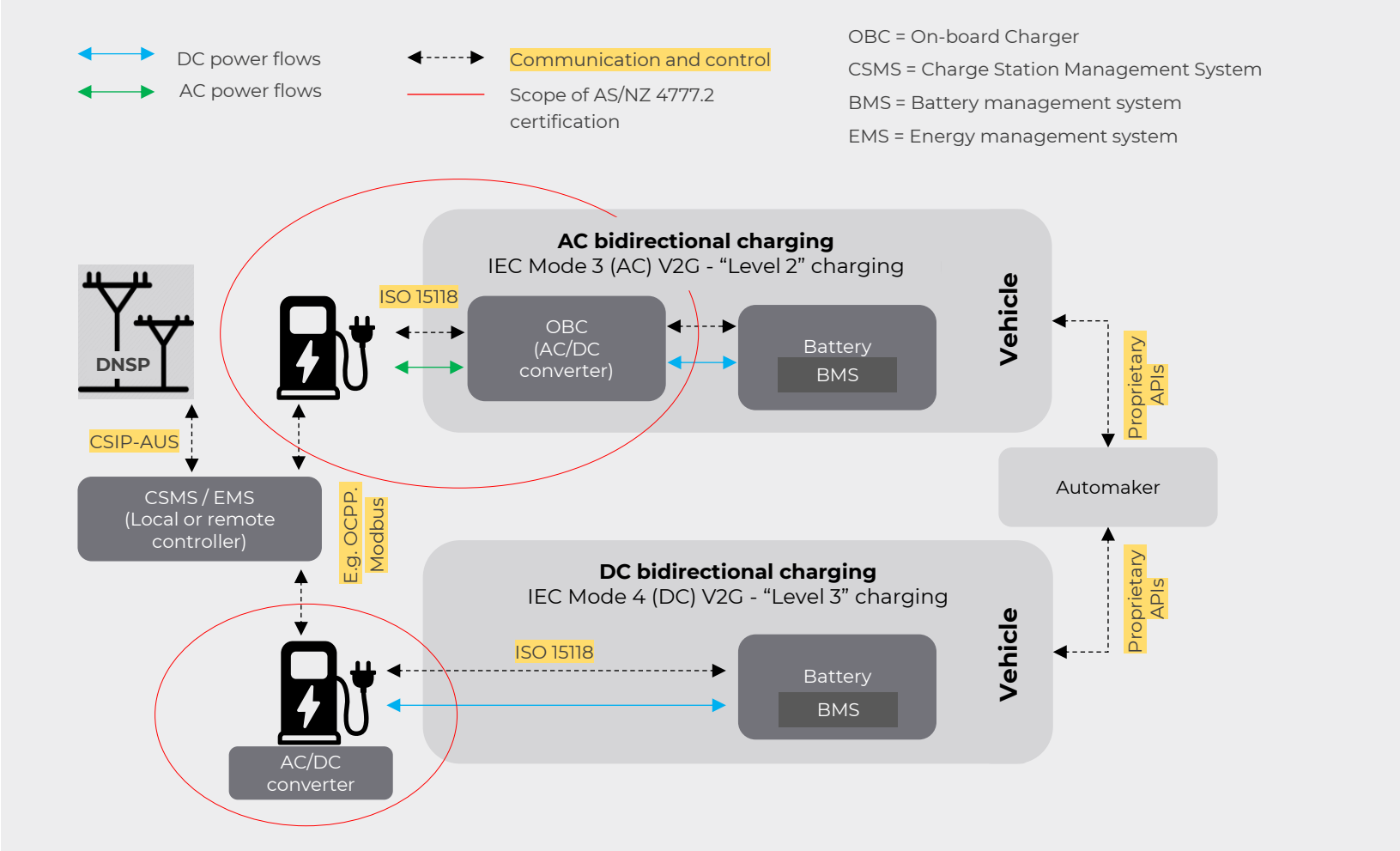
Standardised communication protocols reduces cost, complexity and fragmentation

Key communication pathways

- ISO15118-20 (EV<>EVSE)
- OCPP2.1 (EVSE<>CSMS)
- CSIP-AUS (DER<>DNSP)

Enablers

- Clear market guidance and future minimum requirements
- Testing and certification



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Consistency in grid compliance/ connection and removal of bottlenecks will accelerate scale

- Finalised AS4777.2 standard updated in 2024 removed one of the biggest hurdles to V2G
- CEC product listing is a bottleneck (particularly following the smarter home battery scheme)
- Standards compliance once connected

EVSE (DC V2G)	AS4777	CEC product listing	Grid connection
Sigenergy SigenStor	✓	✓	✓
StarCharge Halo	✓	⧗	some networks
V2Grid Numbat	✓	✓	some networks
RedEarth Ambibox	⧗	✗	✗
Wallbox Quasar II	*No Australian release date*		
Enphase	*In development*		
Fronius	*In development*		
Ocular	*In development*		

Any Customer | Any Device | Any Retailer | Any Network

ARENA is supporting projects that unlock the potential of DER, including V2G

Vehicle to grid

1. Scale up the use of residential V2G
2. Remove barriers to secondary use cases (e.g. fleets, heavy vehicles, public charging)
3. Improve underlying infrastructure and governance (e.g. standards, certification, testing)

Distributed Energy Resources

1. integrate DER into the distribution network and wholesale market
2. improve aggregator business models and capabilities
3. improve supporting IT infrastructure and governance (including standards, communication protocols and data exchange).

Thank you

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