

# Essential Energy and CSIRO Demonstrate Transformative Vehicle-to-Grid Technology

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**A collaborative project between Essential Energy and Australia’s national science agency, CSIRO, has successfully demonstrated the potential of vehicle-to-grid (V2G) technology using commercially available equipment. The research highlights V2G’s capacity to revolutionize energy management for Australian households.**

The project, conducted at Essential Energy’s newly established testing laboratory in Port Macquarie, successfully showcased how electric vehicles (EVs) equipped with the widely adopted Combined Charging System (CCS2) plug type can both store and discharge energy from residential rooftop solar systems back into the grid.

Dr. Sam Behrens, the project leader, emphasized the significance of this achievement as a crucial step towards enhancing rooftop solar integration and grid stability across Australia. “This project marks an important milestone for Australia, successfully demonstrating a Combined Charging System (CCS2) bi-directional charger with a market-available V2G-capable vehicle,” Dr. Behrens stated. “This is significant as it paves the way for broader adoption of readily available CCS2-compatible V2G technology, empowering both households and utilities to leverage EVs as flexible energy resources.”

The study, conducted between late 2024 and early 2025 at Essential Energy’s Innovation Hub, utilized a simulated home environment to accurately replicate real-world household energy consumption and grid connectivity. This allowed researchers to evaluate the practical application of bi-directional EV charging in managing household energy demands and grid exports under various conditions, including seasonal variations.

While previous V2G demonstrations in Australia have primarily utilized the CHAdeMO charging plug, compatible with a limited number of older Japanese EV models, this project marks the first successful demonstration using the increasingly prevalent CCS2 standard with commercially available bi-directional charging technology.

“This successful demonstration of CCS2 bi-directional charging underscores the potential for a wide range of current and future EVs to function as ‘batteries on wheels’ within residential settings,” Dr. Behrens explained. “This capability can significantly support the increased integration of both rooftop solar and other renewable energy sources into Australia’s power grid.”

The research yielded key insights into the real-world potential of V2G technology, including the successful integration of both CHAdeMO and CCS2 V2G technologies within a household energy simulation. The accurate replication of household energy consumption and grid connection within the laboratory environment allowed for comprehensive testing under diverse scenarios.

Building on this successful pilot, Essential Energy and CSIRO are currently exploring an extension of their collaboration. The next phase will focus on expanding the laboratory’s capabilities, further refining the implementation of bi-directional charging technology, and investigating real-world deployment scenarios. This will involve advancements in automation, communication standards, and control technologies to facilitate the testing of a broader range of future V2G system configurations.

As EV adoption continues to rise across Australia, V2G technology offers a promising solution for flexible energy storage, supporting a transition towards a more renewable-powered energy system. Continued research and investment in this area could soon make EVs a mobile energy storage reality for numerous Australian households.

“We are optimistic that V2G will deliver substantial benefits not only to EV owners but also to the wider community by providing crucial energy storage to power system infrastructure,” Dr. Behrens concluded. “The enhanced power and energy density, coupled with the mobility of EVs, could offer a level of flexibility and impact unprecedented in Australia’s energy sector.”