Submission to the Electricity Authority on Maximizing the Benefits of Local Generation

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Photo: StarCharge 11kW DC Vehicle-to-Grid charger launched in the Australasian market

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Submitter

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Introduction and context

Thank you for the opportunity to submit on the consultation from the Electricity Authority Te Mana Hiko on Maximising the Benefits of Local Generation.

Retyna Ltd is a specialist consultancy that provides advice to organisations along their transport electrification journey. We have assisted fleet operators, electricity sector companies, vehicle manufacturers' representatives, charging infrastructure manufacturers, Charge Point Operators, central and local government agencies.

Vehicle-to-grid (V2G) is an emerging technology where the electricity stored in an electric vehicle (EV) traction battery can be discharged to a grid-connected property or local electricity network. This is done using V2G capable bi-directional Electric Vehicle Supply Equipment (EVSE – colloquially called a charger), with the V2G capable EVSE also being used to charge the EV.

Retyna and Concept Consulting recently undertook a multi-client study of the potential for V2G in New Zealand[1]. The sponsors of the study included Transpower, EECA, Meridian Energy, Ecotricity, Aurora Energy, Horizons Networks, Orion, PowerCo, Unison, WEL Networks, StarCharge and others.

The results of the study showed that V2G technology has the potential to deliver $2,000 per vehicle per year of benefits to the electricity system for a household EV. These benefits comprise a mix of:

- Generation value – for example an EV battery discharging power during the evening electricity demand peak, and recharging during off-peak times overnight
- Network value – by avoiding costs for local distribution network and transmission upgrades to meet peak demand.

V2G technology is now being deployed commercially in Australia and EECA is supporting a 40-50 vehicle V2G pilot in Queenstown which is scheduled to commence in 2026[2]. EECA currently has a tender open for the supply of V2G capable EVSE for this pilot.

Injecting power using V2G technology is equivalent to distributed generation using solar PV or other small scale renewable generation. However, unlike intermittent renewable generation, V2G can be scheduled and contracted at times of electricity demand peaks, typically with greater value per kWh than distributed generation.

The benefits of V2G technology benefit not only the households and businesses that own EVs, but all New Zealanders by reducing the overall cost of the electricity system.

[1] https://www.concept.co.nz/uploads/1/2/8/3/128396759/v2g_in_nz_v2.0.pdf
[2] https://www.eea.nz/v2g

V2G capable EVSE in the global market

There are two main V2G technologies:

- Using DC V2G EVSE, where the conversion from DC from the EV battery to grid-compatible AC occurs within the EVSE
- Using AC V2G EVSE, where the conversion from DC from the EV battery to grid-compatible AC occurs with bi-directional V2G-compatible inverters in the vehicle.

DC V2G EVSE will be more expensive than AC V2G EVSE but will be able to be used with a much wider range of EV makes and models. EV manufacturer BYD have stated that their EVs will use DC V2G technology for the New Zealand market from 2026. It is expected that DC V2G will lead in the New Zealand market in the short term at least.

Examples of DG V2G capable EVSE in the global market which use the CCS2 connector are shown in the table below. The CCS2 connector is used with all NZ-new EVs and is the most common connector type in New Zealand (only used-import EVs from Japan use the CHAdeMO connector).

V2G EVSE make and name	Export power	Australasian availability status
Ambibox RedEarth	11kW	Available in Australia from February 2026
Ambibox RedEarth	7.4kW	Planned for Australia
Delta V2G 11kW	11kW	Available in Australia
Enphase IQ Bidirectional	11kW	Not confirmed
Sigenergy	25kW	Available in New Zealand
StarCharge Halo	11kW	Planned for Australia and New Zealand
StarCharge Halo	7.4kW	Available in Australia and planned for NZ
Wallbox Quasar 2	11kW	Available in New Zealand

A1 - Proposals to improve export limits for small-scale DG

Retyna suggests that the default export limit for small-scale DG (which includes V2G) is increased to 11kW to increase the potential for V2G to contribute to the NZ electricity system with only a slight increase to the proposed 10kW export limit. Without this increase it is likely that DC V2G EVSE with a rating of 7.4kW is deployed instead, despite many EVs being able to discharge power at a higher rate. This potentially reduces the value of V2G by one third. It may also negatively impact the investment proposition for household or small business V2G such that they decide not to invest in V2G technology.

It may be possible for the EVSE manufacturer or installer to limit the export power from an 11kW unit using hardware and/or software adjustments for EVSE sold in New Zealand market. It may also be possible for EV owners to limit the power exported to 10kW using software features in the EV or EVSE. The V2G EVSE is likely to have a communications connection to the electricity retailer or a 3rd party electricity system actor, such that they can control the power exported via the EVSE.

It is noted that as part of the Authority's recent decisions on the Network connections project (stage 1), DG application thresholds will be based on 'maximum export power' rather than 'nameplate capacity'.

If an increase in the power export limit to 11kW is not possible, then Retyna supports the increase from 5kW to 10kW as this will permit V2G using 7.4kW DC V2G EVSE.

A2 – Proposals for inverter standard

Retyna fully supports the use of AS/SNZ4777:2024 inverter standards. These standards are being used in Australia to approve:

- Bidirectional inverters for use in DC V2G EVSE
- Bidirectional V2G compatible inverters installed at manufacture within some electric vehicles allowing the use of less expensive AC V2G EVSE.

Australia and New Zealand are considered as one market for international vehicle manufacturers, with the Australian vehicle market being more than ten times larger than New Zealand's. Consequently, vehicle manufacturers are unlikely to adapt vehicles specifically for the New Zealand market, including for on-board bidirectional V2G-capable inverters and related firmware/software.

Consequently, Retyna supports any alignment of New Zealand and Australian standards to ensure full interoperability of EVs and EVSE for V2G is achieved, including the volt-watt and volt-var settings.