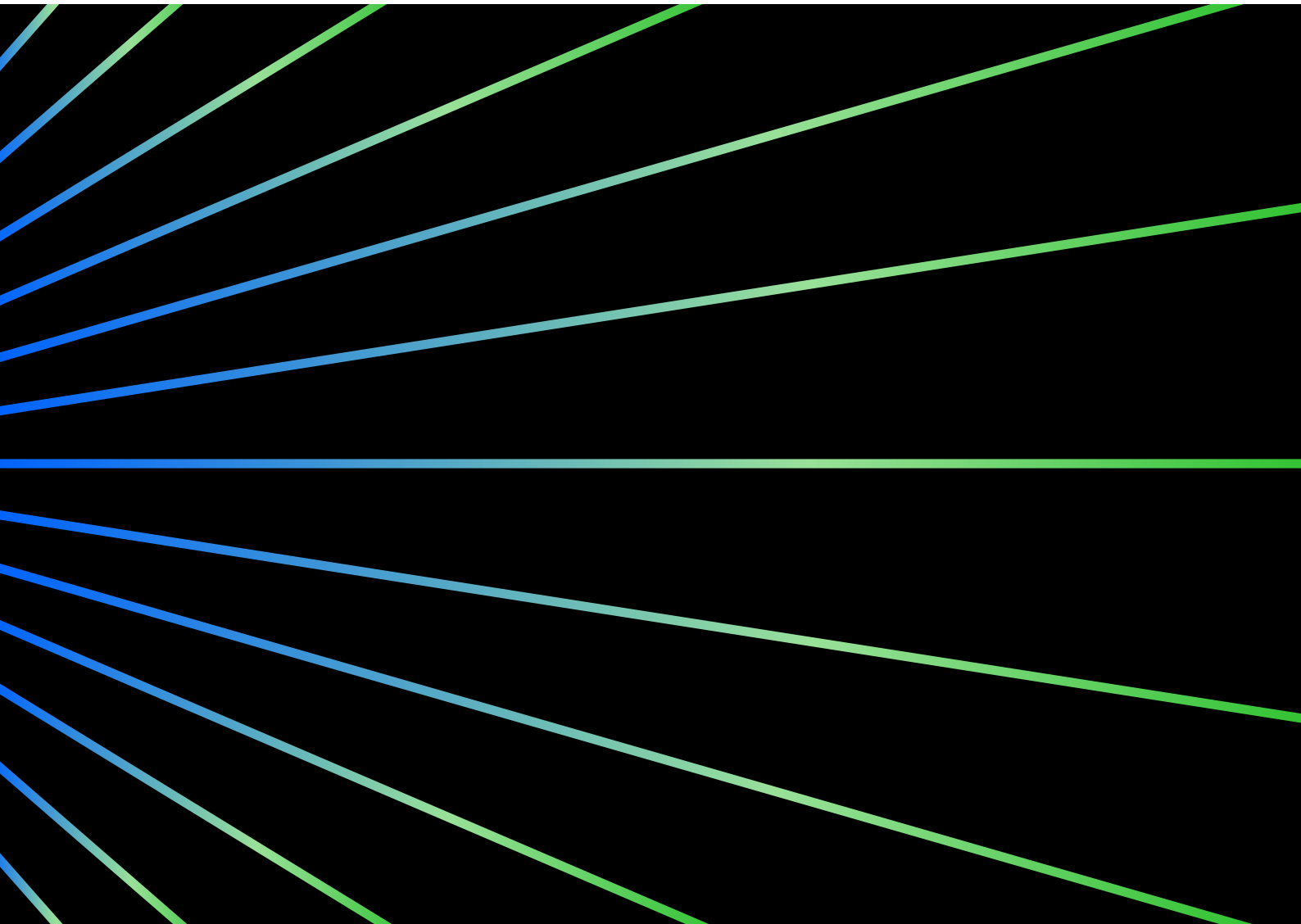
Kwetta

Unlocking the grid at Ngātea

Z Energy, Powerco and Kwetta key value drivers



Ngātea grid unlock overview

Kwetta innovation solving grid challenges	Providing Z Energy with cost effective, scalable, reliable and future proofed EV charging infrastructure, for cars, buses and trucks, enabled through Zeus Grid voltage support services to Powerco
Unlocking the grid at Ngātea	Proving the value of voltage support services in reducing the time, cost and risk of connecting high voltage EV charging infrastructure to a voltage constrained distribution network
Kwetta Ngātea site installation	1 x 1.2 MW 11 kV connected Prime Unit 2 x 200kW CCS2 SkyHooks 1 x 25kW CHAdeMO Charger
Kwetta Grid Services	Zeus Grid – STATCOM voltage support services
Participants	Z Energy, Powerco and Kwetta
Timeline	July 2023 - Kwetta network connection request December 2023 - Installation commissioned

Ngātea grid challenge

Ngātea is centrally located on the Golden Triangle, a busy transport route between Auckland, Tauranga and Hamilton. The Ngātea Z Energy petrol station is ideally located for an electric vehicle (EV) fast charging site, to support the growing demand for in-transit EV charging.

The Powerco network supplies electricity to the Ngātea region, and, although there was sufficient capacity on the feeder to comfortably supply EV charging infrastructure, this 11kV distribution grid, spanning over 10 km, faces voltage constraints during peak periods.

To address the voltage constraints for this feeder, Powerco investigated the installation of a voltage regulator and the construction of a new feeder line, estimated to cost between $1.5M and $2.5M and scheduled for completion in 2029.

Powerco could have been expedited network strengthening to reduce the challenge of connection delay from 6 years to 1-2 years, however the capital contribution associated with this solution, negatively impacted business case metrics for this strategic EV infrastructure deployment.

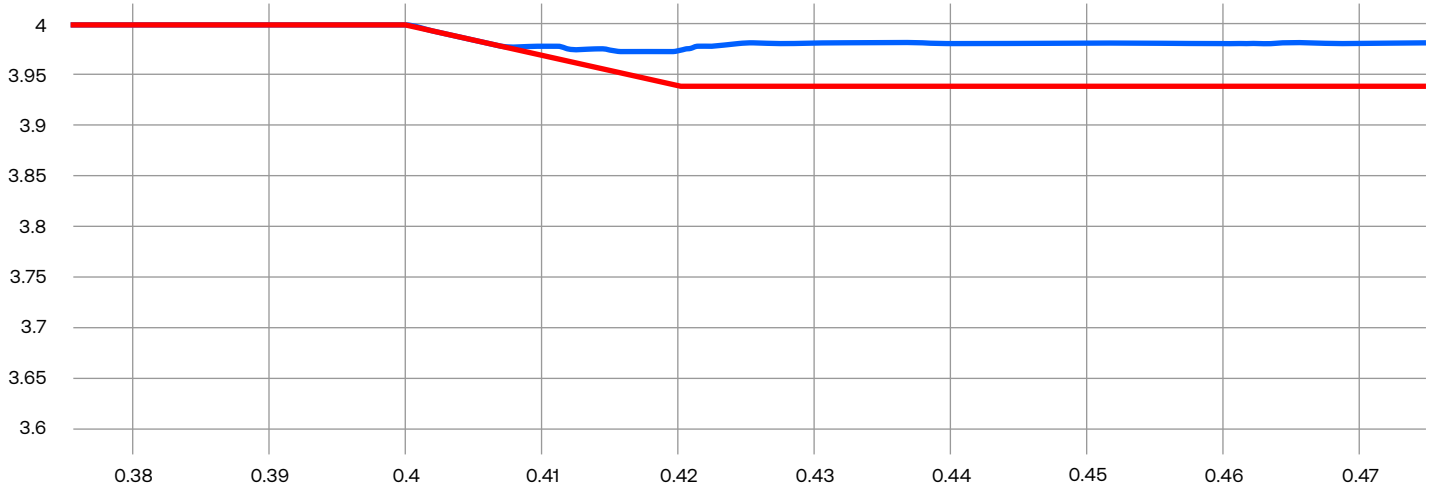
Grid unlock solution

To solve the near-term voltage challenges and expedite the connection process for the Z Energy Ngātea site, Powerco was open to a non-network grid service, to support voltage regulation on the Ngātea feeder, provided it did not risk compromising the reliability and stability of the current power supply. This led to a collaboration between Powerco, Kwetta and Z Energy, to demonstrate how the benefits of Kwetta's innovative solution could be realized, while maintaining a robust and reliable power network.

The EV fast charger system deployed included grid support functions, including Static Synchronous Compensator (STATCOM) voltage support and harmonic cancellation, to effectively unlock grid capacity.

At Ngātea, STATCOM functionality allows the EV charger to support the grid voltage during charging and, when not charging, the STATCOM supports Ngātea's voltage fluctuations, during constrained periods.

The figure below shows the proposed benefit of Kwetta provided STATCOM functionality for Powerco, at the Ngātea site, with the red line showing the uncorrected voltage and the blue line showing the voltage corrected to Powerco's required network tolerances by the STATCOM.



These features allowed Kwetta's EV fast charging system to be deployed in less than four months, providing Z Energy accelerated installation of EV charging in this strategic location, and the Powerco network development team time to implement a longer-term solution for this feeder.

Further technical information, including output graphs for the Ngātea project is attached in Appendix 1 – Solving the Grid Problems for EV Fast Chargers. This is a technical paper submitted to the Electricity Engineers Association and was co-presented with Powerco at the recent Electricity Engineers Association Conference

Key value drivers – Z Energy

Metric	Value Stream
Kwetta innovation solving grid challenges	Providing Z Energy with cost effective, scalable, reliable and future proofed EV charging infrastructure, for cars, buses and trucks, enabled through Zeus Grid voltage support services to Powerco.
Accelerated network connection	Network connection timeline reduced from 12-18 months to 4 months. ~67% reduction in time to connect.
Improved customer charging experience	As EV charging demand increases, a fixed and flexible network connection increases available capacity, enhancing the customers fast charging experience.
Reoccurring additional revenue	STATCOM grid service revenue through Kwetta Zeus Grid. Service revenue value stream.
Future proofed installation	Ability to scale up from the initial 3 x Kwetta Sky Hook™ charging stations, as EV charging demand increases and in-transit heavy transport charging comes onstream.
Energy envelope optimisation	Future energy optimisation and revenue opportunities through Zeus Grid, as flexibility markets evolve.

“We were facing a long delay and significant grid upgrade cost, or expensive batteries, to upgrade EV charging to our Z site in Ngātea. The Kwetta technology was a game changer for us which enabled large-scale charger connection in roughly a third of the time for a grid upgrade. Amazing EV charging speed delivered via great technology!”

Kieran Turner
Head of CX + Product Development,
Energy Solutions, Z Energy

Key Value Drivers – Powerco

Metric	Value Stream
Enhanced customer service	Speed of connection reduced from 1-2 years to 3-4 months, demonstrating planning efficiency and strong customer focus.
Reduced network risk	Improved network stability and reliability with implementation of STATCOM support services
Network optimisation	Opportunity to optimise existing network capacity and defer and de-risk future network strengthening

“We have a multi-year reinforcement plan to relieve grid constraints and grow capacity in that greater Ngātea region. The Kwetta technology provided the necessary voltage support so we could allow early connection of this important charging infrastructure. And we’re trialling STATCOM voltage support as a grid service”

Ryno Verster
Programme Director DSO, Powerco

Key Value Drivers – Kwetta

Demonstration and proof - technical and financial value of grid voltage support services to:

- expedite new connections;
- reduce customer capital contributions for network strengthening; and
- optimise value streams, across project participants.

"This groundbreaking collaborative project with Z Energy and Powerco demonstrates, through Kwetta grid services, the potential for New Zealand to optimise existing network infrastructure, to expedite new connections and defer the negative business case impact of network upgrades, delivering safe, reliable and most importantly, cost-effective EV charging solutions."

Mike Lazelle
Chief Growth Officer, Kwetta

Appendix 1 – Solving the Grid Problems for EV Fast Chargers

Follow this link to download the paper

Appendix 2 – Kwetta DC Electric Vehicle Charging and Network Challenges White Paper

Follow this link to download the paper

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