



TRANSPOWER

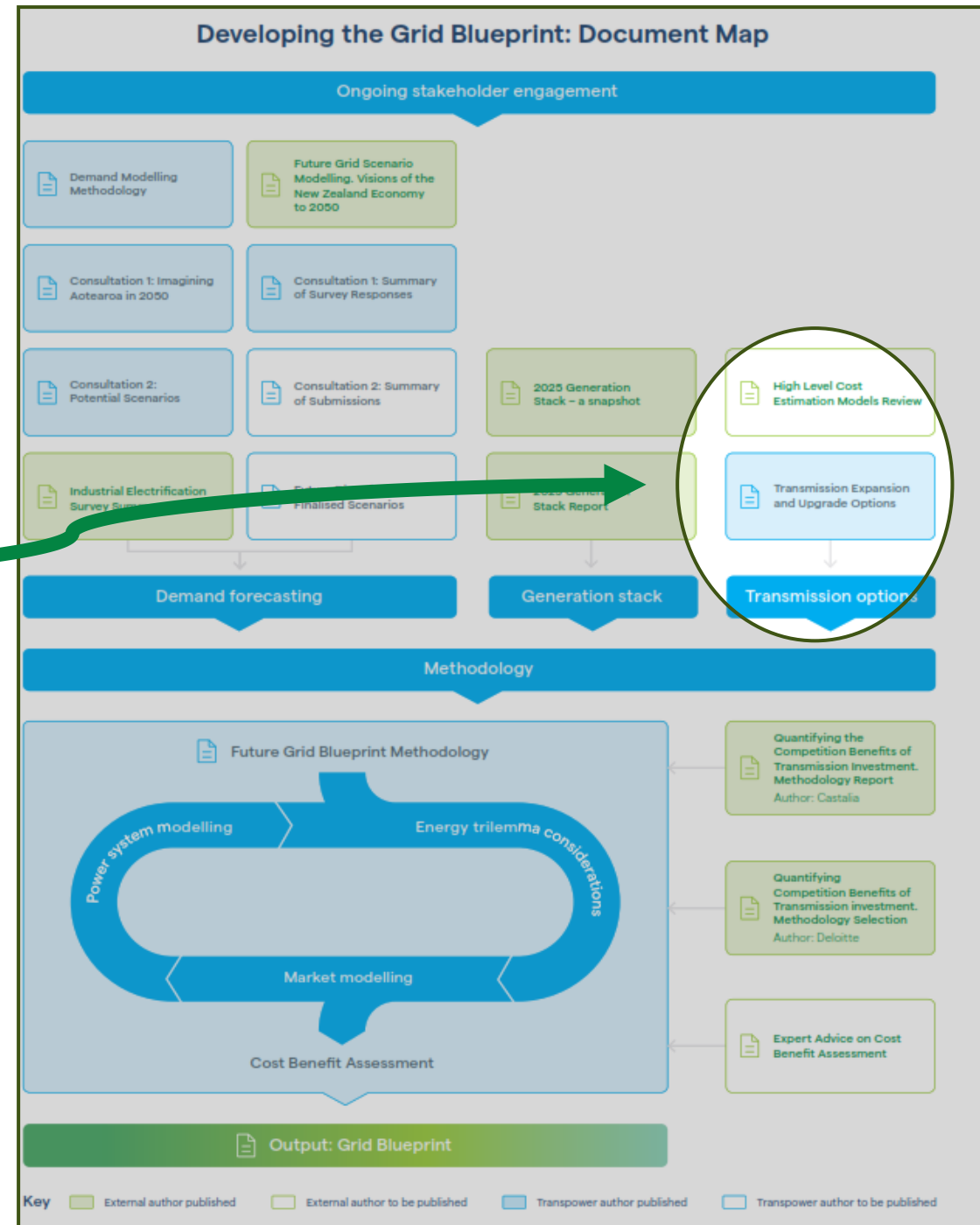
Te Kanapu

Cost estimation webinar
30 April 2026

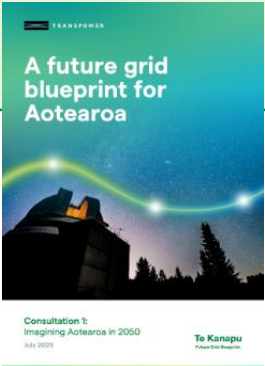
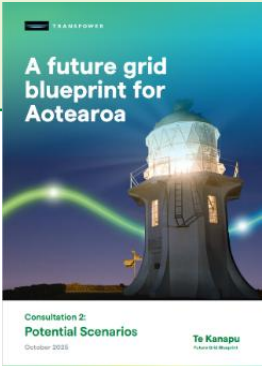
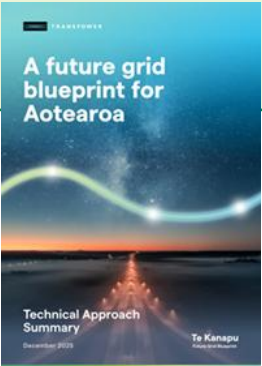
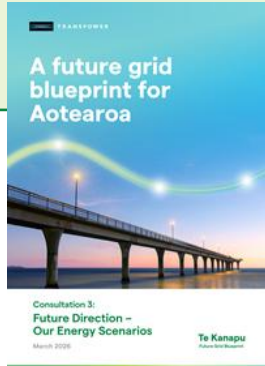


Developing a
future grid
blueprint for
Aotearoa

Our discussion today focuses on the Transmission Options that we consider within our Technical Analysis.



Our timeline to develop the grid blueprint

1 Imagining Aotearoa in 2050	2 Potential scenarios	3 Technical approach	4 Future direction	5 Draft grid blueprint	6 Te Kanapu future grid blueprint
July 2025	October 2025	December 2025	March 2026	Later in 2026	Later in 2026
Gathering views on the future of Aotearoa in 2050	Draft scenarios, load & generation	Draft methodology, potential investment options	Finalised scenarios, generation mix	Combining insights, research, inc. least- regrets investment	We'll publish our first grid blueprint
					

Categories of transmission expansion options

Category 1

Adding Transmission Capacity

Upgrading existing lines (thermal upgrade, reconductoring, duplexing)

New overhead HVAC transmission lines (220 / 400 kV)

New underground & subsea cables

New HVDC intra-island and inter-island transmission (LCC, VSC, hybrid)

Category 2

Maximising Existing Capacity

System reconfiguration (switching, bus-splitting)

Remedial actions schemes

FACTS devices (series compensation, phase shifting transformers)

Voltage stability support (STATCOMs, synchronous condensers)

Control system & protection upgrades

Category 3

Emerging New Solutions

Consumer energy resources & demand flexibility (CER/DER)

Smart grid solutions (dynamic line ratings, topology optimisation)

Virtual transmission lines using grid-scale batteries

Technologies still maturing — costs and capabilities evolving

Reminder: Flexibility, consumer energy resources, and demand-side management is assumed within each scenario.

Transmission option costs needed estimating



To understand the key cost items



We needed Blueprint transparency

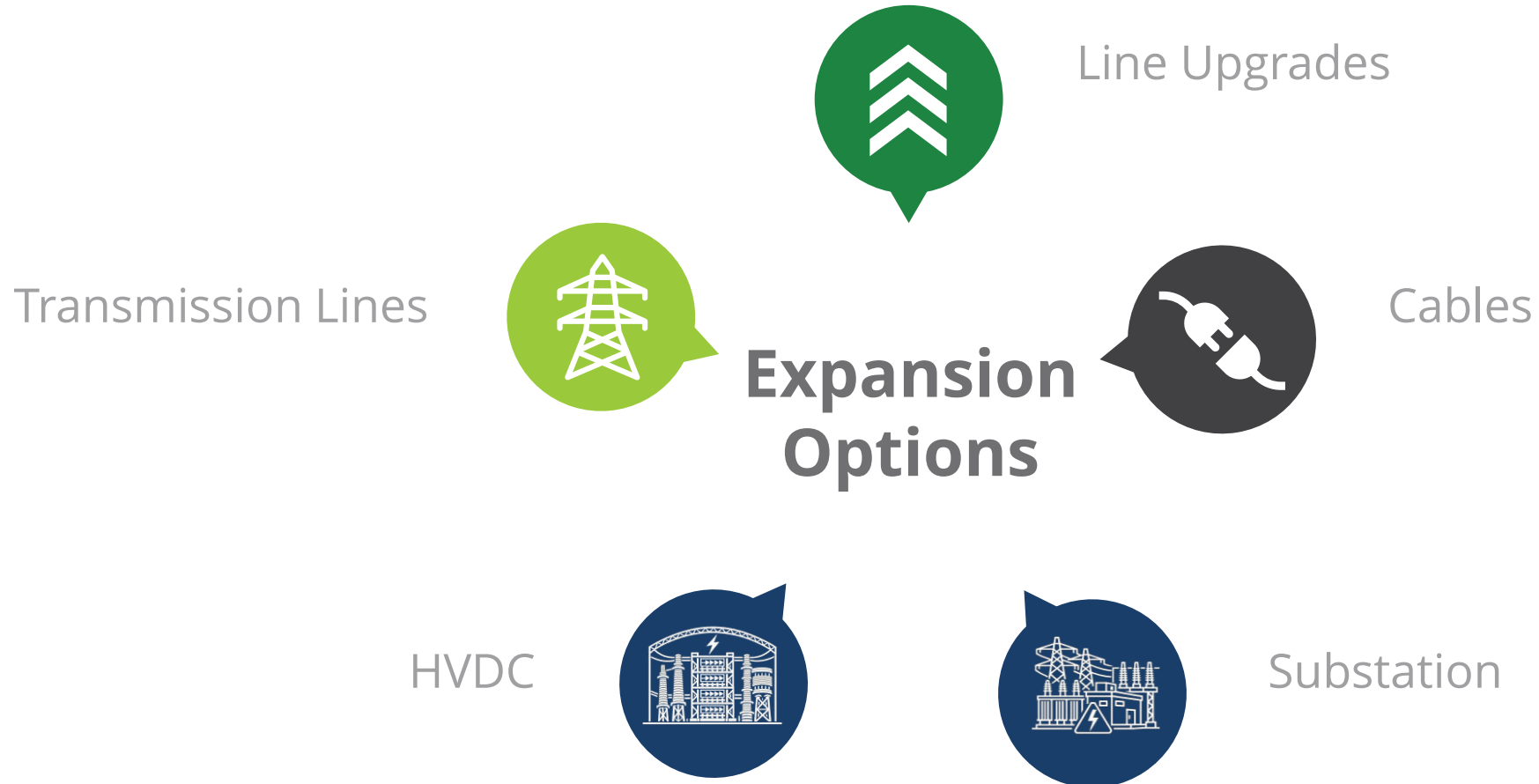


Helped us understand the feasible options



The Cost Models

Five cost models were created to estimate costs



A bottom-up model design



Primary Equipment
Towers, conductors,
foundations, etc.

Enabling works
Earthworks, access tracks,
crane pads, etc.

Design Costs
Engineers, environmental,
cost estimators, etc.

Property
Easements, legal fees,
and injurious affect

Some options we have been considering

Example Regional Options (not exhaustive)

Northland–Auckland: duplexing or reconductoring; addresses potential data centre and industrial demand or increasing generation building Northland

Waikato–Bay of Plenty: new 220 kV double circuit; supports Tauranga growth and generation connections

Otago–Southland: duplexing or reconductoring INV-ROX (\$79-314M); supports load and generation growth in Southland.

New Inter-Island HVDC Link

Additional bipole HVDC link to supplement existing ± 350 kV bipole HVDC link between Benmore-Haywards; supports increased renewable generation transfer between islands and system resilience

Intra-Island HVDC Links

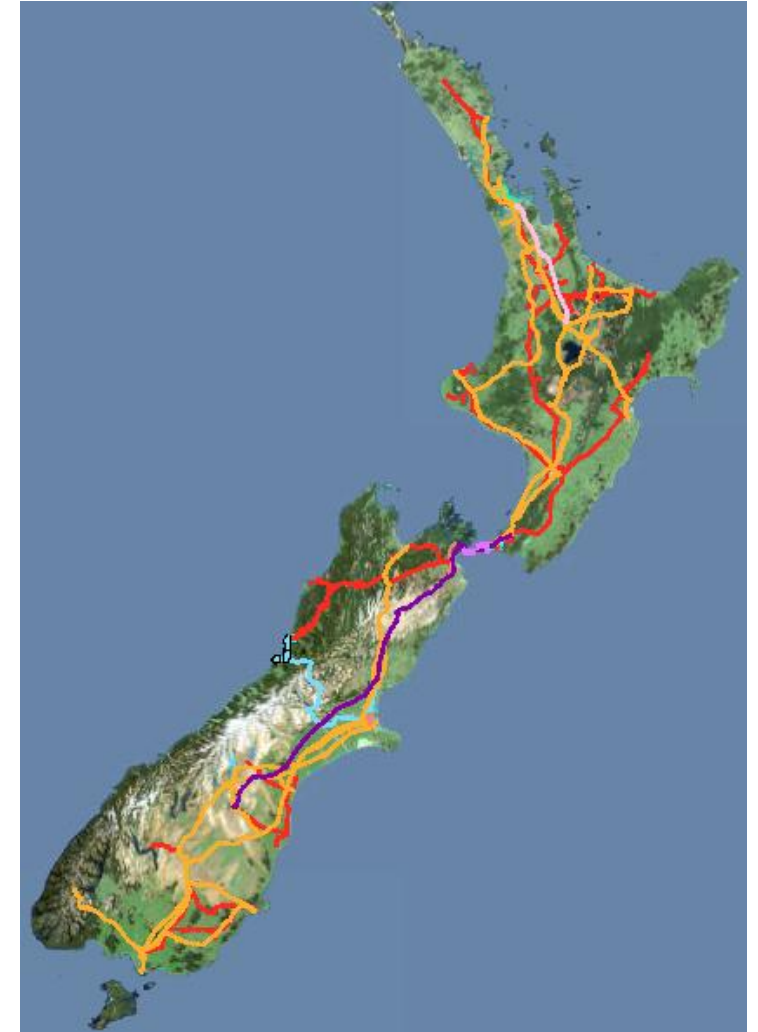
Could address long-distance constraints within and between regions, supporting Christchurch growth, Southland load and generation developments, and potential offshore wind integration (e.g. South Taranaki to Auckland) in future scenarios.

New 400 kV HVAC Backbone

The capacity of a transmission line increases proportionally to its voltage rating so a single 400 kV double circuit can provide the same capacity as multiple lower voltage lines which reduces the footprint of the transmission grid.

A higher voltage grid backbone also reduces system impedance which enhances system strength, voltage stiffness and transient stability

New Zealand already has a 400 kV-capable line (operated at 220 kV)



Indicative Costs of New Transmission

Option Type	Indicative Cost Range	Lead Time
Thermal Transmission Upgrades (TTUs)	\$0.1 – \$1.3M / km	1 – 2 years
Reconductoring / Duplexing	\$0.3 – \$1.8M / km	1 – 5 years
New Overhead AC Lines (220 kV)	\$2.0 – \$9.9M / km	5 – 12 years
Underground Cables	\$6.4 – \$38.1M / km	5 – 10 years
Subsea Cables	\$7.3 – \$47.6M / km	5 – 10 years
Overhead HVDC Link + Converter Stations	\$3.7 – \$11.6M / km + \$0.6 – \$1.5B per station	8 – 12 years

Note: All costs in 2025 NZD. These are AACE Class 5 screening-level estimates. Actual project costs will depend on terrain, consenting, brownfield complexity, and market conditions.

Ensuring robust, benchmarked transmission cost

Mott MacDonald Independent Review



Independent benchmarking against **comparable international transmission programmes (UK, Europe, Australia)**

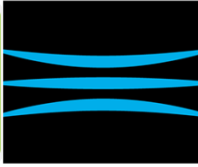
Validation of cost estimates within **AACE Class 5 expectations for strategic planning and early-stage decision making**

Cross-checking against **technology-specific cost drivers (HVDC, 400 kV AC, substations, emerging technologies)**

Ensuring inclusion of **future-relevant technologies not yet deployed in New Zealand**

Providing **independent assurance that cost assumptions are credible, transparent and fit-for-purpose**

Transpower Internal Review



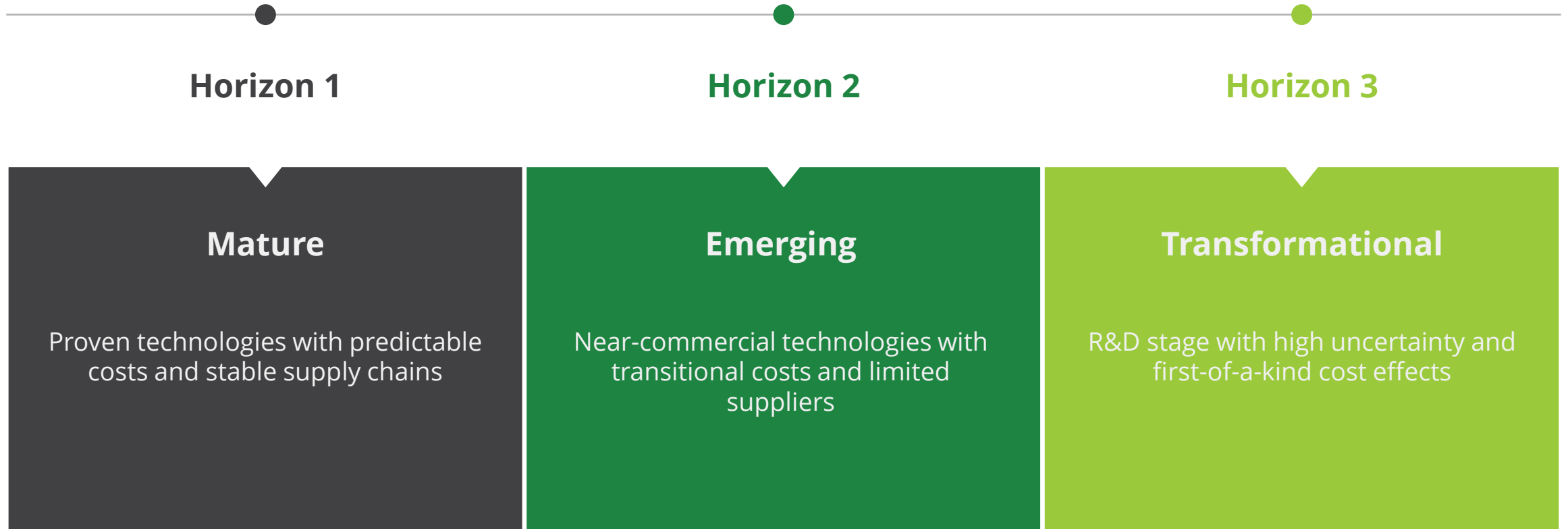
Checking against past and ongoing national projects

North Island Grid Upgrade Project – 400 kV transmission line (operated at 220 kV)

Clutha and Upper Waitaki Lines Project:

- Duplexing, reconductoring and TTU- Forecast expenditure for Bunnythorpe
- Whakamaru A/B – TTU and duplexing

Our Approach to Escalation



We are thinking about the future!

Starting with what's proven

Our Cost Benefit Analysis tool is built on mature, established technologies.

These have predictable costs, proven supply chains, and known lead times.

This gives us a robust and defensible foundation for the Grid Blueprint.



Then, testing what's possible

We overlay the Blueprint with sensitivities where emerging technologies advance faster than expected.

This helps us identify where new developments could materially change outcomes.

And highlights the key technologies we need to keep monitoring over time.

The Blueprint is designed to be robust today — while staying alert to the technologies that could reshape it tomorrow.

Thank you for your time

If you have questions after today, or would like to arrange a meeting with us, please email feedback@transpower.co.nz

We have signed you up to our newsletter to receive updates and invitations to future webinars.

Scan here to visit our website for more information:



A future grid blueprint for Aotearoa



Consultation 3:
**Future Direction –
Our Energy Scenarios**

March 2026

Te Kanapu
Future Grid Blueprint