



Empowering our energy future

Net Zero Grid Pathways

Our aim is to ensure New Zealand can take an integrated view of future investment needs given the 10-year lead times for approving, consenting and building transmission lines. This would enable the power system, including new renewable and distributed generation and new transmission interconnections, to achieve the least cost pathway to a net zero carbon future.

September 2020: Our environment today

Rio Tinto's announcement to start planning for the wind-down and eventual closure of New Zealand's Aluminium Smelter (NZAS) at Tiwai Point accelerates New Zealand's transition to a highly renewable energy future. It presents an opportunity to enable the renewable electricity used by the smelter to be used across New Zealand and move the electricity system from being around 85% renewable today to at least 96% renewable in 2025.

In the immediate-term, Transpower has committed to deliver the Clutha Upper Waitaki Lines Project (CUWLP) by May 2022. The project is set to deliver benefits in the order of \$100m per year by enabling low-cost renewable electricity generated in the lower South Island to be transported north. In September, the Commerce Commission approved Transpower's Major Capital Expenditure Proposal for the Waikato Upper North Island Voltage Management project.

Additional opportunities exist across New Zealand's electricity transmission system to further access and utilise the excess renewable electricity from a smelter closure which in turn, assists our transition to a low-carbon economy.

This document outlines the transmission grid opportunities in the short and medium term and the approach we will take to investigate, consult and seek approval for them, in the context of the longer-term view in *Whakamana i Te Mauri Hiko*.

Our Approach: Net Zero Grid Pathways

The need for integrated transmission system planning

In *Whakamana i Te Mauri Hiko* we identified that the development of a long-term, plan for the transmission grid, supported by a wider future view power system, would promote “least regrets” decisions in delivering the lowest cost pathway towards greater renewable electricity and electrification of the economy. We are calling this work our Net Zero Grid Pathways.

The aim of our work is to ensure New Zealand can take an integrated view of future investment needs given the 10-year lead times for approving, consenting and building transmission lines. This would enable the power system, including new renewable and distributed generation and new transmission interconnections, to achieve the least cost pathway to a net zero carbon future.

Phase one: Accessing Lower South Island Renewables

We believe it is important for industry and stakeholders to have a roadmap that provides high-level guidance on the likely scope, timing and cost of transmission investments that enable the most efficient access and utilisation of the renewable electricity made available, if closure of the smelter is confirmed.

Phase one of the Net Zero Grid Pathways work will focus on the investment opportunities arising from a closure of the smelter. We are seeking industry involvement and collaboration in helping us determine how best to develop the transmission system post the smelter closure.

The key principles of the new Net Zero Grid Pathways – Accessing Lower South Island Renewables are:

1. Collaborate with industry and relevant stakeholders over the coming months to develop a common set of modelling assumptions for future transmission grid investment opportunities that arise from the closure of the smelter¹. These assumptions will be used to develop scenarios. A common approach will enable work at pace to support sector-wide consultation and the development of grid investment cases to the Commerce Commission.;
2. Use the scenarios of generation together with electricity demand, to develop an integrated view of the investment cases following the smelter’s closure where the overall benefit of all investments is considered alongside each proposal, and
3. Build industry and electricity market confidence that further electrification can occur in a way that supports an increasing reliance on renewable generation.

We acknowledge there are still many uncertainties regarding the nature of the smelter’s exit and its flow on effects across the electricity system and market. Even with a delayed exit, the lead times for key transmission investments to enable access to renewable generation would still be on the critical path. It is important we start planning now, even without clarity on additional industrial demand in the lower South Island or the development of options to address dry year risk arising from the Government’s recently announced \$30 million study.

¹ A critical component of any investigation are the future scenarios used to predict future needs. In order to recover the costs of investing in the grid Transpower is required to consider the Electricity Demand and Generation Scenarios (EDGS), as developed and published by MBIE. In the time since the last release of the EDGS significant changes have occurred in the New Zealand electricity landscape, including the smelter announcement

Opportunities for investment to further enable access to lower South Island renewable electricity

A number of grid investment opportunities exist in the medium-term, to enable more South Island renewable electricity to service the North Island, beyond the CUWLP work. The following outlines the opportunity, timings and interdependencies. These will be further refined as our work continues and whenever market participants make material announcements.²:

1. *Increasing the capability and capacity of the HVDC*

Current analysis suggests the addition of a fourth undersea cable will be required to enable an increase in maximum HVDC transfer into the North Island by 200MW to 1400MW. Investigation work is already underway on the ability to increase the capability of Pole 2 as part of a planned half-life refurbishment. We will also consider the case for a partial replacement of the existing three Cook Strait cables at the same time as a fourth cable. The existing cables are in good condition and are expected to be near end-of-life by the mid-2030s. We will identify any interim tactical options to increase HVDC capacity ahead of installing additional cables given the long lead time to install these.

Indicative timing - Fourth cable, late 2020s, Cost: \$150-\$200 million (Fourth cable only)

2. *Lower North Island Constraints: Wellington to Palmerston North*

The ability to send additional electricity through the lower and central North Island 220 kV grid may be limited by constraints imposed by regional transmission routes that run electrically in parallel with the backbone. This can be addressed by measures to change the grid configuration and how these regional routes interact with electricity flow on the backbone. We do not expect to identify the need to upgrade existing backbone lines, but this will be investigated. Further analysis is required.

Indicative timing – constraint relief by 2025. Cost: <\$20m

3. *Central North Island Capacity: Palmerston North to Taupo*

It is likely that both added capacity to the 220 kV grid backbone will be required as well as constraint relief on regional transmission routes. Added grid backbone capacity will focus on existing lines upgrades as we have done with CUWLP. This will require studies on upgrade options for existing lines to inform the assessment. Any investment will also be dependent on the investment cases for the HVDC capacity and Lower North Island constraint improvements. Further analysis is required.

Indicative timing – constraint relief by 2025, capacity upgrades to the grid backbone, if justified, late 2020s. Cost: \$300-\$350million

4. *Lower South Island and other possibilities yet to be identified*

These are subject to further investigation regarding timing and cost.

² Transpower has just released its [2020 Transmission Planning Report](#), however this report was completed prior to the NZAS announcement on July 5 and the sequence of transmission grid investment needs envisaged here differ from those in that report.

Industry input on modelling assumptions and scenarios:

Advancing the analysis and development of the multiple grid investment opportunities will require the development of a common set of modelling assumptions and scenarios. These are needed to support the preparation of any grid investment proposals to the Commerce Commission.

The smelter's closure will result in New Zealand's total electricity demand falling by around 12% in the short-term. This will have knock-on supply-side effects across generation, especially around the role of thermal plant and the timing of renewable additions. The availability of large volumes of renewable electricity could lead to accelerated electrification as well as potential investments in new electricity intensive sectors, such as data centres and green hydrogen production. These changes would have an impact on both the need for, and timing of, the development of the National Grid.

Your input into our modelling assumptions and scenarios will be critical to ensuring we make the best investment decisions for New Zealand, in enabling the transition to a highly renewable electricity system

Net Zero Grid Pathways Interconnections



Next Steps and Timelines

We will confirm timelines for scenario development and investment case submissions in the next part of our work. Both require sector consultation and engagement with MBIE on their Electricity Demand and Generation Scenarios (EDGS) and the Commerce Commission.

Sept-Dec 2020	<ul style="list-style-type: none">• Confirm potential system development needs from updated studies
Oct 2020	<ul style="list-style-type: none">• Industry engagement on possible post smelter demand and generation scenarios
Dec 2020	<ul style="list-style-type: none">• Updated list of areas for investigation for investment• Publish System Security Forecast
Early 2021	<ul style="list-style-type: none">• Finalise demand and generation scenarios with industry and MBIE• Commence work on individual investment cases for Commerce Commission approval
End 2021 – End 2022	<ul style="list-style-type: none">• Submission of investment cases to Commerce Commission
Early 2022 – Mid 2023	<ul style="list-style-type: none">• Indicative timeline for Commerce Commission Approval of investment cases
2022–2030	<ul style="list-style-type: none">• Delivery of approved investments



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