

26 February 2024

Matthew Clark
Transpower and Gas Manager
Commerce Commission
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Dear Matthew

Notice of intention to plan the Waikato regional interconnection capacity major capex project.

This letter is notice under clause 3.3.1(1) of the Transpower Capital Expenditure Input Methodology Determination 2012 (**Capex IM**) of Transpower's intention to plan a major capex project which may become a proposed investment.

Investment need

We have identified an investment need, related to reliability, to increase the capacity and security of the Waikato 110 kV network. The Waikato 110 kV load is reaching the capacity limits of the existing 220/110kV interconnecting transformers at Hamilton. The peak load on the Waikato 110 kV network surpasses the N-1 capacity of the core grid Hamilton interconnecting transformers. We are reliant on generation and operational measures to manage the system if one of the inter-connecting transformers has an outage and there is an increasing risk of loss of supply. Therefore, we consider it is important that we proceed with this project expeditiously.

We do not anticipate that this proposal will be a major capex project (staged) proposal.

We are calling the potential project the *Waikato regional interconnection capacity major capex project*.

Background

The region comprises two distinct transmission networks, operating at 110 kV and 220 kV, of which the 220 kV network forms part of the grid backbone (core grid).

The transmission in the Waikato region is complex:

- The 220 kV circuits establish critical connections between the region and Stratford (Taranaki), Tokaanu and Wairakei (Central North Island), as well as Drury and Otahuhu (Auckland).
- The 110 kV circuits connect the region to Tarukenga (Bay of Plenty), Ongarue (Central North Island), and Bombay (Auckland).
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Figure 1 shows the schematic diagram of the Waikato transmission network. The 220 kV and 110 kV networks are connected by two 220/110 kV transformers at Hamilton – highlighted in the diagram. These transformers supply most of the Waikato 110 kV transmission network load (as well as a small proportion of the Auckland 110 kV loads under certain system conditions).

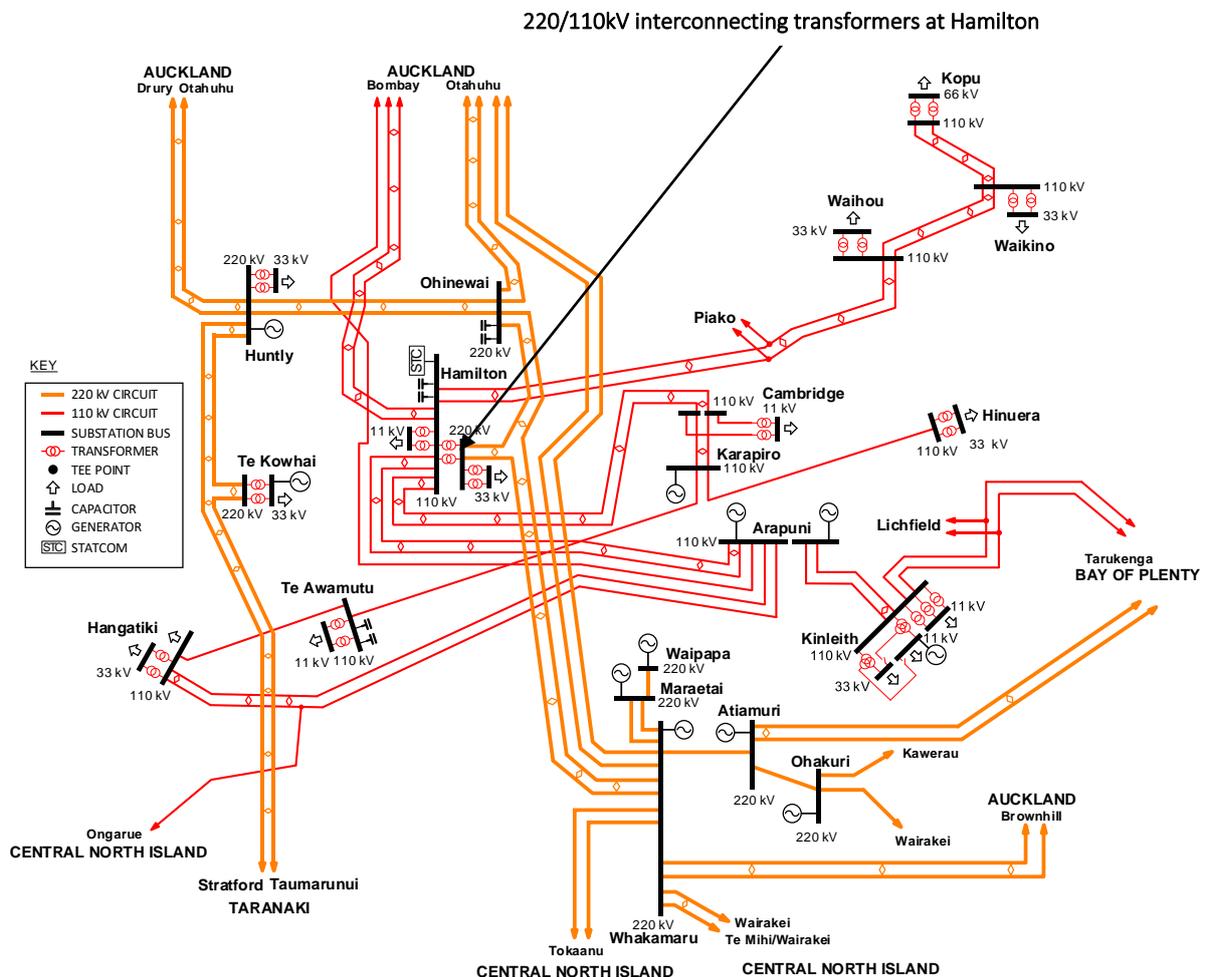


Figure 1. Transmission schematic of the Waikato 220 kV and 110 kV networks

The Waikato region, which has significant dairy, and pulp and paper processing industries, has a number of drivers of demand growth:

- strong population growth
- the electrification of transport
- electrification of process heat in the dairy, wood and meat processing industries
- new industrial development (manufacturing and logistics).

The 110 kV load is reaching the capacity limits of the existing interconnecting transformers. The peak load on the Waikato 110 kV network surpasses the N-1 capacity of the two Hamilton interconnecting transformers, meaning a trip of one transformer can overload its parallel counterpart.

The System Operator does not dispatch generation to ensure N-1 security on the Hamilton

interconnecting transformers, as transformer outages are treated as extended contingent events (ECE). Post contingent overloads following an ECE are managed by the System Operator through post contingency actions, including generation redispatch, grid reconfigurations or load control.

From Figure 2 below (**Waikato 110kV load – Winter**) this years demand on the Waikato 110 kV network is anticipated to exceed the capacity of a single Hamilton interconnecting transformer when Waikato 110 kV generation is low (60 MW combined Arapuni North and Karapiro output) and from 2030 under a maximum generation output (220 MW combined output). This means we are at risk of not providing N-1 security on core grid assets, and there is a risk of loss of load following an outage.

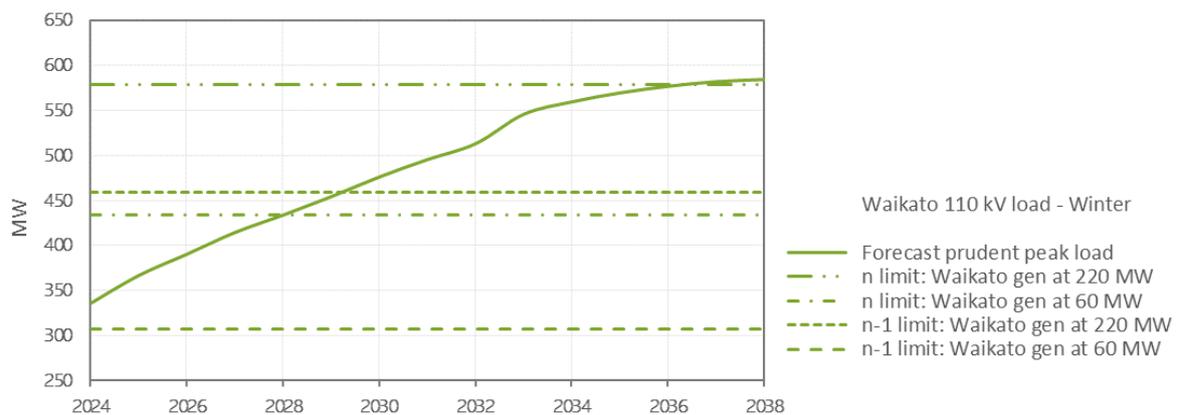


Figure 2. Waikato 110kV load – Winter

There are no practical grid reconfigurations available in the event of a contingency involving the Hamilton interconnecting transformer that could materially reduce the overload on the Waikato 110 kV load. Consequently, the System Operator will need to implement demand control measures and/or constrain on generation from Arapuni and Karapiro (if available) to manage the overload on the remaining Hamilton interconnecting transformer following an outage on its parallel unit.

In addition to the N-1 capacity issues associated with the Hamilton interconnecting transformers, the Waikato region faces N-security challenges for planned maintenance outages on:

- a Hamilton interconnecting transformer;
- the 220 kV Hamilton–Ohinewai circuit; or
- the 220 kV Hamilton–Whakamaru circuit.

Such outages will place many grid exit points in the region on N-security, and result in the need to split the Waikato 110 kV network in multiple locations to limit risk of any potential voltage collapse spreading beyond the region.

The above issues represent our current understanding and highlight an investment need to maintain a reliable electricity supply in the Waikato region. The investment need relates to capacity and security of the Waikato 110 kV network, illustrated electrically above.

The combined interconnecting transformer capacity and security of supply issues can be resolved together with investments such as the establishment of a 220/110 kV

interconnection at a new site. Therefore, these two grid issues will be investigated together, including the optimal timing for investment.

At this stage we are treating the potential project as a major capex project because some of the transmission investment options involve improving the service potential of the grid beyond that attributable to replacing existing assets with modern equivalents, and we expect the overall capex to exceed the current base capex threshold of \$20m.

The Waikato regional interconnection capacity major capex project is a new project. There are no previously approved staging projects for it.

Proposed timetable

Subject to agreement with the Commission, our high-level timetable for this investigation is as follows:

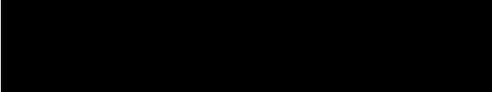
Date	Action
April 2024	Publish long list consultation
May 2024	Long list consultation closes
December 2024	Publish short list consultation (assuming no NTS RFP)
May 2025	Short list consultation (assuming NTS RFP)
July 2025	Submit major capex proposal for project

Non-transmission solutions will be considered as part of our investigation. With our long-list consultation we plan to provide respondents with 8 weeks to respond on the potential for non-transmission solutions. Depending on responses we may undertake further engagement to ensure we have adequately considered potential options. We will inform the Commission of any need to adjust our consultation programme.

Our intent is to consult on the demand forecasts and key assumptions we should use for this project as part of our long-list consultation. We are aware that new Electricity and Generation Demand Scenarios (EDGS) may be released post our long-list consultation but prior to our submission of a proposal. If that was to happen, then we will assess if there is a strong need to update our forecasts.

We look forward to working with the Commission to agree on the timetable, including the approval timeframe, and the other matters in clause 3.3.1(3) of the Capex IM.

Yours sincerely


Stephen Jones
Grid Investment Group Manager