5 Major Industry Events

5.1 Upper North Island thermal decommissioning

Since 2015, over 1,000 MW of generation capacity has been decommissioned in the Waikato and Upper North Island area. With the proposed closure of the final two Huntly Rankine units in 2022, an additional 500 MW of generation will be lost. This reduction in generation capacity coupled with forecast demand growth in the region raises significant voltage stability concerns. In addition, the loss of generation will exacerbate constraints in the central North Island.

We have published a series of reports since September 2015 examining the potential impacts of reduced thermal generation capacity in the upper North Island. These can be found at the following links:

- [https://www.transpower.co.nz/system-operator/information-industry/impact-thermal-generator-decommissioning](https://www.transpower.co.nz/system-operator/information-industry/impact-thermal-generator-decommissioning)

The main issues raised by the decommissioning of thermal generation are briefly discussed below.

5.1.1 Upper North Island voltage stability

Previously published reports have forecast dynamic and static voltage stability issues in the upper North Island following the proposed thermal generation decommissioning. Transpower’s Waikato and Upper North Island Voltage Management (WUNIVM) project team was established to investigate the investment need, options, and timing to mitigate the identified issues.

A long list consultation document was published in mid 2016.¹ A range of submissions were received, which were generally supportive of Transpower’s approach.

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¹ A long list consultation document identifies a full range of options to meet the need, even if these is no identified proponent. Options have not been assessed against specified criteria at this stage.
Since that time the project team has focussed on producing high level development plans identifying how various combinations of investment options would impact the upper North Island voltage stability limit over an extended time period, from 2018 to beyond 2040.

From the development plans, work is underway to identify a preferred option, with a view to submitting it to the Commerce Commission for approval in 2018.

The development plans include possible transmission solutions, but some components of the plans are costly. Transpower intends to seek proposals for non-transmission solutions that could enable the more costly transmission components to be economically deferred or avoided.

For more details of this project, including the long list consultation paper and submissions received refer to [https://www.transpower.co.nz/waikato-and-upper-north-island-voltage-management-investigation](https://www.transpower.co.nz/waikato-and-upper-north-island-voltage-management-investigation).

### 5.1.2 Thermal constraints: Future generation development

With existing generation assets, no thermal constraints are seen between Whakamaru and Auckland. However for system studies it is necessary to assume generation development, over time, to maintain a balance between demand and generation.

Our system studies have assumed generation development occurs either at, or south of Whakamaru, or in Taranaki.

**Whakamaru area generation development**

Where our studies assumed generation development at (or south of) Whakamaru, thermal constraints arise between Whakamaru and Auckland.

As there is not currently any committed generation development in these locations, we have not studied the potential constraints in detail at this stage. The voltage stability studies being undertaken for the WUNIVM project have linkages with thermal constraints between Whakamaru and Auckland. Where future investments offer both thermal and voltage benefits the thermal benefits will also be taken into consideration in the options analysis.

Refer to Chapter 6, Grid Backbone (North Island section), for further discussion of thermal constraint issues.

**Taranaki area generation development**

Where our studies assumed generation development in the Taranaki region, existing transmission constraints on the Tokaanu–Whakamaru and Huntly–Stratford circuits were exacerbated. These constraints are most likely to be seen when high generation output in Taranaki coincides with high HVDC north transfer or high generation output in the Wellington region.

As there are not currently any committed generation developments in the Taranaki region we have not studied the constraints in detail at this stage.

### 5.1.3 Central North Island 110 kV constraints

The 110 kV Bunnythorpe–Mataroa circuit already limits the ability to supply the upper North Island with existing generation from the South Island and the Wellington and
5.1.4 Central North Island 220 kV constraints

Northward transfer of power on the grid backbone through the central North Island is currently limited by a special protection scheme that prevents overloading of a Tokaanu–Whakamaru circuit for the loss of the parallel circuit. We have committed to modifying the special protection scheme to provide a small increase in the operational n-1 limit of the scheme and associated line capacities.

Transmission constraints south of Whakamaru depend on where new generation is located, its size and the timing of the investment.

Refer to Chapter 6 for further detail on these constraints.

5.1.5 Wairakei Ring constraints

New generation connections in the Wairakei Ring area have the potential to create transmission constraints on the Wairakei Ring. However, as there are no currently no committed generation developments in this region, we have not initiated any investment investigations. (Refer to Chapter 6 for further detail.)

5.2 Tiwai Point Aluminium Smelter closure

The aluminium smelter, owned by New Zealand Aluminium Smelter Limited, connects to the grid at the Tiwai grid exit point. It’s peak load is 582 MW. Potential closure of the plant has been raised in recent years, but current arrangements mean that a minimum 12 month notification must be given of intention to cease operations.

Closure of the smelter would result in an excess of generation in the lower South Island. Transmission of this surplus to other regions of New Zealand would be constrained by the capacities of the South Island grid, the HVDC link, and the North Island grid.

The main transmission issues raised by smelter closure are briefly discussed below.

5.2.1 South Island grid constraints

There will be transmission constraints in sending power from Clutha/Southland to Benmore if operations at the aluminium smelter cease.

To increase power export from Southland the 220 kV circuits between Roxburgh and Benmore will need increased capacity. These constraints were studied as part of the Clutha Upper Waitaki Lines Project (CUWLP). Construction of the new assets identified by the CUWLP work is expected to take three years from an announcement of smelter closure. (Refer to Chapter 6 for more details.)

5.2.2 HVDC capacity constraint

Current northward transfer capacity of the HVDC link is 1,200 MW. The Pole 3 upgrade project completed in 2013 envisaged a ‘Stage 3’, which would further
increase northward transfer capacity to 1,400 MW. However, this addition was not economically justifiable while the aluminium smelter remained in operation.

Recent condition assessment shows that the existing HVDC submarine cables will be approaching their end of life in approximately 10 years. An investigation will be initiated within the next year to assess the replacement need and options for the HVDC cables. This investigation will include an option to increase the capacity of the HVDC cables beyond the current capacity. (Refer to Chapter 6, HVDC section).

5.2.3 North Island Grid constraints

Transferring the surplus generation from the lower South Island to the load centres in the upper North Island will exacerbate existing constraints on the central North Island 220 kV circuits. The increased power transfer may require investment in the Central North Island 220 kV circuits to increase capacity.

The constraints likely to be seen are those discussed Chapter 6, Grid Backbone (North Island section).