

Amendment to System Security Forecast 2010 December 2011 Summary of Changes



SYSTEM OPERATOR

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I M P O R T A N T

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1. EXECUTIVE SUMMARY

The Electricity Governance Rules (the rules) require the System Operator to publish a System Security Forecast (SSF) on 1 December 2004 and every two years thereafter. The rules require the System Operator to review the most recent SSF at six monthly intervals. The last SSF was published on 1 December 2010.

If, in the reasonable opinion of the System Operator, a change has been made to the power system that would materially affect the most recent SSF then the System Operator must amend, publish and provide a revised SSF to the Electricity Authority.

To meet the requirements of the 'Code' for the June 2011 review, the System Operator has undertaken the following review process:

- Review committed changes
- Quantify effects on the most recent SSF
- Revise SSF and publish to the Electricity Authority

The System Operator has completed the review of committed changes and has decided to amend the System Security Forecast that was first published on 1 December 2010.

This report amends the System Security Forecast December 2010 and published updates, by Transpower in its role as System Operator. Except for those areas amended by this report, the December 2010 System Security Forecast are still valid.

This amendment takes into account new upgrades which now pass the committed investment test. These upgrades affect supply the Central North Island, Waikato, and Taranaki regions.

This report includes four sections:

- Sections 2 and 3 set out the process by which the System Operator has reviewed the December 2010 System Security Forecast and subsequent amendments
- Section 4 describes the additional changes to the power system
- Section 5 summarizes the impacts to the power system and contains the amendments to the December 2010 System Security Forecast



2. INTRODUCTION

As required by the rules from December 2004, the System Operator undertakes a major review of the SSF every two years. The rules also require the System Operator to review the most recent System Security Forecast at six monthly intervals. If, in the reasonable opinion of the System Operator, a change has been made to the power system that would materially affect the most recent version of the SSF then the System Operator must amend, publish and provide a revised SSF to the Electricity Authority.

To meet the requirements of the rules, the System Operator worked through the following process:

- **Review committed changes.** Review committed changes to the power system and assess the effects of these changes upon the most recent SSF. If the committed changes are assessed to have no material effect then the review will end at this point.
- **Quantify effects on most recent SSF.** Quantify the effects of the committed changes by carrying out necessary power system analysis. If the effects are considered likely to be material then the necessary power system analysis will be carried out to quantify the effects. If the quantified effects are not sufficient to materially affect the most recent SSF then the review will end at this point. The Electricity Authority will be formally notified of the outcome.
- **Revise SSF and publish to the Electricity Authority.** If the review concludes that the most recent SSF needs to be revised then the revised SSF will be provided to the Electricity Authority on a date agreed between the System Operator and the Electricity Authority. This phase will include approval of the revised SSF by Transpower's Board.

This report contains the System Operator's opinion as to whether changes to the power system will materially affect the most recent SSF.



3. METHODOLOGY

To determine whether any changes to the power system may materially affect the most recent SSF the following process has been performed.

- A compiled list of new generation proposals, notified generator decommissioning and grid upgrades that were not assumed in the most recent SSF
- Applying the SSF Committed Investment Test (see below) to each new generation proposal, generator decommissioning and new grid upgrade
- Assessing the material effect on the most recent SSF of each new generation proposal and grid upgrade that passes the SSF Committed Investment Test
- Assessing whether new power system issues have emerged since the most recent SSF that should be included in the SSF

3.1 SSF COMMITTED INVESTMENT TEST

Committed changes to the power system are defined as:

- The actual proposed investment project must satisfy a number of criteria indicating that they are extremely likely to proceed in the near future, for instance:
 - Land has been acquired for construction of the project
 - Planning consents, construction approvals and licences have been obtained
 - Construction has begun or a firm commencement date has been set;
 - Contracts for supply and construction have been finalised
 - Financing arrangements must be largely completed.
- The removal or reduction of stated capability of existing assets where a final decision has been made to decommission or reduce the capability on or after a specified date (such changes to have publicly communicated and contracts have been put in place for the purpose of decommissioning or reduced capability) or where consents or other agreements required for the continued operation of the assets expire or are expected to expire and in respect of which no reasonable certainty of renewal is available.



4. COMMITTED POWER SYSTEM CHANGES

4.1 BACKGROUND

The December 2010 SSF took into account transmission upgrades that passed the SSF Committed Investment Test at the time. There were a number of transmission upgrades proposed at that time that did not pass the SSF Committed Investment Test. These upgrades (and others later proposed by Transpower as part of its Grid Upgrade Plans) are re-evaluated at each six monthly review of the SSF to determine whether additional upgrades can be considered as committed. The cut off date for any new transmission investments to be considered in this review of the SSF was 3 November 2011.

4.2 NEW INVESTMENT

The following updates and additional transmission investments have been added to the list of committed changes used in the preparation of the December 2011 review of the SSF.

4.2.1 TRANSMISSION

Asset	Upgrade	Impact Region	Expected Date	Status
North Island Region New Committed Upgrade Projects				
<i>Te Mihi</i>	Te Mihi switching station connecting the Te Mihi and Poihipi generating stations into the WRK-PPI-WKM-1 220 kV circuit	Central North Island	September 2012	Committed
<i>Arapuni</i>	110 kV bus split	Bay of Plenty	N/A	Operational
South Island Region New Committed Upgrade Projects				
N/A				

Table 4-1 : SSF Transmission Committed Assets

4.2.2 GENERATION

Additional generation that has been considered as committed for this update

Asset	Upgrade	Impact Region	Expected Date	Status
North Island Region New Committed Upgrade Projects				
<i>McKee</i>	2 x 50 MW gas generating units that tee connect into the MNI-SFD-1 110 kV circuit	Taranaki	End of 2012	Committed
<i>Ngatamariki</i>	4 x 20 MW geothermal plant connected to the NAP station that is teed into the OKI-WRK-2 110 kV circuit	Central North Island	Jan-Mar 2013	Committed
<i>Te Mihi</i>	2 x 92 MW geothermal plant connected to the Te Mihi switching station	Central North Island	End of 2012	Committed
South Island Region New Committed Upgrade Projects				
N/A				

Table 4-2 : SSF Generation Committed Assets

5. AMENDED SECTION OF THE LATEST UPDATE OF DECEMBER 2010 SYSTEM SECURITY FORECAST REPORT

5.1 EFFECT OF POWER SYSTEM CHANGES

Three regions in North Island have been updated based on Tables 4-1 and 4-2 and any additional power system security issues noted by the System Operator. The summary of the amended sections of the latest December 2010 SSF are shown in this section.

Central North Island Regions

The addition of the Te Mihi switching station reconfigures the existing Wairakei-Poihipi-Whakamaru 1 220 kV circuit to the Te Mihi-Wairakei 1 and Te Mihi-Whakamaru 1 220 kV circuits. The new Te Mihi and the existing Poihipi generating stations are connected to the Te Mihi switching station. There are no changes to existing power system limits but the risk that a parallel circuit may exceed stated capability for the loss of the Te Mihi-Whakamaru-1 220 kV circuit is increased with the additional generation in the region prior to the implementation of new 220 kV circuit between Wairakei and Whakamaru.

Following the upgrade of the Mangamaire-Masterton and Mangamaire-Woodville 110 kV circuits, the limit on HVDC south transfer is the Bunnythorpe-Woodville 110 kV circuits exceeding stated capability for the loss of the other circuit with the 110 kV system intact. This issue can be managed operationally by splitting the 110 kV system at Mangamaire but will reduce security at that station.

Waikato Region

The 110 kV system split at Arapuni has alleviated the issues with 110 kV assets exceeding stated capability for the loss of a parallel 220 or 110 kV circuit and has increased the amount of generation that can be injected into that bus. Note that this is not a permanent split, as it is via circuit breaker, and it may be closed under certain grid conditions.

Taranaki Region

The McKee 100 MW generation station is planned for the Taranaki region. The station will be teed into the Motunui-Stratford 1 110 kV circuit. No power system security issues have been identified with this new connection.



6. OTHER UPDATES

6.1 DRY YEAR OPERATIONAL ISSUES

6.1.1 TRANSMISSION CONSTRAINTS

As mentioned in section 5.1, with lower than normal hydro storage levels in late winter/early spring of this year the power system has seen significant levels of HVDC south transfer and this has caused thermal constraints to bind on the Bunnythorpe-Woodville 110 kV circuits.

6.1.2 GENERATOR INSTANTANEOUS RESERVE CONSTRAINTS

The limit on HVDC south transfer is often dictated by the amount of reserves available to manage an under-frequency and over-frequency event. The System Operator has recently reviewed these limits on HVDC south transfer based on the amount and type of reserves that may be available on the system.

The binding constraint remains the amount of reserve offered for an under-frequency event in the South Island following the loss of the HVDC. Following the commissioning of Pole 3, the availability of reserves for an over-frequency event in the North Island will set the HVDC south transfer limit.

6.2 FREQUENCY PRINCIPAL PERFORMANCE OBLIGATIONS

Section 6.2 on over-frequency management of HVDC south transfer has been updated. As mentioned in section 6.1 above the System Operator has reviewed the limits on transfer to manage an over-frequency event in the North Island and the interim limit of 490 MW HVDC has been removed.

