

System Operator Reports

December 2015

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SYSTEM OPERATOR

TRANSPower



Keeping the energy flowing

System Operator Operational and System Performance Report to the Electricity Authority for December 2015

Purpose of Report

This report summarises Transpower's review of its performance as system operator for December 2015, as required under clause 3.14 of the Electricity Industry Participation Code 2010 (the Code).

Any relevant operational issues are also provided for the information of the Electricity Authority (Authority). A separate detailed System Performance report will be provided to Authority staff.

1. Business Plan Progress Update

The System Operator Business Plan outlines the key business initiatives to be undertaken in the 2015/16 financial year to enable us to meet the strategic goals set out in the System Operator Strategic Plan 2015-2020.

There are eight key business initiatives, each pertaining to one or more strategic goals, with a number of associated key performance indicators (KPIs). Performance to date is good with over 90% (35/38) of the measurable 2015/16 KPI's forecast to be on track. One KPI has now been missed. Performance on each key business initiative is summarised in Appendix A.

2. December Summary from an Operational and System Performance Perspective

Operational and System Performance

On 1 December, a continuing HVDC planned maintenance outage resulted in Pole 3 transfer of 0 MW and the unavailability of bi-pole attributes of FKC and reserves sharing. During the bi-pole outages frequency keeping services reverted to island-based service (with North and South Island bands of 50MW and 25MW respectively). Normal HVDC services resumed at 19:30.

At 00:02 on the 11th, a HVDC bi-pole protection trip operated causing the loss of approximately 90 MW of HVDC transfer northwards. The loss of transfer caused North Island frequency to fall to 49.39 Hz and South Island frequency to rise to 50.90 Hz. Investigations determined a protection monitoring system module had failed, which, following replacement with a spare held on site, allowed the bi-pole to return to service at 05:30 the same day.

Although the HVDC control system was repaired quickly, concern remained regarding the reason for the failure and the fact it impacted both poles. Consequently, the system operator determined the HVDC bi-pole should be treated as a contingent event (CE) risk until the issues resulting in the failure were sufficiently understood. Initially it was believed understanding these issues might take in excess of a month. However, following remedial works carried out during a bi-pole outage on 19 December, the system operator was able to re-classify the bi-pole to its usual status as an ECE risk.

Transpower is undertaking a review of the incident and will publish a report (in its roles as grid owner and system operator) in February.

During December the system operator carried out additional dispatch parameter and frequency keeping tests as part of ongoing work related to the Authority's normal frequency and national frequency market works. Testing involved:

- sending dispatch schedules, using an automated procedure, with MFK enabled from 2-9 December. Frequency keeping service was procured in the normal way.
- as a separate trial, disablement of MFK the application (with continued sending of automated dispatch schedules). This trial was to assess system operator capability of managing the system without MFK, which was a continuation of trials undertaken during the FKC trial (reported in April 2015). While this test was disrupted by bi-pole outages, it was completed satisfactorily. A further test is to be carried out in January.

Other activity on the power system was relatively subdued. Transpower continued outages on its Bunnythorpe-Haywards circuits, where conductor replacement work is being carried out, which were accommodated without causing security issues. Stratford Peaker units U21 and U22 tripped on 5 December (due to a gas issue), with 150MW departing from the system resulting in a drop in North Island frequency to 49.77Hz.

3. Market

There were no market systems outages exceeding two hours in duration in December.

4. Business Performance

Policy Statement Review

The system operator is currently reviewing its Policy Statement, as per its Code obligations (also key business initiative 1). The industry consultation paper and amended Policy Statement were published in mid-October and the consultation closed in November. The system operator provided a draft for consultation to the Authority in December 2015.

Significant Project Update – Reserves and Frequency Management Programme

The Reserves and Frequency Management (RFM) programme continued to progress per the schedule agreed between the system operator and the Authority. Industry collaboration remains a high priority and is greatly assisting a positive relationship with industry stakeholders. The next RFM engagement group is scheduled for mid-February. The RFM programme forms part of key business initiative 4.

Programme component projects are progressing at different stages as follows:

- MFK Refinement (TASC SOW 055) – MFK testing with FKC disabled was completed during the bi-pole outage. Further testing will commence during January with results to be analysed on completion.
- System Stability (TASC SOW 056) – This TASC follows on from TASC SOW 049 and will assess the level of droop that can be set without undermining system security. Following advice from the Authority that funding for this SOW is to be reduced the scope has been revised to include only phase 1 work. A change request has been submitted to the Authority to this effect.
- National Market for Frequency Keeping – This project remains on hold pending the findings of the Normal Frequency Management Strategy and subsequent investigations. The Authority is currently preparing a proposed timeline for this work stream which is to be presented at the February RFM project advisory team meeting.

- National Market for Instantaneous Reserve – Solution requirements have been issued as a baseline version for approval. Design is progressing well with the final business case to be issued in February.
- Review of Instantaneous Reserve Markets Stage 2 (TASC SOW 053) – The focus for December was re-scoping and re-planning following advice of a reduction in funding by the Authority. This work has been completed and a change request is now with the Authority for approval. Work will continue against the revised scope and timelines.
- RMT Study Tool – Release 1 testing was undertaken in December. Testing was completed successfully with a small number of defects to account for. Release 2 development is now underway.

Significant Project Update – Efficient Procurement of Extended Reserves Implementation

The system operator completed work on managing the implementation phase, including a review of risks and assessing impacts on the Reserves Management Tool.

Significant Project Update – PRISM

Transpower Board approval to change the commissioning date to 18 March 2016 has now been incorporated into the revised project schedule. A formal request associated with this change was approved by the Authority in December. The project remains on track to commission on 18 March; however, there is a risk of delays due to unresolved "go live" defects. This issue is being actively managed by the project. A commissioning working group has been formed to engage key business representatives and ensure updated information is regularly provided.

5. Security of Supply Update

Storage has steadily declined since early December due to particularly low inflows into South Island catchments.

NZ aggregate storage levels are 89% of average for this time of year. The hydro risk meter is currently set at "normal". In the unlikely event of significant equipment failure, the security of supply status could change quickly.

6. Compliance Report

There were no breaches of the principal performance obligations during December.

One breach of the Code (event 3145) was reported to the Authority during December, relating to the incorrect application of a constraint during an emergency potline reduction at Tiwai.

The Authority also initiated an investigation into a system operator breach (event 3051) regarding the incorrect modelling of a Huntly unit 5 dispensation.

7. Ancillary Services

During the monthly processing for December, an issue was identified with the HVDC configuration which forms part of the reserves cost allocation calculation.

Under clause 8.68 (2) of the Code, the system operator is obligated to provide the 'at risk HVDC transfer' to the clearing manager. From 10:00 on 11 December to 17:30 on 19 December the HVDC was classified as a CE risk. The Code does not explicitly provide for the situation where the HVDC configuration is 'bi-pole not round power' while the HVDC is treated as a CE risk, hence the 'at risk HVDC transfer' was higher than normal.

To ensure the at risk HVDC transfer information provided to the clearing manager was consistent with the HVDC being a CE risk, the system operator used a different HVDC configuration ('Pole 2 only') for the affected periods. This configuration does not reflect the actual state of the HVDC for the affected periods, but was used in order to provide pragmatic 'at risk HVDC transfer' values and to fairly allocate reserve costs to all parties for the affected periods.

The system operator informed the market of the situation in a CAN on 15 January, with a link to further information provided on our website.

Ancillary Service Costs

The costs of ancillary services for the month are in Appendix B.

8. Code 7.10: Separation of Transpower Roles

In performing its role as system operator, Transpower has not been materially affected by any other role or capacity Transpower has under the Code or under any agreement.



Appendix A – Business Planning Update KPI Table

Key Business Initiative	# of KPIs	Complete	On track	At risk	NA	Missed	Comments
1. Assisting the Authority to meet its competition, reliability and efficiency objective (the CRE objective)	2	1	1	-	-	-	One KPI, relating to applying the CRE objective to 25% of our policies and procedures, has been completed ahead of schedule. However, we will continue to monitor progress. The other KPI, relating to releasing \$1m of market benefits, is now on track following the assignment of the necessary resources.
2. Developing an efficient balance between risk, reliability and resilience	3	-	3	-	-	-	Work is continuing on all KPIs with all presently on track.
3. Seeking opportunities to add value through the provision of information to support an efficient market	3	-	3	-	-	-	Work has now commenced on all three KPIs with all presently on track. The third KPI, relating to publishing event reports within four weeks, has moved to 'on track' during December following the timely provision of a summary report regarding the 11 December HVDC tripping and subsequent contingent event risk.
4. Improvements to deliver a system operator service that meets or exceeds expectations and represents value for money	6	1	5	-	-	-	One KPI, relating to recognising and addressing the Authority's concerns about increasing capital spend, has been completed ahead of schedule. Work is ongoing on the remaining five KPIs, with all presently on track.
5. A transparent business and requirements roadmap for investments required to deliver the system operator service	2	1	1	-	-	-	One KPI, related to aligning our capital investments, is now complete following the completion of project Aardwolf. Completion was ahead of schedule. The second KPI remains on track.



Key Business Initiative	# of KPIs	Complete	On track	At risk	NA	Missed	Comments
6. Building capability, and promoting a professional, responsive service culture	5	1	4	-	-	-	One KPI, relating to implementing a study version of vSPD for analyst use, has been completed ahead of schedule. Work continues on the remaining four KPIs, with all remaining on track at this stage. One KPI is being closely evaluated due to potential impacts of an employee transfer.
7. Engaging with and understanding the Authority, market participants and consumers	5	1	4	-	-	-	One KPI, relating to the completion of a 'building connections' customer video, has now been completed ahead of schedule. Work continues on the remaining four KPIs with all presently on track.
8. Maximising opportunities arising from being part of the wider Transpower business	12	4	5	2	-	1	Four KPIs, relating to an MOU for generator commissioning, a baseline for comparing future staff turnover, an engineering progression programme, and the introduction of an annual site visit safety assessment programme have been completed ahead of, or on, schedule. Two KPIs, related to the development of a common fatigue management policy, and the investigation and implementation of changes to reduce the quantity of reserves required to cover HVDC operation, are now at risk. One KPI, regarding the introduction of a market analyst progression programme has now been missed. Work has commenced, or is shortly planned to commence, on the remaining KPIs, with these on track.
Totals	38	9	26	2	0	1	

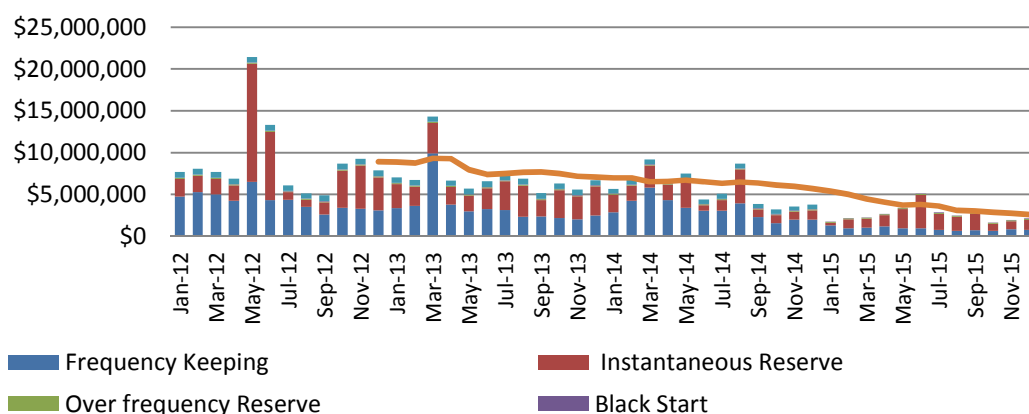


Appendix B – Ancillary Service Costs for December 2015

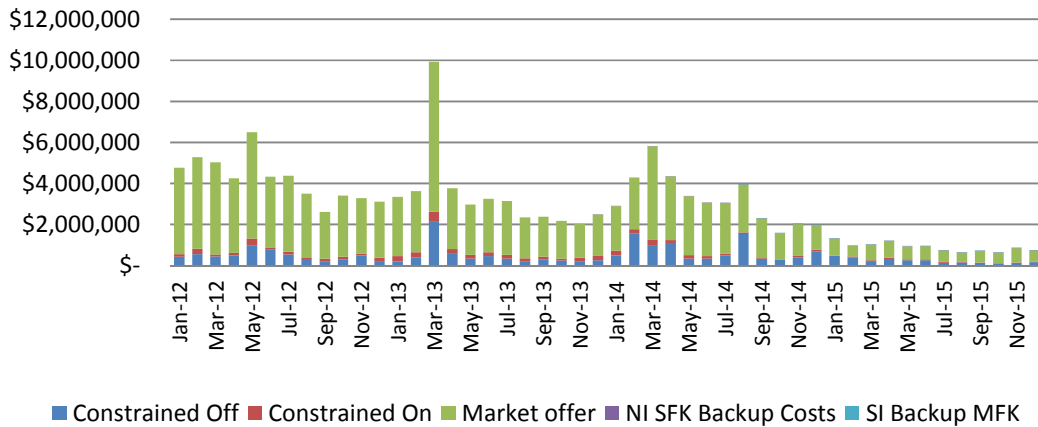
Note: The scale for the Instantaneous Reserve (Past 4 Years) graph has been reduced to clarify detail. Two months data, May and June 2012, overly influenced the graph scale.

		Cost	
Frequency Keeping	Constrained Off	\$	154,869
	Constrained On	\$	27,379
	Market offer	\$	550,198
	NI SFK Backup Costs	\$	2,916.67
	SI Backup MFK	\$	3,832.00
	Total monthly Cost	\$	739,195
Instantaneous Reserve	Spinning reserve	\$	658,636
	Interruptible Load	\$	557,092
	Constrained On	\$	9,617
	Total monthly Cost	\$	1,225,345
Over Frequency Reserve	Total monthly Cost	\$	123,349
Black Start	Total monthly Cost	\$	55,285
Voltage Support	Total monthly Cost	\$	-
All Ancillary Services	Total monthly Cost	\$	2,143,173

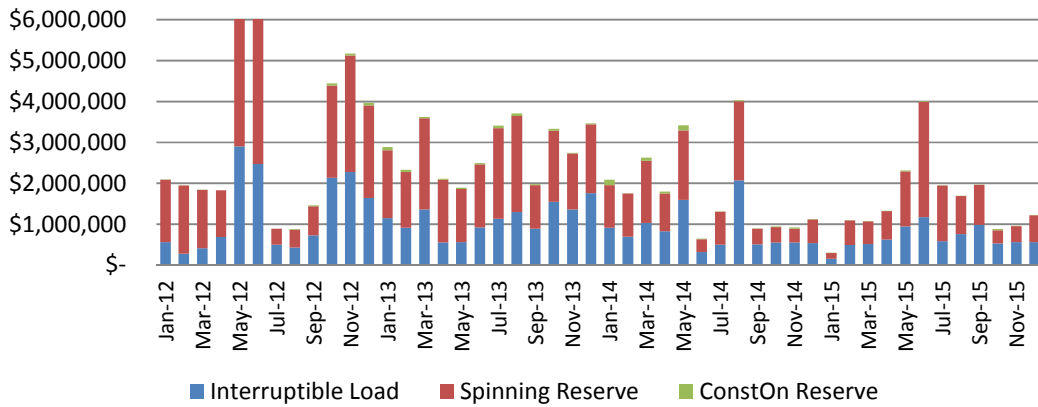
Ancillary Services Costs (past 4 years)



Frequency Keeping (past 4 years)



Instantaneous Reserve (past 4 years)



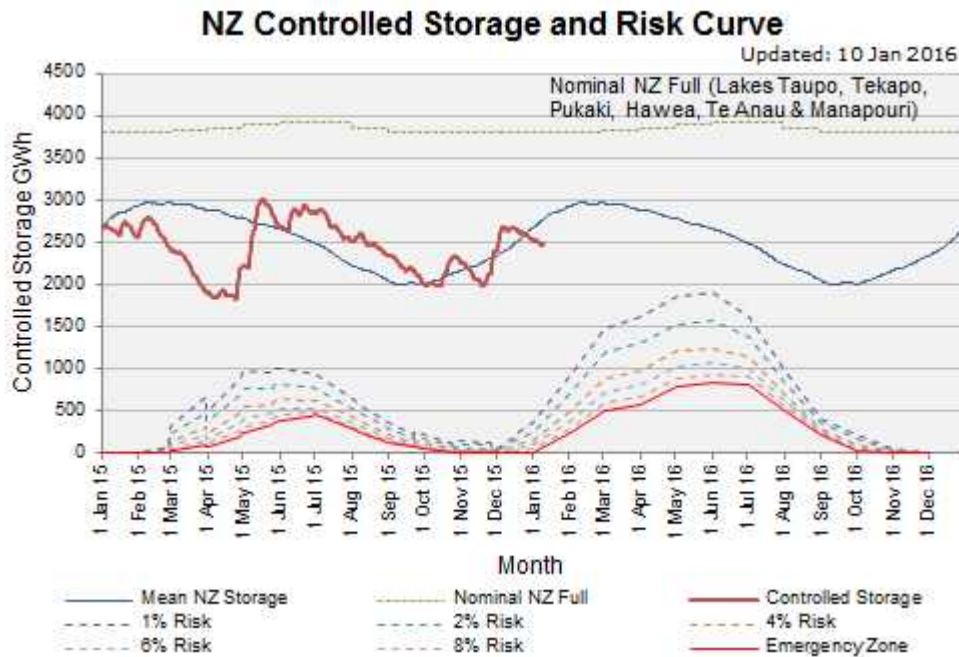
Note: IR Cost May 2012 = 14.129M, IR Cost Jun 2012 = 8.164M

Appendix C – Security of Supply

New Zealand Hydro Storage and Hydro Risk Curves

As at 12 January 2016, aggregate primary New Zealand storage was 89% of average.

The graph below compares New Zealand hydro storage to the hydro risk curves.



Hydro Storage and Generation in December

North Island inflows were 70% of average.

South Island inflows were 81% of average.

Measurements are based on daily inflow values.

Hydro generation met 62% of demand.

System Performance Report

To the Electricity Authority

December 2015

Purpose

This System Performance Report summarises power system performance each month. The detailed reporting of system events is intended to provide an understanding of the nature of system events that occur in the normal course of the real time co-ordination of security and to identify emerging issues in system operation.



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1. SUMMARY OF SYSTEM PERFORMANCE

This system performance report covers the month of December 2015.

Principal Performance Obligations

The system operator met the Principal Performance Obligations during the reporting period.

System Events

- On 2 December, at 16:04, an emergency potline off-load at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.50 Hz.
- On 11 December, at 00:02, HVDC Poles 2 & 3 tripped resulting in a momentary drop in North Island frequency to 49.39 Hz and, consequently, a momentary rise in South Island frequency to 50.90 Hz.
- On 21 December, at 12:33, an emergency potline off-load at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.54 Hz.

Other noteworthy events occurring during the reporting period:

- On 11th December at 16:59 Ohakune 110 / 11 kV supply transformer T2 tripped resulting in a loss of supply to Ohakune. Supply was restored after 4115 minutes.

2. PRINCIPAL PERFORMANCE OBLIGATIONS

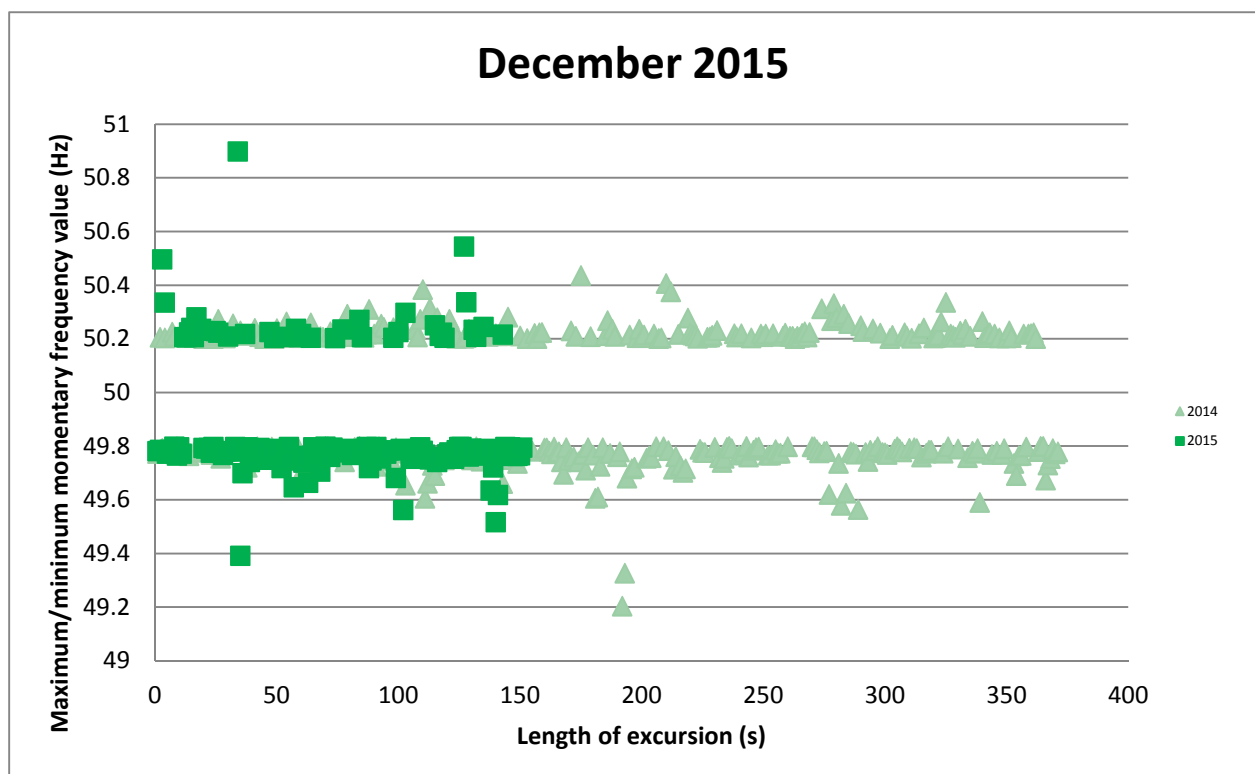
2.1 AVOID CASCADE FAILURE

No instances of cascade failure occurred during the reporting period.

2.2 FREQUENCY

Maintain frequency in normal band and recover quickly from a fluctuation

The chart below shows the maximum or minimum frequency reached and length of each frequency excursion outside the normal band (49.8 to 50.2 Hz) during the reporting period. The majority of excursions are within 0.4 Hz of the normal band and frequency typically returns to within the normal band within 2 minutes.



Maintain Frequency and limit rate occurrences during momentary fluctuations

The table below shows the total number of momentary fluctuations outside the frequency normal band, recorded in both Islands, over the last 12 months. The 12 month cumulative totals, grouped by frequency band, are compared to the frequency performance objective.

Frequency Band	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Annual rate	PPO target
55.00 > Freq >= 53.75														0.2*
53.75 > Freq >= 52.00														2*
52.00 > Freq >= 51.25														7
51.25 > Freq >= 50.50		1	2	1	1	4	2	2		1	1	3	18	50
50.50 > Freq >= 50.20	26	25	47	153	252	308	104	131	146	52	52	37	1333	
50.20 > Freq > 49.80														
49.80 >= Freq > 49.50	24	15	44	174	315	295	141	170	172	128	173	111	1762	
49.50 >= Freq > 48.75	1	1	1					1				1	5	60
48.75 >= Freq > 48.00														6
48.00 >= Freq > 47.00														0.2
47.00 >= Freq > 45.00														0.2

* South Island

Manage time error and eliminate time error once per day

The time error performance criteria are:

Time error must be managed within +/- 5 seconds.

Time error must be eliminated at least once every day.

Time Error Compliance Table		Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Time Error Management	NI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Error Elimination	NI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3. OPERATIONAL MANAGEMENT

3.1 SECURITY NOTICES

The following table shows the number of Warning Notices, Grid Emergency Notices and Customer Advice Notices issued over the last 12 months.



Notices issued	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	1	4	-	2	3	1	-	-	-	1	2	1
Warning Notice	29	27	31	10	12	-	-	1	-	3	-	-
Customer Advice Notice	11	12	12	13	32	11	5	6	10	7	9	16

3.2 GRID EMERGENCIES

The following table shows grid emergencies declared by the system operator in the reporting period.

Date	Time	Summary Details	Island
18/12/15	17:51	A grid emergency was declared to close the 110 kV Arapuni Bus split due to an electrical storm in the vicinity.	N

A summary of grid emergencies that have occurred in the last 12 months is shown in the following table.

Island	Region	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	July-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Total
North Island	Northland	-	-	-	-	-	-	-	-	-	-	-	-	0
	Auckland	-	-	-	-	-	-	-	-	-	-	-	-	0
	Zone 1	-	-	-	1	-	-	-	-	-	-	-	-	1
	Waikato	1	2	-	-	3	-	-	-	-	1	1	1	9
	Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	0
	Hawkes Bay	-	-	-	-	-	-	-	-	-	-	-	-	0
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	0
	Bunynthorpe	-	-	-	-	-	-	-	-	-	-	-	-	0
	Wellington	-	-	-	-	-	-	-	-	-	-	-	-	0
	North Island (all)	-	-	-	-	-	-	-	-	-	-	-	-	0
Lower North Island	-	-	-	-	-	-	-	-	-	-	-	-	0	
North & South Islands		-	-	-	-	1	-	-	-	-	-	-	-	1
South Island & HVDC	Nelson Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	0
	West Coast	-	-	-	-	-	-	-	-	-	-	1	-	1
	Christchurch	-	-	-	-	-	-	-	-	-	-	-	-	0
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	0
	Zone 3	-	-	-	-	-	-	-	-	-	-	-	-	0
	Otago	-	1	-	-	-	-	-	-	-	-	-	-	1
	Southland	-	1	-	1	-	1	-	-	-	-	-	-	3
	South Island (all)	-	-	-	-	-	-	-	-	-	-	-	-	0
HVDC	-	-	-	-	-	-	-	-	-	-	-	-	0	

3.3 CUSTOMER ADVICE NOTICES

Sixteen Customer Advice Notices (CANs) were issued in the reporting period including:

- six related to the temporary classification of an HVDC bi-pole tripping as a contingent event risk following an incident on 11 December;



- five related to planned and unplanned outages of HVDC Poles 2 & 3;
- one related to Multiple Frequency Keeping (MFK) and HVDC frequency keeping control (FKC) testing between 13 January and 3 February 2016;
- one advising of an industry teleconference on 17 December to discuss the scheduled outages on the 220 kV Bunnythorpe - Haywards circuits from November 2015 to April 2016;
- one advising of an industry teleconference on 17 December to update parties relating to the work Transpower is undertaking in response to announced decommissioning of North Island thermal generation;
- one providing an update on the Grid Owner's proposed Clutha / Upper Waitaki lines reinforcement project; and
- one related to the management of the Redclyffe 220 / 110 kV inter-connecting transformers.

3.4 FORECAST STANDBY RESERVE SHORTFALL (SRS) NOTICES

A total of fifteen SRS notices were issued during the reporting period based on the SDS (the system operator's own load forecasting tool). These SRS notices were in respect of trading periods on 1 and 11 December.

3.5 VOLTAGE MANAGEMENT

Grid voltages did not exceed the Code voltage ranges during the reporting period.

3.6 OUTAGE MANAGEMENT

The following table shows the number of outages over the last 12 months where operational measures (generation agreements, load management agreements or grid re-configurations) were required to allow the outage to proceed. Load agreements generally require the distributor to manage load at one or more grid exit points. Generation agreements are required to ensure that sufficient regional generation is available to provide energy or reactive support during the outage to maintain security standards. Grid re-configurations typically involve splitting the network during the outage to manage post contingency power flows. Security of supply is sometimes reduced by grid re-configuration.

Island	Region	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	July-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Total
North Island	Northland	3	7	6	12	8	7	-	3	3	5	6	3	63
	Auckland	1	6	4	8	11	5	3	7	9	5	8	2	69
	Waikato	4	10	9	8	11	7	4	6	9	5	4	1	78
	Bay of Plenty	3	4	4	6	4	4	3	2	5	2	4	-	41
	Hawkes Bay	2	4	6	6	7	3	-	-	3	2	2	1	36
	Taranaki	4	4	3	2	5	2	-	-	2	2	3	2	29
	Bunnythorpe	5	4	4	8	7	4	2	2	-	5	4	-	45
	Wellington	11	9	8	9	6	7	-	3	4	5	6	3	71
Total		33	48	44	59	59	39	12	23	35	31	37	12	432
South Island	Nelson Marlborough	7	6	4	6	8	3	2	2	4	4	7	2	55
	West Coast	8	8	6	5	10	7	6	3	3	5	9	3	73
	Christchurch	5	8	7	7	7	6	6	4	3	2	7	3	65
	Canterbury	4	5	2	2	6	1	2	2	3	1	5	2	35
	Otago	1	3	2	3	5	-	-	2	2	3	2	-	23
	Southland	1	2	4	5	3	1	4	2	1	4	-	2	29
Total		26	32	25	28	39	18	20	15	16	19	30	12	280

3.7 CONSTRAINTS

SUMMARY: Security constraints binding during the month

The following table shows binding constraints during the reporting period.



Additional information on security constraints can be found on the following website address: <http://www.systemoperator.co.nz/security-management#cs-147305>. This information includes constraint equations and a brief summary of their purpose.

Island	Region	Branch	Description	Total
South Island & HVDC	Otago	NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 2.	3
		NSY_ROX.1__CYD_TWZ1.1__CYD_TWZ1__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 1.	3
		NSY_ROX.1__CYD_ROX2.1__CYD_ROX2__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Roxburgh 2.	4
		NSY_ROX.1__CYD_TWZ2.1__:S__CYD_TWZ2__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 2.	21
		NSY_ROX.1__CYD_TWZ1.1__:S__CYD_TWZ1__ROX__LN	This is an SFT generated constraint. Its purpose is to protect Naseby-Roxburgh 1 for a tripping of Clyde-Twizel 1.	41
	Southland	EDN_INV.1__GOR_ROX.1__GOR_ROX1__INV__LN	This is an SFT generated constraint. Its purpose is to protect Edendale-Invercargill 1 for a tripping of Gore-Roxburgh 1.	3
Grand Total				75

Constraints binding during last 12 months

The following table shows constraints that bound during the reporting period for a duration of four or more trading periods, and those binding for more than 48 trading periods during the year.

Island	Region	Constraint	Reporting period		Previous 12 months	
			Number of trading periods that constraint bound	Percentage of trading periods	Number of trading periods that constraint bound	Percentage of Trading periods
North Island	Hawkes Bay	RDF_T3&T4_S_P_1	0	0.00%	84	0.48%
South Island & HVDC	West Coast	COL_HOR2.1__COL_HOR3.1__COL_HOR3__COL__LN	0	0.00%	48	0.27%
		HOR_KBY_ISL1.2__HOR_KBY_ISL2.2__:S__HOR_ISL2__ISL__LN	0	0.00%	128	0.73%
	Otago	NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	3	0.20%	103	0.59%
		NSY_ROX.1__CYD_ROX2.1__CYD_ROX2__ROX__LN	4	0.27%	6	0.03%
		NSY_ROX.1__CYD_TWZ1.1__:S__CYD_TWZ1__ROX__LN	41	2.76%	1	0.01%
		NSY_ROX.1__CYD_TWZ2.1__:S__CYD_TWZ2__ROX__LN	21	1.41%	1	0.01%



4. SYSTEM EVENTS

4.1 SIGNIFICANT SYSTEM EVENTS

The following table shows significant events (frequency excursions and connection point events) which occurred during the reporting period.

Significant frequency excursions

Date	Time	Summary Details	Island	Freq (Hz)
02/12/15	16:04	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.50
11/12/15	00:02	HVDC Poles 2 & 3 tripped in north transfer resulting in the momentary drop in frequency in the North Island and consequent momentary rise in frequency in the South Island.	N S	49.39 50.90
21/12/15	12:33	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.34

Connection point events

Date	Time	Summary Details	Generation / Load interrupted (MW)	Restoration time (minutes)
11/12/15	16:59	Ohakune supply transformer T2 tripped resulting in a loss of supply to Ohakune.	2	4115

4.2 SYSTEM EVENTS DURING REPORTING PERIOD

System events that occurred during the reporting period are summarised below:

Contingent events

Event	Number	Summary
Loss of single AC transmission circuit	14	<p>These related to trippings of:</p> <ul style="list-style-type: none"> • Ashburton-Islington 1 (auto-reclose) • Coleridge-Otira 1 (auto-reclose) • Carrington St-Huirangi 2 (auto-reclose) • Edgecumbe-Owhata 2 (auto-reclose) • Hamilton-Piako-Waihou 1 (auto-reclose) • Hamilton-Piako-Waihou 2 (auto-reclose) • Inangahua-Westport 2 • Islington-Livingstone 1 (3 x auto-reclose) • Livingstone-Waitaki 1 (auto-reclose) • Maraetai-Whakamaru 1 • Otahuhu-Whakamaru 2 • Whirinaki-Wairakei 1 (auto-reclose)
HVDC Start/Stop	0	
Supply Transformer	9	<p>This related to tripping of:</p> <ul style="list-style-type: none"> • Bells Pond T2* • Coleridge T6 • Ohakune T2 • Reefton T2* (4 x) • Tangiwai T8 • Temuka T2 <p>* Asset owned by the connecting party not the Grid Owner.</p>
Loss of grid reactive plant	4	<p>These related to trippings of:</p> <ul style="list-style-type: none"> • Islington Capacitor Bank C25 • Islington Static Var Compensator SVC9 (3 x)



Event	Number	Summary
Loss of single generation units	16	These related to trippings of: <ul style="list-style-type: none"> • Benmore G4 • Coleridge G1 • Clyde G3 (1 x trip, 1 x fast ramp) • Kinleith Co-generation • Ohaaki G6 • Poihippi G1 (2 x) • Stratford U21, U22 • Tauhara generation • Te Mihi G2 • Tekapo B G2 • Waipori generation (2 x) • Wairakei G9
Total during reporting period	43	

Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	1	This related to the tripping of: <ul style="list-style-type: none"> • HVDC Pole 2 & 3
Loss of interconnecting transformer	0	
Loss of bus bar section	0	
Total during reporting period	1	

Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	0	
Demand change	3	This related to: <ul style="list-style-type: none"> • Tiwai NZAS Standby Potline Emergency off-load (2 x) • Trippings in the connected party's network fed from Naseby Substation
Generation	0	
Total during reporting period	3	

Other disturbances

Event	Number	Summary
Feeder trippings	40	Various locations
Total during reporting period	40	



4.3 SYSTEM EVENTS – TREND

	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Total	Average Events per month
Contingent Event – transmission	13	10	8	13	8	26	11	7	8	6	20	14	144	12.0
Contingent Event – generation	19	10	14	6	11	11	13	6	16	19	27	16	168	14.0
Contingent Event – Supply transformer	2	3	2	3	3	4	0	1	2	1	2	9	32	2.7
Contingent Event – Reactive plant	7	4	2	3	6	4	3	2	5	1	2	4	43	3.6
Contingent Event - HVDC	1	0	3	0	0	0	0	0	1	0	0	0	5	0.4
Extended Contingent Event HVDC	0	0	0	0	0	0	0	0	0	0	0	1	1	0.1
Extended Contingent Event Inter-connecting Transformers	0	0	1	0	2	0	0	0	0	0	0	0	3	0.3
Extended Contingent Event Busbar	0	0	1	2	1	2	0	1	0	1	0	0	8	0.7
Other Event – AC transmission	2	1	4	0	1	8	0	0	3	2	1	0	22	1.8
Other Event – Demand	1	2	1	1	2	5	2	3	0	3	3	3	26	2.2
Other Event – Generation	3	1	4	0	1	0	0	1	3	0	0	0	13	1.1

