

System Operator Reports

July 2015

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SYSTEM OPERATOR

TRANSPower



Keeping the energy flowing

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

Purpose of Report

This report summarises Transpower's review of its performance as system operator for July 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 very good with over 90% of the 2015/16 KPI's forecast to be on track. However, we are conscious that we are only one month in to the year

Performance on each key business initiative is summarised below.

- Key business initiative 1: Assisting the Authority to meet its statutory completion, reliability and efficiency objective (the CRE objective)
 - Work has commenced on the tasks relating to both KPIs for this key business initiative. To date, the system operator is on target to meet these KPIs.
- Key business initiative 2: Developing an efficient balance between risk, reliability and resilience
 - Work has commenced on the tasks relating to all three KPIs for this key business initiative. To date, the system operator is on target to meet these KPIs.
- Key business initiative 3: Seeking opportunities to add value through the provision of information to support an efficient market
 - Work has commenced on the tasks relating to all three KPIs for this key business initiative.
 - To date, the system operator is on target to meet two of the KPIs, which relate to no pricing incidents being attributable to incorrect information being provided by the system operator to market participants and identifying a list of non-confidential data and information that can be provided to participants and consumers.
 - The third KPI, relating to prompt reporting on market events, is currently in amber status. There is a challenge in publishing these reports within the stretch target of 4 weeks and this deadline is not currently being consistently met. The system operator has a plan in place to enable this stretch target to be met.

- Key business initiative 4: Improvements to deliver a system operator service that meets or exceeds expectations and represents value for money
 - Work has commenced on the tasks relating to three of the six KPIs for this key business initiative. Work on a fourth KPI – relating to the determination of economic capability to assist with the provision of the system operator service – is expected to commence in August/September 2015. To date the system operator is on target to meet these KPIs.
 - The remaining two KPIs are dependent on the commissioning of capital projects (no projects have commissioned in the 15/16 year to date) and may be at risk due to PRISM delays.
- Key business initiative 5: A transparent business and requirements roadmap for investment required to deliver the system operator service
 - Work has commenced on the tasks relating to both KPIs for this key business initiative. To date, the system operator is on target to meet these KPIs.
- Key business initiative 6: Building capability, and promoting a professional, responsive service culture
 - Work has commenced on the tasks relating to four of the five KPIs for this key business initiative. To date, the system operator has met one of the KPIs – relating to the implementation of a study version of vSPD for analyst use – ahead of time, and is on target to meet the remaining KPIs for which work has commenced.
 - Work on the final KPI – relating to the rollout of written communication training – is yet to commence, but delivery is still anticipated to be on target.
- Key business initiative 7: Engaging with and understanding the Authority, market participants and consumers
 - Work has commenced on the tasks relating to the five KPIs for this key business initiative. To date, the system operator is on target to meet these KPIs.
- Key business initiative 8: Maximising opportunities arising from being part of the wider Transpower business
 - There are twelve KPIs that comprise this key business initiative, with work having commenced on the tasks relating to the majority of the KPIs. The system operator is on target to meet most of these KPIs.
 - The KPI relating to the development of a benchmark against which future system operator turnover can be compared has been completed ahead of schedule.
 - One KPI relating to the development of a common fatigue management policy has not been met on time due to a lack of engagement from part of the business. Engagement is being sought to deliver this KPI as soon as possible.

2. July Summary from an Operational and System Performance Perspective

Operational

Reductions in Gas supplies

Gas supplies through the Maui pipeline were reduced following an overnight Pohokura station tripping on 13 July 2015. The reduction in gas supplies for the three days following the tripping, coupled with a period of cold weather and high demand, resulted in reduced generation capacity margins at peak times, especially on the evening of 14 July 2015. Genesis' ability to utilise the remaining Rankine units, substituting gas for coal, helped alleviate what could have been a tight supply situation.

Snowstorm on the North Island's east coast

A heavy snowstorm was experienced on 10 July 2015 on the east coast of the North Island, which resulted in areas with significant snowfall and also led to trippings of assets recently divested to Eastland Networks. A number of voltage excursions occurred as a result of the storm. The load forecast was updated regularly across several days as low temperatures were experienced in many parts of the country.

Loss of supply at Hinuera

One short outage occurred on 18 July 2015 at Hinuera, after the Hinuera-Karapiro circuit tripped (a loss of 27MW).

3. Market

A 65 minute market system outage occurred on 21 July 2015 as a result of an unexpected dual storage disk failure. The back-up process using standalone dispatch worked as required. These standby systems and procedures are tested on a regular (often weekly) basis.

There were no outages, exceeding two hours in duration, to the market systems during July 2015.

4. Business Performance

Policy Statement Review

The system operator is currently reviewing its Policy Statement, as per its Code obligations and as part of key business initiative 1. The review is well underway and the system operator is on target to provide a draft for consultation to the Authority in November/December 2015.

Significant Project Update – Reserves and Frequency Management Programme

The Reserves and Frequency Management (RFM) programme is currently progressing as per the schedule agreed between the system operator and the Authority. The last meeting of the engagement group was held on 12 July 2015. The RFM programme forms part of key business initiative 4.

Programme component projects are progressing at different stages as described below:

- Efficient Procurement of Extended Reserves Implementation – The Authority has agreed to the scope and the proposed use of development fee for this work. The Authority has distributed industry invites to the 2 September 2015 workshop, with the system operator commencing the work required for this workshop. The joint project team is currently developing an outcome based approach to be presented at the workshop.
- Inter-island Instantaneous Reserve Sharing Implementation – SIR sharing functionality has been built as part of the Security Tools project, which has been functionally tested and is about to go through user acceptance testing (U)AT. An Authority discussion paper proposing the amount of SIR to be shared (60MW) was sent out to Industry for feedback. The feedback period closed in the 3rd week of July with only 2 responses received.
- Normal Frequency Management Strategy (TASC 49) – The Normal Frequency Management Strategy project (TASC49) has continued with testing one of the interim options (band swap) on the system. The short list options have been assessed and the options report is currently being drafted.

- National Market for Frequency Keeping – Work is on hold pending the outcomes of TASC49 Normal Frequency Management Strategy.
- National Market for Instantaneous Reserve – The Initial Business Case is progressing through the Transpower approval process with approval received from all signatories up to, and including, GM level.
- Review of Instantaneous Reserve Markets (TASC 47) – Project is completed, with the close out report submitted to, and accepted by, the Authority.
- RMT Study Tool – The RMTSAT Study Tool Investigation has been completed. The capital phase is currently on hold pending further review of the Initial Business Case and the associated budget as a result of an internal challenge session.
- Security Tool Implementation for New HVDC Controls – Functional testing continued, and is expected to complete, during July 2015. Regression testing and formal UAT is on target to commence at the end of July 2015. Development of the e-learning training is currently being completed, after which an end-to-end dry run will be held. Coordinator training is on target to start on 10 August 2015, with project commissioning still scheduled for 10 September 2015.

Significant Project Update – PRISM

The project continues to make progress in resolving critical defects identified from testing that must be resolved to enable commissioning, although the progress has not been as quick as planned. This issue has been escalated to the Alstom senior management and progress has improved. Transpower has also continued to send senior representatives to the Alstom's R&D Centre in the United States to keep the pressure on the resolution of defects and expedite their retesting which has worked effectively.

Despite these measures the number of issues still outstanding has placed the completion date and budget at risk, which impacts two of the KPIs that comprise key business initiative 4. Replanning is underway including assessing the consequential impacts on other projects.

Significant Project Update – Project Aardwolf

Project Aardwolf has now completed its analysis and is documenting the outputs. The project has developed a roadmap and approach to ensure the system operator service can be maintained at lowest capital cost, which will assist our delivery of key business initiative 5. This involves maintaining the existing system and simplifying some targeted areas to enable future change.

5. Security of Supply Update

There have been no Security of Supply concerns during July 2015 due to good inflows into all hydro catchments. However, we are monitoring announcements on Tiwai, and the availability of large thermal generators and considering how these announcements may affect security of supply going forward.

NZ aggregate storage levels are 108% 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 July 2015.

Three breaches of the Code were reported to the Authority during July 2015. The first two breaches related to the incorrect application of constraints, and the third to the incorrect modelling of a contingency input to the forward looking schedules.

None of these events had a market impact.

7. Ancillary Services

The system operator has completed a comprehensive review of its cost allocation process to provide assurance the errors that occurred earlier this year won't be repeated. A summary of the key findings was presented to the system operator's senior leadership team, with learnings shared with the wider system operator group. Following implementation of the review recommendations, an external auditor will be engaged to carry out an independent audit of the enhanced processes. Breach reports relating to the allocation errors will be submitted to the Authority in August 2015.

The system operator has commenced planning discussions with Genesis to carry out a black start test at Tokaanu early next year.

Trustpower has experienced some delays with bringing Patea into the Multiple Frequency Keeping market and is now targeting the end of August 2015.

Planning is fully underway for the 2015 annual procurement round, due to commence at the end of August.

Ancillary Service Costs

The costs of ancillary services for the month of July 2015 are set out in Appendix A (as required by clause 82.1 of the Procurement Plan).

Of note, instantaneous reserve costs have dropped back significantly from the spike seen in June 2015. This is primarily due to an increase in the offering of lower priced reserves during July.

8. Code 7.10: Separation of Transpower Roles

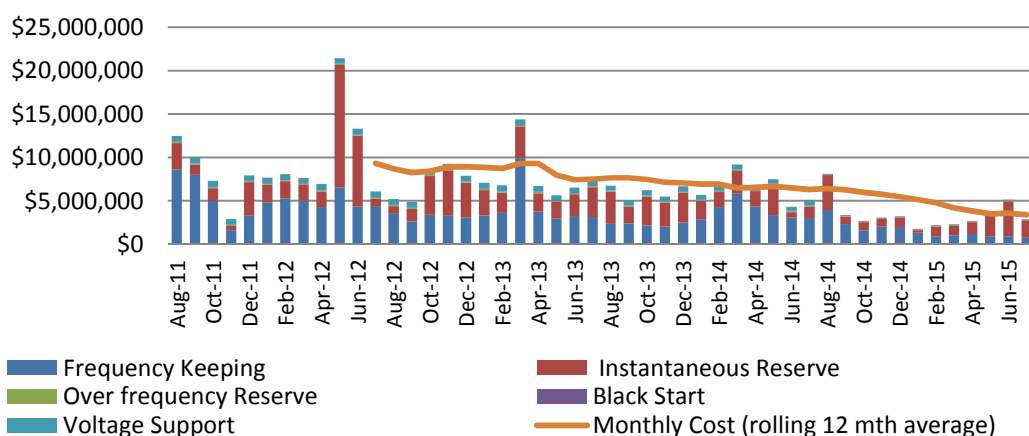
In performing its role as system operator, Transpower has not been materially affected by any other role or capacity Transpower has under the Code or under any agreement.

Appendix A – Ancillary Service Costs for July 2015

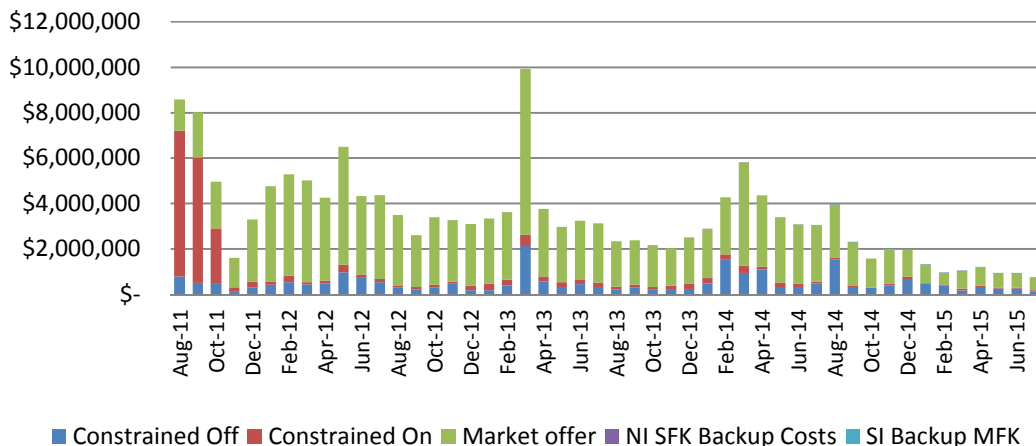
Note: The scale for the Instantaneous Reserve (Past 4 Years) graph has been reduced to clarify detail. Two months data, May and June 2012, overly influenced the graph scale.

		Cost
Frequency Keeping	Constrained Off	\$ 133,673
	Constrained On	\$ 60,162
	Market offer	\$ 538,229
	NI SFK Backup Costs	\$ 2,716.67
	SI Backup MFK	\$ 2,232.00
	Total monthly Cost	\$ 737,013
Instantaneous Reserve	Spinning reserve	\$ 1,360,308
	Interruptible Load	\$ 581,328
	Constrained On	\$ 8,946
	Total monthly Cost	\$ 1,950,582
Over Frequency Reserve	Total monthly Cost	\$ 116,184
Black Start	Total monthly Cost	\$ 52,487
Voltage Support	Total monthly Cost	\$ -
All Ancillary Services	Total monthly Cost	\$ 2,856,266

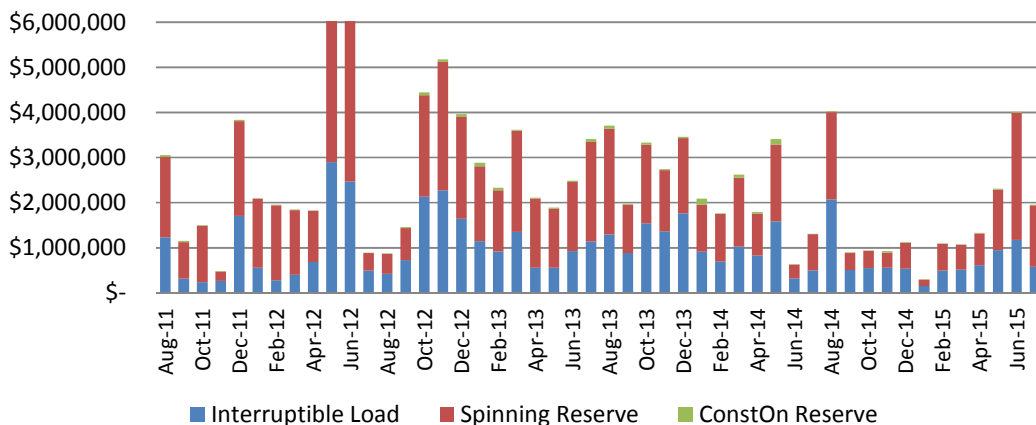
Ancillary Services Costs (past 4 years)



Frequency Keeping (past 4 years)



Instantaneous Reserve (past 4 years)



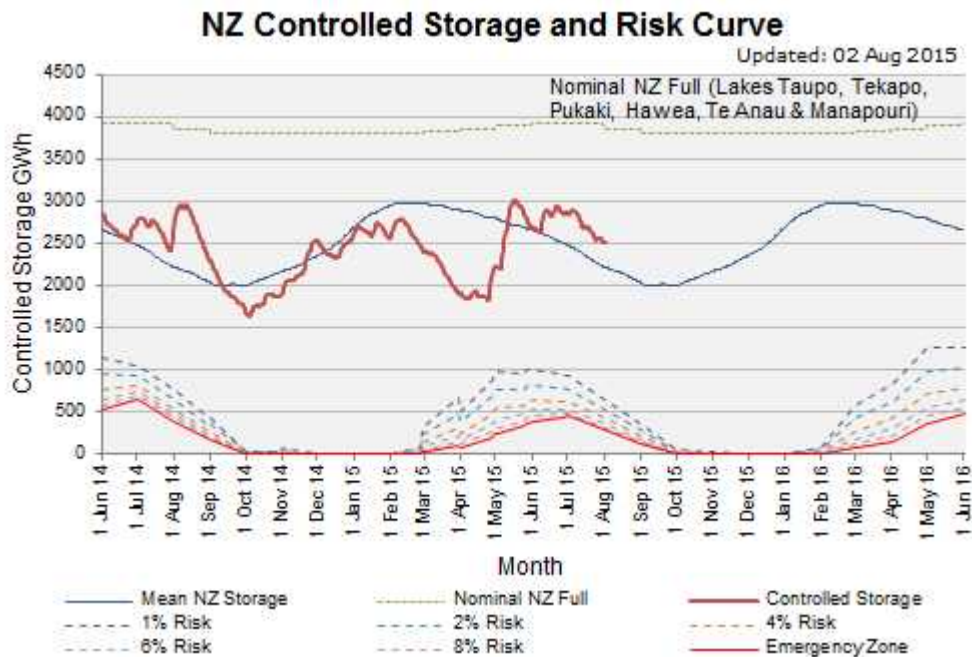
Note: IR Cost May 2012 = 14.129M, IR Cost Jun 2012 = 8.164M

Appendix B – Security of Supply

New Zealand Hydro Storage and Hydro Risk Curves

As at 2nd August 2015, aggregate primary New Zealand storage is 108% of average.

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



Hydro Storage and Generation

North Island inflows during July 2015 were 99% of average.

South Island inflows during July 2015 were 124% of average.

Measurements are based on daily inflow values.

Hydro generation met 63% of demand during July 2015.

System Performance Report

To the Electricity Authority

July 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.



SYSTEM OPERATOR

Keeping the energy flowing

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1. SUMMARY OF SYSTEM PERFORMANCE

This system performance report covers the month of July 2015.

Principal Performance Obligations

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

System Events

- On 13 July at 07:01 an emergency potline off-load at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.59 Hz.
- On 16 July at 03:13 an emergency potline off-load at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.64 Hz.
- On 18 July at 12:21 110 kV Hinuera – Karapiro Circuit 1 tripped resulting in a loss of supply to Hinuera substation. Supply was restored after 118 minutes.

Other noteworthy events occurring during the reporting period:

- On 9-10 July a snowstorm hit the east coast of the North Island, significantly affecting supply in the region. For further details see the performance report in part 2 above.

2. PRINCIPAL PERFORMANCE OBLIGATIONS

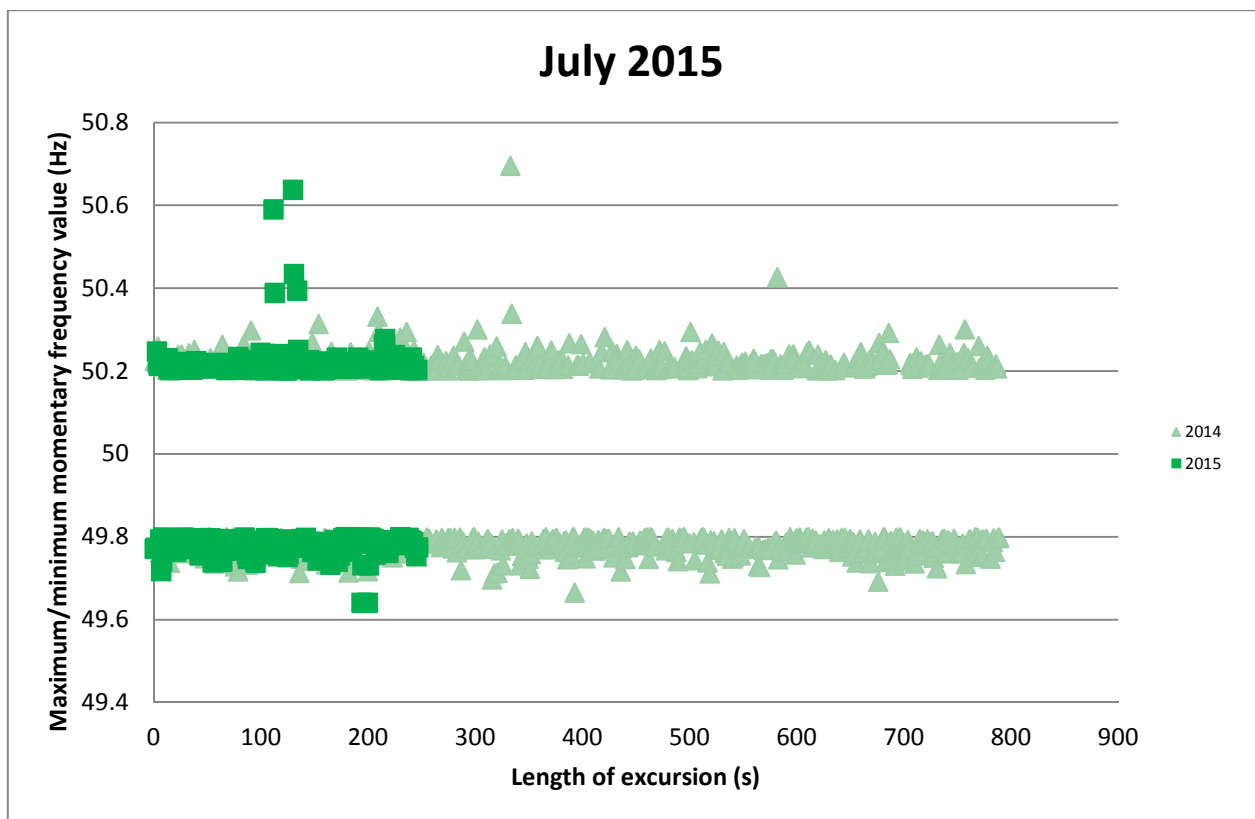
2.1 AVOID CASCADE FAILURE

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 (PPO).

Frequency Band	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-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	1		2			1	2	1	1	4	2	15	50
50.50 > Freq >= 50.20	345	420	244	360	165	26	25	47	153	252	308	104	2449	
50.20 > Freq > 49.80														
49.80 >= Freq > 49.50	401	585	351	375	204	24	15	44	174	315	295	141	2924	
49.50 >= Freq > 48.75	1		2	5	2	1	1	1					13	60
48.75 >= Freq > 48.00				1									1	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		Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-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	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	4	3	7	3	5	1	4	-	2	3	1	-
Warning Notice	21	7	8	11	23	29	27	31	10	12	-	-
Customer Advice Notice	16	10	28	22	20	11	12	12	13	32	11	5

3.2 GRID EMERGENCIES

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

Date	Time	Summary Details	Island
		None	

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

Island	Region	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	July-15	Total
North Island	Northland	-	-	-	-	-	-	-	-	-	-	-	-	0
	Auckland	-	-	4	-	-	-	-	-	-	-	-	-	4
	Zone 1	1	-	-	-	-	-	-	-	1	-	-	-	2
	Waikato	-	2	2	2	4	1	2	-	-	3	-	-	16
	Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	0
	Hawkes Bay	-	-	-	-	-	-	-	-	-	-	-	-	0
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	0
	Bunynthorpe	-	-	-	-	-	-	-	-	-	-	-	-	0
	Wellington	-	-	-	-	-	-	-	-	-	-	-	-	0
	North Island (all)	-	-	-	-	-	-	-	-	-	-	-	-	0
Lower North Island	1	-	-	-	-	-	-	-	-	-	-	-	1	
North & South Islands		1	-	1	-	-	-	-	-	-	1	-	-	3
South Island & HVDC	Nelson Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	0
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	0
	Christchurch	-	-	-	-	-	-	-	-	-	-	-	-	0
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	0
	Zone 3	1	1	-	1	-	-	-	-	-	-	-	-	3
	Otago	-	-	-	-	-	-	1	-	-	-	-	-	1
	Southland	-	-	-	-	-	-	1	-	1	-	1	-	3
	South Island (all)	-	-	-	-	1	-	-	-	-	-	-	-	1
HVDC	-	-	-	-	-	-	-	-	-	-	-	-	0	



3.3 CUSTOMER ADVICE NOTICES (CANs)

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

- three related to dispatching from back-up tools due to an unplanned Market Systems outage on 21 July;
- one related to a new constraint associated with outages in the Manawatu area; and
- one advised that permanent constraints associated with the Maraetai-Whakamaru runback scheme would no longer be required as of 24 July.

3.4 STANDBY RESIDUAL CHECK (SRC) NOTICES

A total of one-hundred and sixty-two SRC notices were issued during the reporting period based on the SDS (system operator's own load forecasting tool). These SRC notices were in respect of trading periods on 7th – 9th, 13th – 14th, 20th – 24th, and 27th – 30th July.

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	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	July-15	Total
North Island	Northland	1	2	5	3	3	3	7	6	12	8	7	-	57
	Auckland	3	6	4	3	1	1	6	4	8	11	5	3	55
	Waikato	5	10	10	9	3	4	10	9	8	11	7	4	90
	Bay of Plenty	5	-	6	7	6	3	4	4	6	4	4	3	52
	Hawkes Bay	-	-	5	2	2	2	4	6	6	7	3	-	37
	Taranaki	1	1	2	7	-	4	4	3	2	5	2	-	31
	Bunnythorpe	-	2	7	4	1	5	4	4	8	7	4	2	48
	Wellington	4	3	12	9	10	11	9	8	9	6	7	-	88
Total		19	24	51	44	26	33	48	44	59	59	39	12	458
South Island	Nelson Marlborough	2	4	10	14	8	7	6	4	6	8	3	2	74
	West Coast	6	4	10	11	8	8	8	6	5	10	7	6	89
	Christchurch	2	4	7	10	6	5	8	7	7	7	6	6	75
	Canterbury	4	2	6	7	4	4	5	2	2	6	1	2	45
	Otago	2	9	2	4	2	1	3	2	3	5	-	-	33
	Southland	5	2	1	3	3	1	2	4	5	3	1	4	34
Total		21	25	36	49	31	26	32	25	28	39	18	20	350



3.7 CONSTRAINTS

SUMMARY: Security constraints binding during the month

The following table shows the 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
North Island	Auckland	BOB_OTA2.2__BOB_OTA1.2__BOB_OTA1__OTA__LN	This is an SFT generated constraint. Its purpose is to protect Bombay-Otahuhu 2 for a tripping of Bombay-Otahuhu 1.	3
	Hamilton	ARI_KIN1.1__ARI_KIN2.1__ARI_KIN2__ARI__LN	This is an SFT generated constraint. Its purpose is to protect Arapuni-Kinleith 1 for a tripping of Arapuni-Kinleith 2	1
South Island & HVDC	Southland	HWB_ROX1.1__ROX__T10__HWBROX2*__HWB__LN	This is an SFT generated constraint. Its purpose is to protect Halfway Bush-Roxburgh 1 for a tripping of Roxburgh interconnecting transformer T10.	4
	West Coast	KUM_OTI.1__HOR_KBY_ISL2.1__S__HOR_ISL2__OTI__LN	This is an SFT generated constraint. Its purpose is to protect Kumara-Otira 1 for a tripping of Hororata-Kimberley-Islington 2.	1
Grand Total				9

Constraints binding during last 12 months

The following table shows constraints during the reporting period that bound for a duration of four or more trading periods, and those binding for more than 48 trading periods during the previous 12 months.

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%	87	0.50%
South Island & HVDC	West Coast	COL_HOR2.1__COL_HOR3.1__COL_HOR3__COL__LN	0	0.00%	64	0.37%
		COL_HOR3.1__COL_HOR2.1__COL_HOR2__COL__LN	0	0.00%	53	0.30%
		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	0	0.00%	103	0.59%
	Southland	HWB_ROX1.1__ROX__T10__HWBROX2*__HWB__LN	4	0.27%	0	0.00%
	HVDC	BEN_HAYP2max	0	0.00%	98	0.56%



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)
13/07/15	07:01	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.59
16/07/15	03:13	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.64

Connection point events

Date	Time	Summary Details	Generation / Load interrupted (MW)	Restoration time (minutes)
18/07/15	12:20	Hinuera-Karapiro Circuit 1 tripped resulting in a loss of supply to Hinuera Substation.	27	118

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	11	These related to trippings of <ul style="list-style-type: none"> • Halfway Bush-Roxburgh 1 (auto reclose) • Henderson-Maungatapere 1 (auto reclose) • Hinuera-Karapiro 1 • Inangahua-Westport 2 (auto reclose) • Invercargill-Roxburgh 2 (auto reclose) • Kaikohe-Maungatapere 2 (auto reclose) • Masterton-Upper Hutt 2 (auto reclose) • Otahuhu-Whakamaru 1 (3 x auto reclose) • Rotorua-Tarukenga 1
HVDC Start/Stop	0	
Supply Transformer	0	
Loss of grid reactive plant	3	This related to tripping of <ul style="list-style-type: none"> • Haywards Synchronous Condensor SC1, SC9 • Islington Static Var Compensator SVC9
Loss of single generation units	13	These related to trippings of <ul style="list-style-type: none"> • Highbank G1 • Kapuni GT2 (2 x) • Kinleith Co-generation (2 x) • Mokai generation • Ohaaki G1 • Ohakuri G3 • Poihippi G1 • Rotokawa generation (2 x) • Te Rapa Co-generation • Whaeo generation
Total during reporting period	27	



Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	0	
Loss of interconnecting transformer	0	
Loss of bus bar section	0	
Total during reporting period	0	

Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	0	
Demand change	2	These related to <ul style="list-style-type: none"> Tiwai NZAS Standby Potline Emergency off-load (2 x)
Generation	0	
Total during reporting period	2	

Other disturbances

Event	Number	Summary
Feeder trippings	54	Various locations
Total during reporting period	54	

4.3 SYSTEM EVENTS – TREND

	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Total	Average Events per month
Contingent Event – transmission	8	14	19	9	11	13	10	8	13	8	26	11	150	12.5
Contingent Event – generation	12	12	1	16	12	19	10	14	6	11	11	13	137	11.4
Contingent Event – Supply transformer	2	4	4	1	1	2	3	2	3	3	4	0	29	2.4
Contingent Event – Reactive plant	1	9	1	2	1	7	4	2	3	6	4	3	43	3.6
Contingent Event - HVDC	0	2	2	7	0	1	0	3	0	0	0	0	15	1.3
Extended Contingent Event HVDC	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Extended Contingent Event Inter-connecting Transformers	0	0	1	0	0	0	0	1	0	2	0	0	4	0.3
Extended Contingent Event Busbar	0	0	2	0	1	0	0	1	2	1	2	0	9	0.8
Other Event – AC transmission	1	0	2	3	0	2	1	4	0	1	8	0	22	1.8
Other Event – Demand	1	2	1	5	0	1	2	1	1	2	5	2	23	1.9
Other Event – Generation	1	2	1	1	0	3	1	4	0	1	0	0	14	1.2

