System Operator Reports
June 2014

Contents

SYSTEM OPERATOR

TRANSPOWER

Keeping the energy flowing

System Operator Operational and System Performance Report to the Electricity Authority

Period from 1 June – 30 June 2014

Purpose of Report

This report summarises the results of the System Operator's review of its performance for the period 1 June – 30 June 2014, 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 Authority. A separate detailed System Performance report will be provided to Authority staff.

1. Summary of Month from an Operational and System Performance Perspective

1.1. Operational

- The new WKM_ WRK circuit was successfully commissioned on Saturday 28th June.
  - The THI_ WKM outage (a critical element for completion of the Wairakei ring upgrade project) went ahead as planned on Monday 23rd June. Following the start of the outage several geothermal generating stations either tripped or reduced output due to issues with the steam fields and water in the steam. The loss of this generation and lack of wind generation meant the evening peak looked to be very tight. However, all generation returned during the afternoon which, together with about 50MW of additional wind, averted a warning notice (a precursor to a Grid Emergence Notice) being issued.
- The THI_WKM outage (completed on 3 July) resulted in the issuing of several block security constraints for the Waikato river chain block (of hydro stations), something not seen for quite some time. These constraints were to manage off-load violations.
- The CCO (Critical Contingency Operator) of the gas industry held an industry business continuity planning (BCP) exercise (Exercise Evolution) on the 26th. NCC participated throughout the exercise, providing advice on the power system impacts of the simulated gas supply conditions, when called upon. NCC is an essential link in the CCO's BCP when gas curtailment notices are issued to gas consumers in band 1 and 2. The major gas generators are consumers within those bands.
- On the 11th the ALB 33 kV feeder tripped resulting in around 80MW of load being lost. The fault appears to have occurred within the Vector network. On the same day STKT3 tripped along with STK_CB_92 & 102. 15 MW of load was lost at Motueka, 3 MW at Motupipi and 29 MW of Cobb generation.
- On the 7th the TIM_TKA circuit and ABY T2 tripped resulting in the loss of embedded Opuha generation and loss of load at Tekapo of 2.3 MW and Albury of an estimated 2-3 MW.

1.2. Market

There were no outages to the Market system exceeding two hours during June.

2. Business Performance

Significant Project Update

	Status	Implementation date	Update
Dispatchable demand	On Track	**'Go Live' date of 15 May 2014**	• Second DD software release was successfully deployed to the Market System on 19 June 2014.

3. Security of Supply Update

NZ aggregate storage levels are 114% 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.

4. Compliance Report

There were no breaches of the principal performance obligations by the System Operator during June. There were no breaches of the Electricity Industry Participation Code (EIPC) reported to the Electricity Authority during the month of June.

On 6 June the Rulings Panel published a finding into the Under Frequency Event (UFE) determination that Meridian caused the UFE on 1 May 2013. The system operator is currently assessing the impact of this finding and what it may mean for future determinations

5. Ancillary Services

There were no issues arising in ancillary services during the month of June.

Ancillary Service Costs

The costs of ancillary services for the month of June are set out in Appendix A (as required by clause 82.1 of the procurement plan).

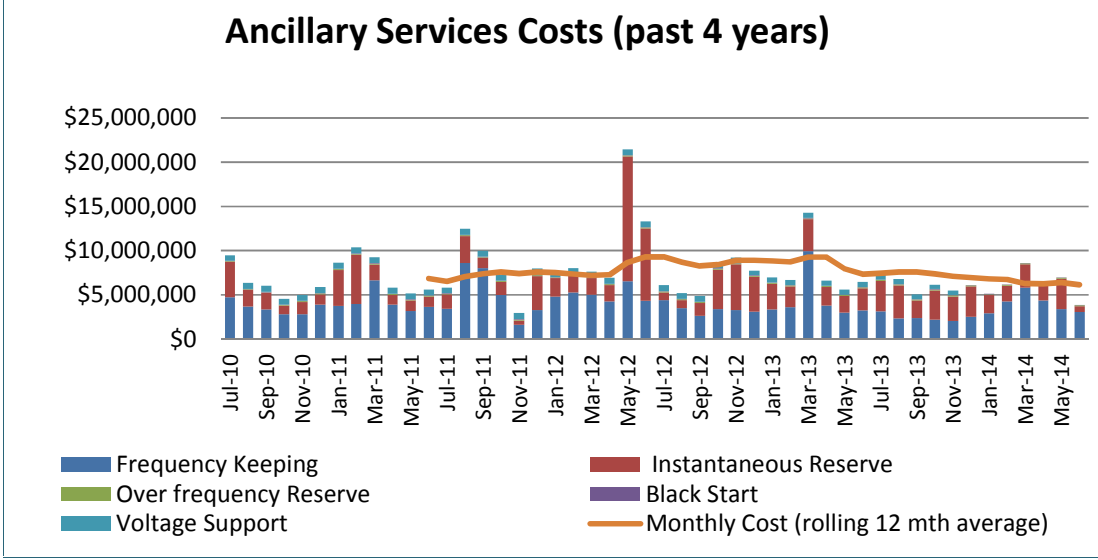
6. Code 7.10: Separation of Transpower Roles

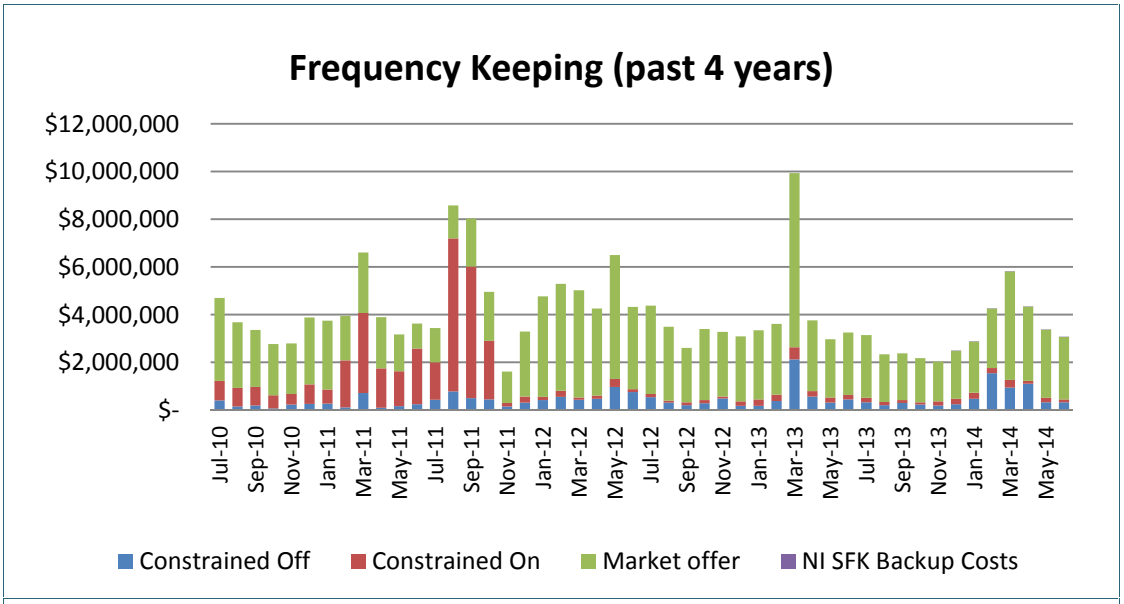
In performing its role as System Operator, Transpower has not been materially affected by any other role or capacity Transpower has under the Code or under any agreement.

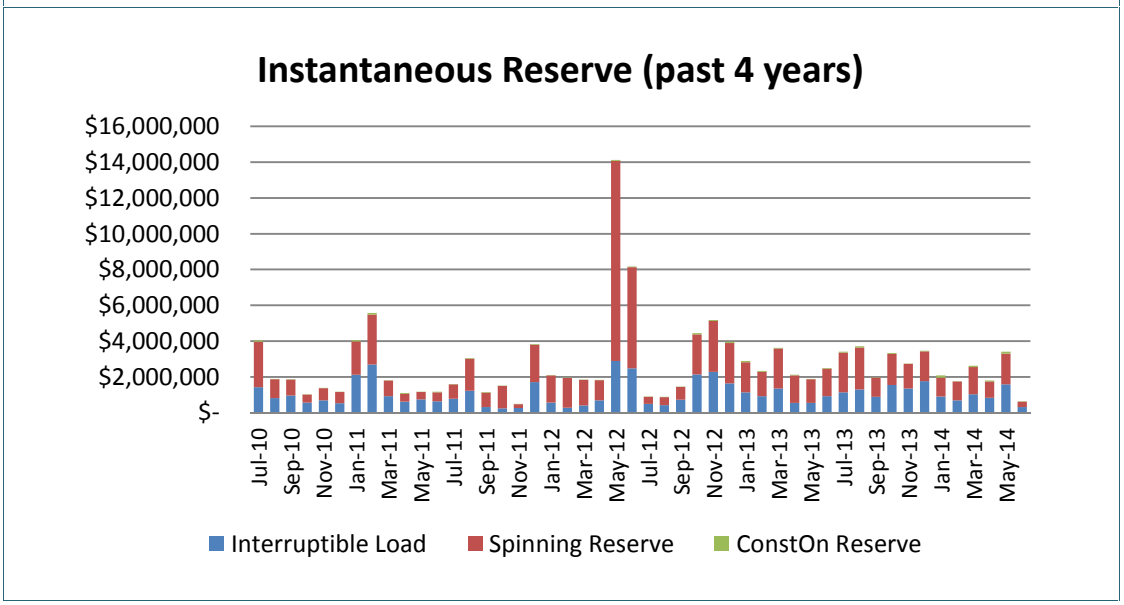
Appendix A – Ancillary Service Costs for June 2014

Note: The Voltage Support graph is no longer included in this report as we no longer have Voltage Support contracts. The last Voltage Support contract was at the end of November 2013.

		Cost	
Frequency Keeping	Constrained Off	$	324,992
	Constrained On	$	131,659
	Market offer	$	2,606,158
	NI SFK Backup Costs	$	1,666.67
	Total monthly Cost	**$**	**3,064,476**
Instantaneous Reserve	Spinning reserve	$	307,818
	Interruptible Load	$	318,071
	Constrained On	$	11,998
	Total monthly Cost	**$**	**637,887**
Over Frequency Reserve	**Total monthly Cost**	**$**	**103,209**
Black Start	**Total monthly Cost**	**$**	**49,405**
Voltage Support	**Total monthly Cost**	**$**	**-**
All Ancillary Services	**Total monthly Cost**	**$**	**3,854,977**



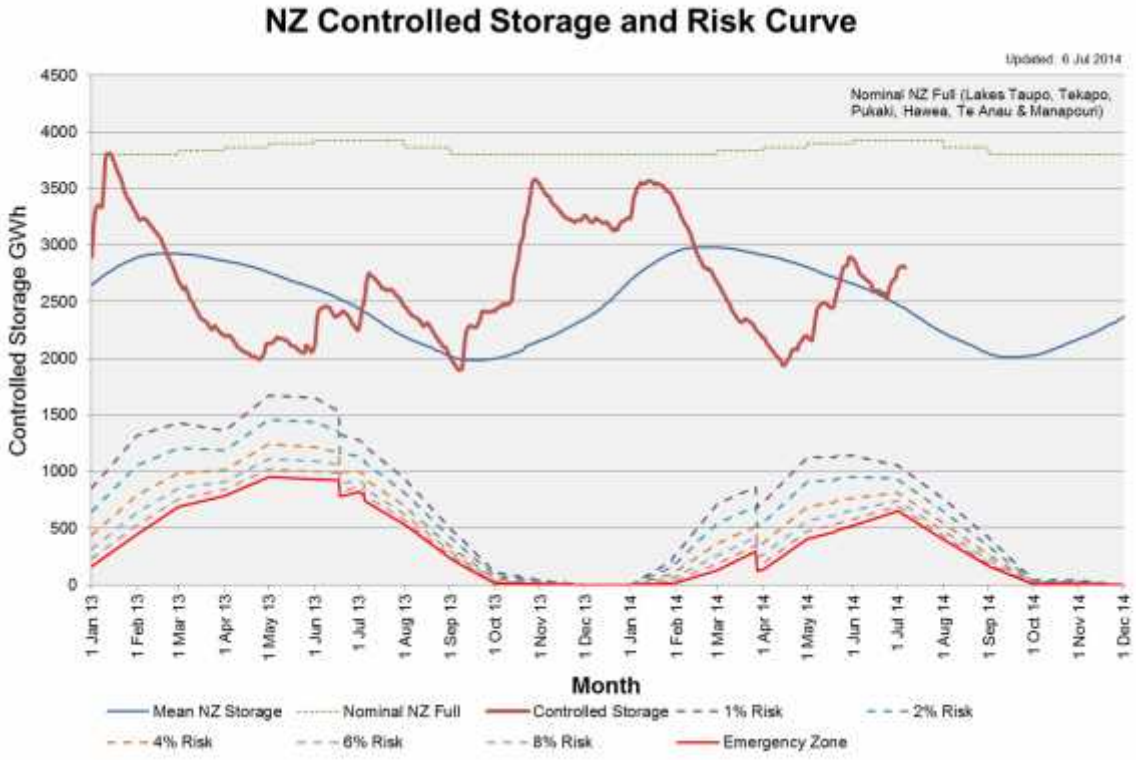

Frequency Keeping (past 4 years)
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
May-11
Jul-11
Sep-11
Nov-11
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Constrained Off
Constrained On
Market offer
NI SFK Backup Costs


Instantaneous Reserve (past 4 years)
$16,000,000
$14,000,000
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
May-11
Jul-11
Sep-11
Nov-11
Jan-12
Mar-12
May-12
Jul-12
Sep-12
Nov-12
Jan-13
Mar-13
May-13
Jul-13
Sep-13
Nov-13
Jan-14
Mar-14
May-14
Interruptible Load
Spinning Reserve
ConstOn Reserve

Appendix B – Security of Supply

New Zealand Hydro Storage and Hydro Risk Curves

Aggregate primary New Zealand storage is 114% of average for this time of year.
The graph below compares New Zealand hydro storage to the hydro risk curves.



Hydro Storage and Generation

North Island Inflows over the last calendar month have been 96% of average.
South Island Inflows over the last calendar month have been 126% of average.
Measurements are based on daily inflow values.

Over the last calendar month hydro generation has met 65% of demand.

System Performance Report

To the Electricity Authority

June 2014

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

TRANSPOWER

Keeping the energy flowing

Table of Contents

1. Summary of System Performance

This system performance report covers the month of June 2014.

Key Points:

- one grid emergency and 330 standby residual notices due to dispatch conditions resulting in limited residual generation to cover an event
- three events that resulted in a loss of supply to consumers
- a number of outage constraints binding due the commissioning of the new Wairakei Whakamaru C line which is now in service

Principal Performance Obligations

The System Operator met the Principal Performance Obligations during the reporting period.

System Events

On 1st June at 02:45 an emergency potline off-load at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.70 Hz.

On 7th June at 07:40 110 kV Timaru – Albury – Tekapo A Circuit 1 tripped resulting in a loss of supply to Albury and Tekapo A Substations. Supply was restored to Tekapo A after 88 minutes and Albury after 92 minutes.

On 11th June at 15:48 110 / 66 kV inter-connecting transformer Stoke T3 tripped resulting in a loss of supply to Motueka and Upper Takaka Substations and a loss of connection to Cobb Power Station. Connection was restored to Cobb after 60 minutes, Upper Takaka after 69 minutes, and Motueka after 74 minutes.

On 11th June at 15:51 the incomer circuit-breakers on all three Albany supply transformers tripped resulting in a loss of supply to the Albany 33 kV grid exit point. Supply was restored after 17 minutes.

Other noteworthy events occurring during the reporting period:

On 7th June at 09:18 110 kV Halfway Bush Roxburgh Circuit 2 tripped and auto-reclosed, the Halfway Bush end of the 100 kV Balclutha – Halfway Bush circuit also tripped.

On 27th June at 17:22 the Livingstone 220 kV bus tripped during a commissioning at the station. The bus was restored after 9 minutes. There was no loss of supply or generation as a result of the tripping.

2. Principal Performance Obligations

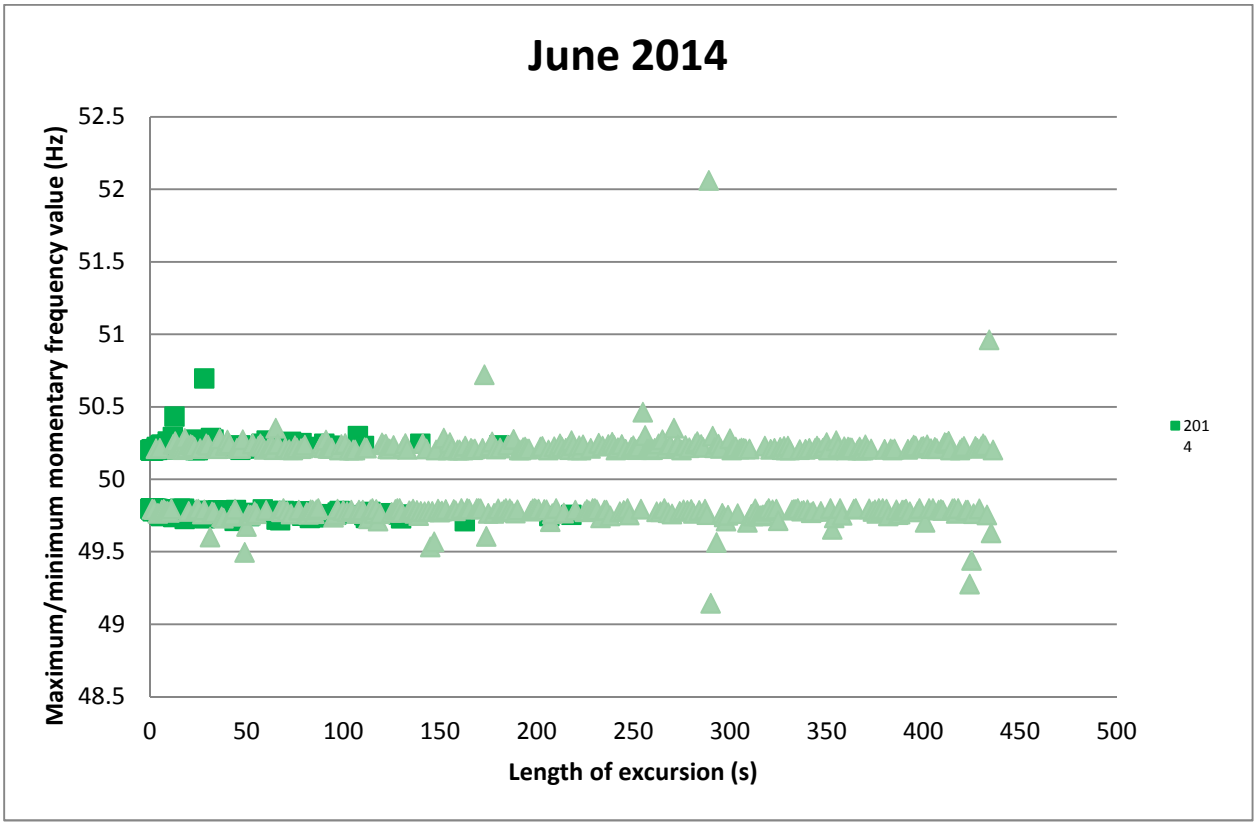
2.1 Avoid Cascade Failure

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	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Annual rate	PPO target
55.00 > Freq >= 53.75														**0.2***
53.75 > Freq >= 52.00					2								**2**	**2***
52.00 > Freq >= 51.25				2				3					**5**	**7**
51.25 > Freq >= 50.50		1	4	4	9	1	2		1	0	1	1	**24**	**50**
50.50 > Freq >= 50.20	404	656	709	797	582	267	364	333	398	545	430	206	**5691**	
50.20 > Freq > 49.80														
49.80 >= Freq > 49.50	385	652	692	789	605	396	450	386	610	639	485	208	**6297**	
49.50 >= Freq > 48.75			2	7	7	3		3	1	2			**25**	**60**
48.75 >= Freq > 48.00														**6**
48.00 >= Freq > 47.00					1								**1**	**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		jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
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	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	4	1	2	1	12	8	22	9	5	14	19	12
Warning Notice	3	1	-	-	2	-	-	-	-	-	1	-
Customer Advice Notice	27	15	31	63	86	48	18	12	18	24	17	4

3.2 Grid Emergencies

The following table shows grid emergencies declared by the System Operator in the reporting period.

Date	Time	Summary Details	Island
02/06/14	23:50	A grid emergency was declared to allow a 220 kV Pakuranga – Whakamaru Circuit to be removed from service to assist with managing high voltages.	N
14/06/14	01:49		
15/06/14	00:37		
22/06/14	00:23		
29/06/14	00:34		
30/06/14	02:32		
05/06/14	01:42	A grid emergency was declared to allow a 220 kV Bunnythorpe - Haywards Circuit to be removed from service to assist with managing high voltages.	N
11/06/14	16:39	A grid emergency was declared to assist with system restoration after the tripping of Stoke T3.	S
14/06/14	03:49	A grid emergency was declared to allow 220 kV Islington - Kikiwa Circuit 1 to be removed from service to assist with managing high voltages.	S
22/06/14	03:45		
30/06/14	02:45		
16/06/14	17:30	A grid emergency was declared due to there being insufficient generation offers to meet demand and provide for N-1 security for a contingent event.	N + S

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

Island	Region	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Total
North Island	Northland	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Auckland	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Zone 1	-	-	-	-	4	5	15	8	3	7	8	6	**56**
	Waikato	4	1	2	-	6	2	3	-	1	1	-	-	**20**
	Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Hawkes Bay	-	-	-	-	-	-	-	-	-	1	-	-	**1**
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Bunnythorpe	-	-	-	1	-	-	1	-	-	-	-	-	**2**
	Wellington	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	North Island (all)	-	-	-	-	2	1	1	1	1	-	-	-	**6**
	Lower North Island	-	-	-	-	-	-	-	-	-	-	1	1	**2**
North & South Islands		-	-	-	-	-	-	-	-	-	-	1	1	**2**
South Island & HVDC	Nelson Marlborough	-	-	-	-	-	-	-	-	-	-	-	1	**1**
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Christchurch	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Zone 3	-	-	-	-	-	-	1	-	-	5	9	3	**18**
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	South Island (all)	-	-	-	-	-	1	-	-	-	-	-	-	**1**
	HVDC	-	-	-	-	-	-	-	-	-	-	-	-	**0**

3.3 Customer Advice Notices (CANs)

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

- Three advised of a temporary change to HVDC capability due to planned outages of Haywards Filter Banks;
- And one advised of planned Multiple Frequency Keeper (MFK) testing on 20th June.

3.4 Standby Residual Check (SRC) notices

A total of three hundred and thirty 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 1st, 7th – 11th, and 13th – 30th June.

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	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Total
North Island	Northland	3	3	7	5	7	4	9	7	8	4	8	6	**71**
	Auckland	5	3	5	9	6	1	-	1	5	-	12	5	**52**
	Waikato	8	6	8	11	7	5	9	9	12	12	12	6	**105**
	Bay of Plenty	7	5	4	8	8	7	2	2	7	5	6	5	**66**
	Hawkes Bay	-	1	-	5	7	2	5	4	6	12	5	-	**47**
	Taranaki	-	-	-	3	2	3	5	5	4	5	2	2	**31**
	Bunnythorpe	1	3	3	5	6	6	7	6	7	3	5	-	**52**
	Wellington	4	4	9	8	9	4	10	13	13	17	12	6	**109**
Total		28	25	36	54	52	32	47	47	62	58	62	30	**533**
South Island	Nelson Marlborough	1	4	3	8	11	7	8	3	7	5	4	7	**68**
	West Coast	4	3	3	7	12	6	8	2	11	6	7	7	**76**
	Christchurch	3	2	4	8	7	3	7	3	4	5	2	5	**53**
	Canterbury	1	3	3	4	4	3	4	2	4	3	2	5	**38**
	Otago	2	4	5	2	1	-	-	-	3	2	4	-	**23**
	Southland	8	5	5	3	-	1	4	2	6	2	8	6	**50**
Total		18	21	23	32	35	20	31	12	35	23	27	30	**307**

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	Bunnythorpe	RPO_TNG1.1__OHK_WRK.1__OHK_WRK__RPO__LN	This is an SFT generated constraint. Its purpose is to protect Rangipo-Tangiwai 1 for a tripping of Ohakuri-Wairakei 1.	2
		RPO_TNG1.1__ATI_WKM.1__$ATIWKM1__RPO__LN	This is an SFT generated constraint. Its purpose is to protect Rangipo-Tangiwai 1 for a tripping of Atiamuri-Whakamaru 1.	1
	Edgecumbe	THI_WKM1.1__OHK_WRK.1__OHK_WRK__WKM__LN	This is an SFT generated constraint. Its purpose is to protect Te Mihi-Whakamaru 1 for a tripping of Ohakuri-Wairakei 1.	7
		THI_WKM1.1__ATI_OHK.1__ATIOHK1!__WKM__LN	This is an SFT generated constraint. Its purpose is to protect Te Mihi-Whakamaru 1 for a tripping of Atiamuri-Ohakuri 1.	43
		ATI_OHK.1__EDG_KAW3.1__EDGKAW3!__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Edgecumbe-Kawerau 3.	1
		ATI_WKM.1__TKU_WKM1.1__TKUWKM1*__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Whakamaru 1 for a tripping of Tokaanu-Whakamaru 1.	2
		ATI_OHK.1__TKU_WKM2.1__TKUWKM2*__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Tokaanu-Whakamaru 2.	4
		OHK_WRK.1__TKU_WKM1.1__TKUWKM1*__WRK__LN	This is an SFT generated constraint. Its purpose is to protect Ohakuri-Wairakei 1 for a tripping of Tokaanu-Whakamaru 1.	3

		ATI_OHK.1__WKM_WRK1.1__WKM_WRK1__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Wairakei-Whakamaru 1.	1
	Hamilton	ARI_HAM1.1__ARI_HAM2.1__$ARIHAM2__HAM__LN	This is an SFT generated constraint. Its purpose is to protect Arapuni-Hamilton 1 for a tripping of Arapuni-Hamilton 2	1
		KIN_TRK1.2__HAM_WKM.1__$HAMWKM1__TRK__LN	This is an SFT generated constraint. Its purpose is to protect Kinleith-Tarukenga 1 for a tripping of Hamilton-Whakamaru 1.	1
	Hawkes Bay	RDF_T3&T4_W_P_1	The effect of this constraint is to manage flows through Redclyffe T3 & T4 to prevent the in service transformer from overloading for a contingency of the other transformer.	3
South Island & HVDC	HVDC	BEN_HAYP2max	The purpose of this constraint is to limit the flow on HVDC from Benmore to Haywards to the Asset Owner offered capability for Pole 2.	13
Grand Total				**82**

Constraints binding during last 12 months

The following table shows constraints binding for more than 4 trading periods during the reporting period, 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	Bunnythorpe	RPO_TNG1.1__THI_WKM1.1__THI_WKM1__RPO__LN	0	0.00%	133	0.76%
	Edgecumbe	THI_WKM1.1__OHK_WRK.1__OHK_WRK__WKM__LN	7	0.49%	52	0.30%
		ATI_OHK.1__TKU_WKM2.1__TKUWKM2*__ATI__LN	4	0.28%	0	0.00%
		THI_WKM1.1__ATI_OHK.1__ATIOHK1!__WKM__LN	43	2.99%	0	0.00%
South Island & HVDC	Otago	NSY_ROX.1__CYD_TWZ1.1__CYD_TWZ1__ROX__LN	0	0.00%	102	0.58%
		NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	0	0.00%	196	1.12%
		LIV_NSY.1__CYD_ROX1.1__CYDROX1!__NSY__LN	0	0.00%	61	0.35%
		LIV_NSY.1__CYD_ROX1.1__CYDROX1#__NSY__LN	0	0.00%	69	0.39%
	HVDC	BEN_HAYP2max	13	0.90%	128	0.73%
		BEN_HAYmax	0	0.00%	251	1.43%
		BEN_HAYP3max	0	0.00%	173	0.99%

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)
01/06/14	02:45	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.70 Hz

Connection point events

Date	Time	Summary Details	Generation / Load interrupted (MW)	Restoration time (minutes)
07/06/14	07:40	110 kV Timaru – Tekapo A Circuit 1 tripped resulting in a loss of supply to Albury and Tekapo A Substations.	ABY 5 MW (generation) TKA 2.3 MW (load)	92 88
11/06/14	15:48	Stoke 110 / 66 kV inter-connecting transformer T3 tripped resulting in a loss of supply to Motueka and Upper Takaka Substations and a loss of connection to Cobb Power Station.	MOT 15 MW UTK 3 MW COB 29 MW (generation)	74 69 60
11/06/14	15:51	All three supply transformer incomer circuit-breakers at Albany Substation tripped resulting in a loss of supply to the 33 kV grid exit point.	79 MW	17

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	9	These related to trippings of • Blenheim-Stoke 1 (auto reclose) • Bunnythorpe-Haywards 1 (auto reclose) • Fernhill-Waipawa 2 (auto reclose) • Halfway Bush-Roxburgh 2 • Islington-Livingston 1 • Masterton-Upper Hutt 2 (auto reclose) • Opunake-Stratford 1 (auto reclose) • Otahuhu-Whakamaru 1 (auto reclose) • Timaru-Tekapo A 1
HVDC Start/ Stop	0	
Supply Transformer	3	These related to trippings of • Frankton T2 (2 x) • Kawerau T8
Loss of grid reactive plant	2	These related to trippings of • Haywards Synchronous Condensor SC3 • Hokitika Capacitor Banks C3 & C5

Event	Number	Summary
Loss of single generation units	7	These related to trippings of • Huntly U2 • Kinleith Co-generation (2 x) • Ohau C G13 • Onepu generation • Rotokawa generation • Te Rapa Co-generation
Total during reporting period	**21**	

Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	0	
Loss of interconnecting transformer	1	This related to tripping of • Stoke T3
Loss of bus bar section	1	This related to tripping of • Livingstone 220 kV bus
Total during reporting period	**2**	

Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	1	These related to trippings of • Halfway Bush- Roxburgh 2 A/R & Halfway Bush CB 542 (Balclutha- Halfway Bush 1).
Demand change	1	This related to tripping of • Tiwai NZAS Potline 3
Generation	0	
Total during reporting period	**2**	

Other disturbances

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

4.3 SYSTEM EVENTS – TREND

	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Total	Average Events per month
Contingent Event – transmission	19	16	64	24	39	30	4	6	8	34	19	9	**272**	22.7
Contingent Event – generation	17	17	10	12	10	12	11	8	11	12	5	7	**132**	11.0
Contingent Event – Supply transformer	3	3	5	1	3	5	3	3	0	3	4	3	**36**	3.0
Contingent Event – Reactive plant	10	6	7	8	8	7	0	5	2	2	5	2	**62**	5.2
Contingent Event - HVDC	0	0	4	18	22	6	1	2	1	1	1	0	**56**	4.7
Extended Contingent Event HVDC	0	0	1	0	1	0	0	0	0	0	0	0	**2**	0.2
Extended Contingent Event Inter-connecting Transformers	1	0	0	0	1	1	1	0	0	0	1	1	**6**	0.5
Extended Contingent Event Busbar	0	0	3	0	0	1	1	1	1	0	0	1	**8**	0.7
Other Event – AC transmission	2	1	5	3	4	2	3	1	0	6	2	1	**30**	2.5
Other Event – Demand	2	1	1	1	1	0	2	2	1	0	1	1	**13**	1.1
Other Event – Generation	0	0	2	0	0	0	1	0	0	0	0	0	**3**	0.3