System Operator Reports
January 2014

Contents

SYSTEM OPERATOR

TRANSPOWER

Keeping the energy flowing

System Operator Operational and System Performance Report to the Electricity Authority

Period from 1 January – 31 January 2014

Purpose of Report

This report summarises the results of the System Operator's review of its performance for the period 1 January – 31 January 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

January was operationally a quiet month reflecting a relatively benign weather pattern and low transmission asset outages. One loss of supply occurred on 1st January when a bus fault at WDV at 01:18 resulted in a 16 MW loss of supply to WPW, DVK and WDV. TAP generation was also lost. Load was fully restored by around 02:38.

New control room consoles were installed and commissioned at both NCC sites during January.

1.2. Market

There were no outages to the Market system that exceeded two hours during January.

2. Business Performance

Significant Project Update

	Status	Implementation date	Update
Dispatchable demand	On Track	April 2014	• The SO and NZX test systems were successfully re-connected on 21 January for the formal start of Integration Testing. • Integration Testing is progressing well and is on track. • The proposed changes to the Policy Statement to accommodate DD were submitted to the EA on 27 January.

3. Security of Supply Update

NZ aggregate storage levels are 112% 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 January. There were no breaches of the Electricity Industry Participation Code (EIPC) reported to the Electricity Authority during the month of January.

5. Ancillary Services

An issue has arisen in January with the allocation of costs for asset dispensations and associated procurement of reserves. Genesis is disputing their December invoice. This is being addressed through the event review process to determine the nature and extent of the issue.

Ancillary Service Costs

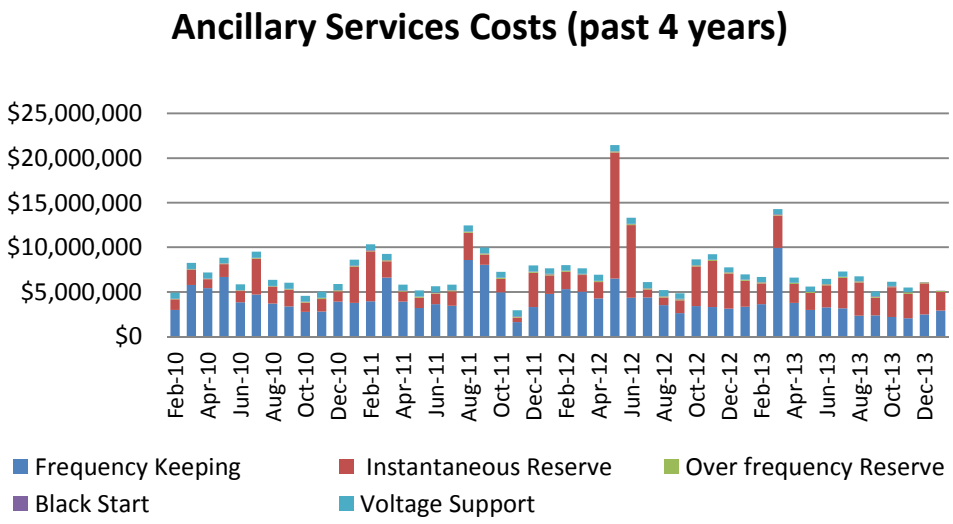
The costs of ancillary services for the month of January are set out in Appendix A (as required by clause 82.1 of the procurement plan).

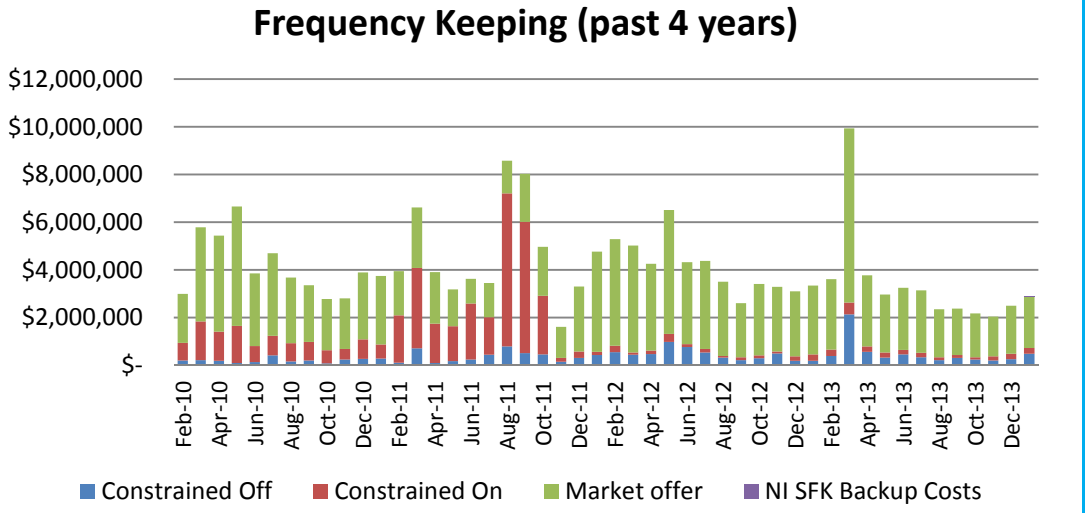
6. Code 7.10: Separation of Transpower Roles

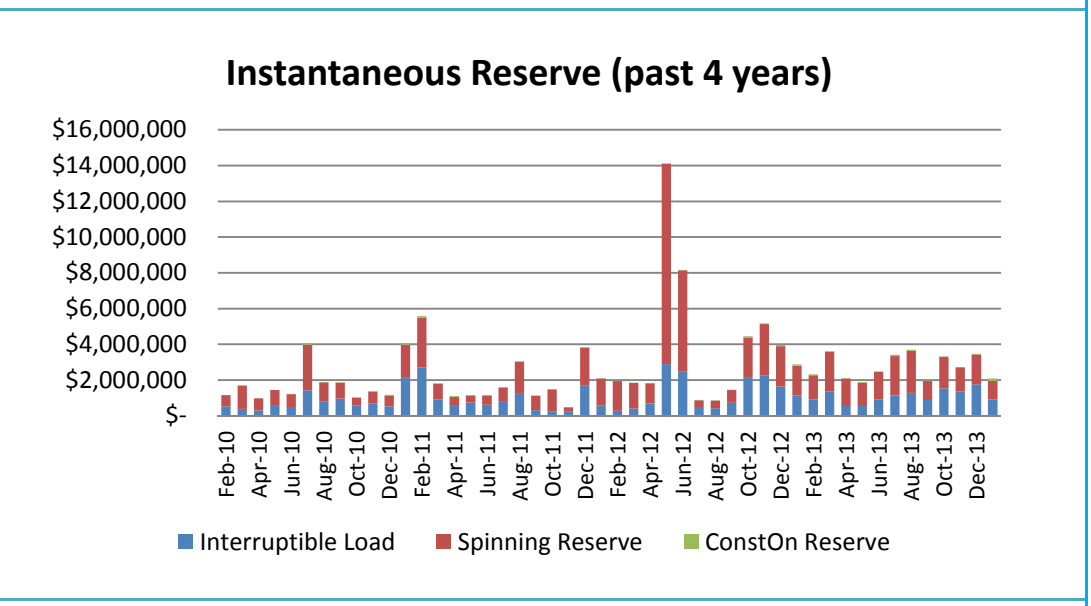
In performing its role as System Operator, Transpower has not been materially affected by any other role or capacity Transpower has under the Code or under any agreement.

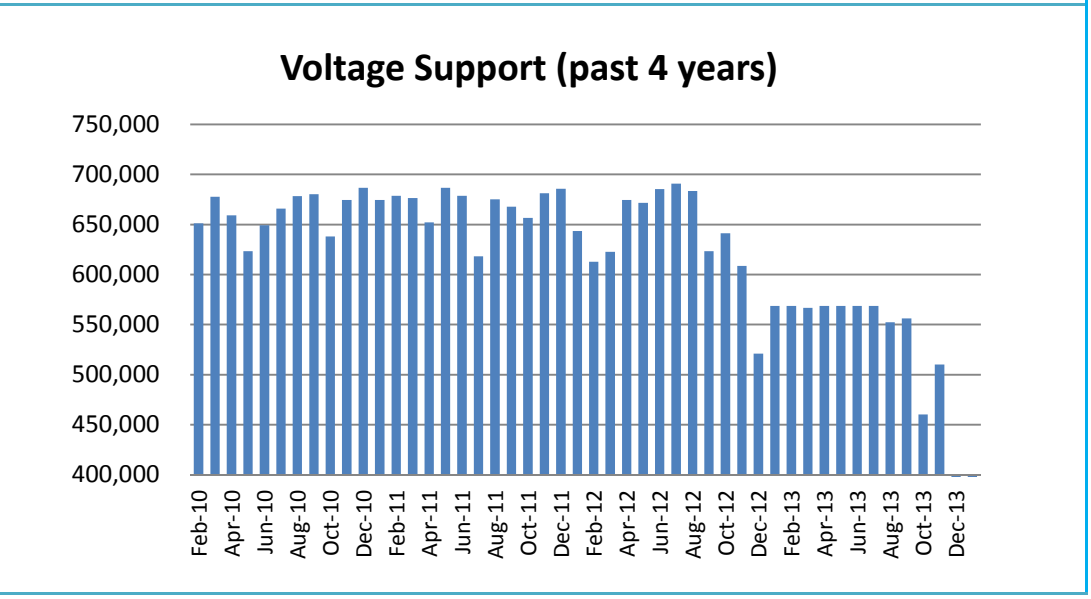
Appendix A – Ancillary Service Costs for January 2014

		Cost
Frequency Keeping	Constrained Off	$ 478,021
	Constrained On	$ 249,020
	Market offer	$ 2,155,553
	NI SFK Backup Cost	$ 1,667
	Total monthly Cost	**$ 2,884,261**
Instantaneous Reserve	Spinning reserve	$ 1,042,351
	Interruptible Load	$ 911,512
	Constrained On	$ 135,925
	Total monthly Cost	**$ 2,089,788**
Over Frequency Reserve	**Total monthly Cost**	**$ 103,080**
Black Start	**Total monthly Cost**	**$ 49,356**
Voltage Support	**Total monthly Cost**	**$ -**
All Ancillary Services	**Total monthly Cost**	**$ 5,128,151**




Frequency Keeping (past 4 years)
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Feb-10 Apr-10 Jun-10 Aug-10 Oct-10 Dec-10 Feb-11 Apr-11 Jun-11 Aug-11 Oct-11 Dec-11 Feb-12 Apr-12 Jun-12 Aug-12 Oct-12 Dec-12 Feb-13 Apr-13 Jun-13 Aug-13 Oct-13 Dec-13
Constrained Off
Constrained On
Market offer
NI SFK Backup Costs

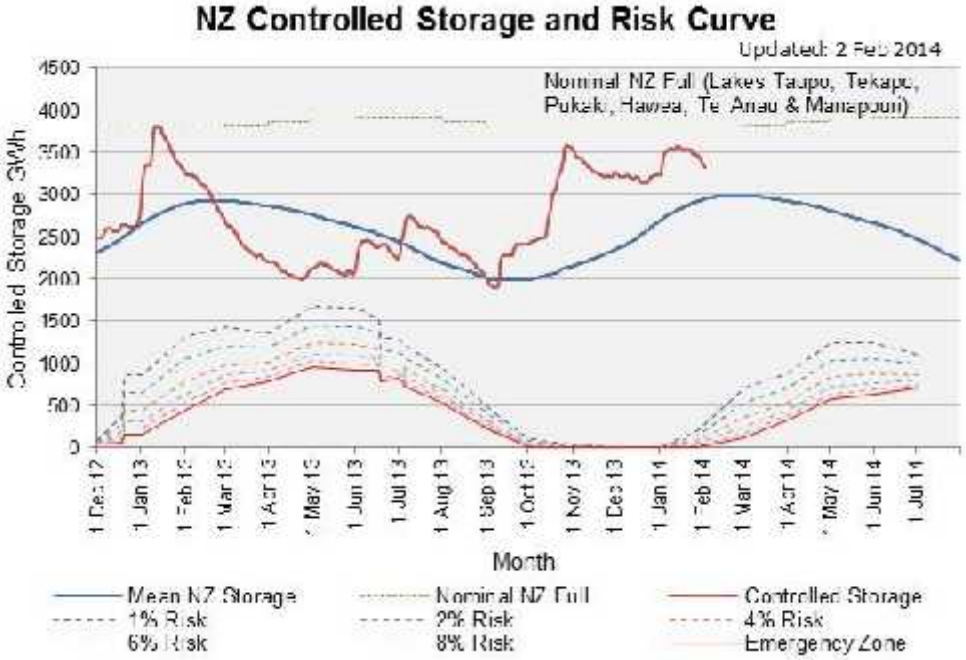

Instantaneous Reserve (past 4 years)
$16,000,000
$14,000,000
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$-
Feb-10 Apr-10 Jun-10 Aug-10 Oct-10 Dec-10 Feb-11 Apr-11 Jun-11 Aug-11 Oct-11 Dec-11 Feb-12 Apr-12 Jun-12 Aug-12 Oct-12 Dec-12 Feb-13 Apr-13 Jun-13 Aug-13 Oct-13 Dec-13
Interruptible Load
Spinning Reserve
ConstOn Reserve


Voltage Support (past 4 years)
750,000
700,000
650,000
600,000
550,000
500,000
450,000
400,000
Feb-10 Apr-10 Jun-10 Aug-10 Oct-10 Dec-10 Feb-11 Apr-11 Jun-11 Aug-11 Oct-11 Dec-11 Feb-12 Apr-12 Jun-12 Aug-12 Oct-12 Dec-12 Feb-13 Apr-13 Jun-13 Aug-13 Oct-13 Dec-13

Appendix B – Security of Supply

New Zealand Hydro Storage and Hydro Risk Curves

Aggregate primary New Zealand storage is 112% 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 67% of average.
South Island Inflows over the last calendar month have been 98% of average.
Measurements are based on daily inflow values.

Over the last calendar month hydro generation has met 66% of demand.

System Performance Report

To the Electricity Authority

January 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

Transpower New Zealand Ltd The National Grid

Table of Contents

1. Summary of System Performance

This system performance report covers the month of January 2014.

Principal Performance Obligations

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

System Events

On 1st January at 01:00 a fault on the 110 kV bus at Woodville Substation resulted in a loss of supply to Dannevirke, Waipawa, and Woodville Substations, and a loss of connection to Te Apiti Windfarm. Supply was restored to Waipawa after 50 minutes, Dannevirke after 56 minutes, Woodville after 98 minutes, and connection was restored to Te Apiti after 102 minutes.

On 1st January at 06:15 and on 21st January at 06:00 emergency potline off-loads at Tiwai Point Aluminium Smelter resulted in a momentary frequency rise in the South Island to 50.66 Hz and 50.62 Hz respectively.

Other noteworthy events occurring during the reporting period:

On 2nd January at 07:25 a lightning strike resulted in a double circuit tripping of 66 kV Hokitika – Otira Circuit 2 and Kumara – Otira Circuit 1.

On 9th January at 11:10 220 kV Bunnythorpe – Tokaanu Circuit 1 tripped and auto-reclosed. The associated voltage disturbance caused commutation failures on HVDC Poles 2 & 3.

On 10th January at 03:26 66 kV Coleridge – Otira Circuit 1 tripped and auto-reclosed resulting in a momentary loss of supply to Arthurs Pass and Castle Hill Substations. Kumara generation tripped at the same time due to the resultant voltage disturbance.

On 20th January at 15:53, Bunnythorpe 220 / 110 kV inter-connecting transformer T3 tripped during a magnitude 6.2 earthquake in the Wairarapa. No damage was sustained to the transformer.

2. Principal Performance Obligations

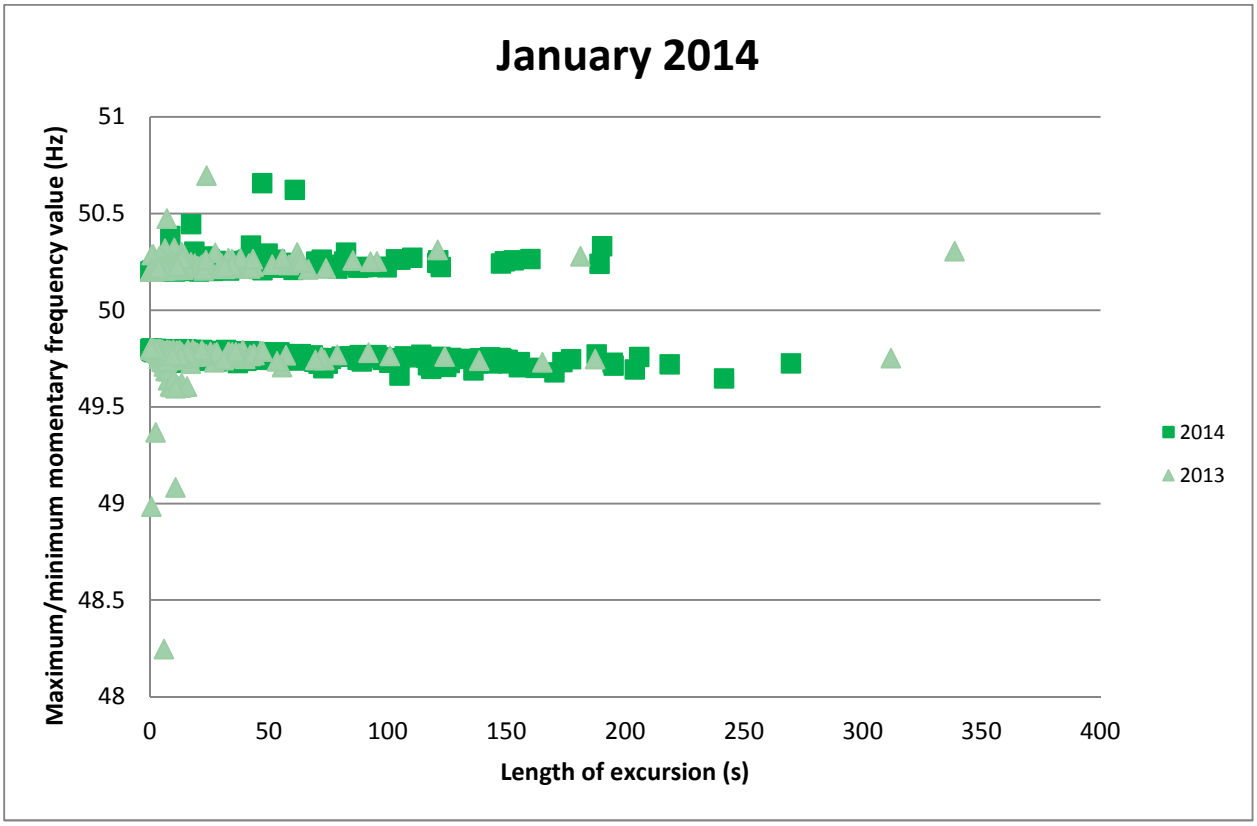
2.1 Avoid Cascade Failure

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	Feb - 13	Mar - 13	Apr - 13	May - 13	Jun - 13	jul - 13	Aug - 13	Sep - 13	Oct - 13	Nov - 13	Dec -13	Jan - 14	Annual rate	PPO target
55.00 > Freq >= 53.75														**0.2***
53.75 > Freq >= 52.00				1	1					2			**4**	**2***
52.00 > Freq >= 51.25		1	2						2				**5**	**7**
51.25 > Freq >= 50.50	2	2	4	8	2		1	4	4	9	1	2	**39**	**50**
50.50 > Freq >= 50.20	445	324	541	419	221	404	656	709	797	582	267	364	**5729**	
50.20 > Freq > 49.80														
49.80 >= Freq > 49.50	367	331	484	401	208	385	652	692	789	605	396	450	**5760**	
49.50 >= Freq > 48.75	1	2	6	9	4			2	7	7	3		**41**	**60**
48.75 >= Freq > 48.00	1	1	1	1									**4**	**6**
48.00 >= Freq > 47.00				1						1			**2**	**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		Feb-13	Mar-13	Apr-13	May-13	Jun-13	jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-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	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14
Demand Allocation Notice	-	-	-	-	-	-	-	-	-	-	-	-
Grid Emergency Notice	-	2	6	5	2	4	1	2	1	12	8	22
Warning Notice	-	1	-	3	2	3	1	-	-	2	-	-
Customer Advice Notice	35	39	43	67	41	27	15	31	63	86	48	18

3.2 Grid Emergencies

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

Date	Time	Summary Details	Island
01/01/14	00:00	A grid emergency was declared to allow the 220 kV Pakuranga – Whakamaru Circuit 1 to be removed from service to assist with managing high voltages.	N
03/01/14	00:25		
06/01/14	00:45		
07/01/14	00:45		
10/01/14	01:49		
11/01/14	01:52		
12/01/14	00:50		
13/01/14	00:43		
14/01/14	00:15		
15/01/14	00:10		
16/01/14	01:00		
19/01/14	02:04		
27/01/14	00:20		
28/01/14	00:05		
29/01/14	00:22		
01/01/14	01:38	A grid emergency was declared to assist with restoration of supply to Waipawa, Dannevirke and Woodville following a bus fault at Woodville.	N

02/01/14 03/01/14	00:45 02:51	A grid emergency was declared to allow the 220 kV Islington – Kikiwa Circuit 1 to be removed from service to assist with managing high voltages.	S
07/01/14	03:00	The System Operator reverted to Single Frequency Keeping in the North Island due to an unplanned outage affecting the Multiple Frequency Keeping (MFK) application.	N
09/01/14	17:03	A grid emergency was declared to initiate load control at Hinuera and Te Awamutu Substations and a grid reconfiguration at Cambridge Substation due to low generation offers at Karapiro Power Station.	N
09/01/14	13:59	A Grid Emergency was declared to close the Arapuni Bus split due to lightning in the area. The split was relocated to Kinleith due to low Arapuni generation.	N
11/01/14	07:06	A Grid Emergency was declared allow the Kinleith 110 kV bus to be split to manage security violations for a Kinleith Tarukenga circuit 2 contingency.	N

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

Island	Region	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Total
North Island	Northland	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Auckland	-	-	-	-	1	-	-	-	-	-	-	-	**1**
	Zone 1	-	-	-	-	-	-	-	-	-	4	5	15	**24**
	Waikato	-	1	5	5	-	4	1	2	-	6	2	3	**29**
	Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Hawkes Bay	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Bunnythorpe	-	1	-	-	-	-	-	-	1	-	-	1	**3**
	Wellington	-	-	1	-	-	-	-	-	-	-	-	-	**1**
	North Island (all)	-	-	-	-	1	-	-	-	-	2	1	1	**5**
South Island & HVDC	Nelson Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	West Coast	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Christchurch	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Canterbury	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Zone 3	-	-	-	-	-	-	-	-	-	-	-	1	**1**
	Otago	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	Southland	-	-	-	-	-	-	-	-	-	-	-	-	**0**
	South Island (all)	-	-	-	-	-	-	-	-	-	-	1	-	**1**
	HVDC	-	-	-	-	-	-	-	-	-	-	-	-	**0**

3.3 CUSTOMER ADVICE NOTICES (CANS)

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

- Two related to an emergency grid reconfiguration that occurred following a fault on the Woodville 110 kV bus;
- Two related to a planned outage of HVDC Pole 2 on 1st February;
- Two related to the secondary risk status of HVDC Pole 2;
- Two advised of HVDC transfer restrictions due to a planned outage on the 220 kV Haywards – Linton Circuit;

- Two related to the planned outage of the Maui gas production facility;
- Two related to the Asset Protection Scheme in place for the planned 220 kV Clyde – Roxburgh Circuit reconductoring;
- One advised the end of trial operation of HVDC Pole 2;
- One advised the end of trial operation of the Haywards Static Compensator;
- One advised a change to HVDC South Transfer limits;
- One advised of changes to the Weekly Dispatch Schedule;
- One related to the level of Automatic Under-Frequency Load-Shedding used in the Reserve Management Tool;
- And one related to the commissioning of the 220 kV Wairakei – Whakamaru C Line.

3.4 STANDBY RESIDUAL CHECK (SRC) NOTICES

A total of ninety-seven 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 9th – 10th, 14th – 15th, 28th – 30th of January.

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	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Total
North Island	Northland	5	4	7	5	1	3	3	7	5	7	4	9	**60**
	Auckland	1	1	3	10	11	5	3	5	9	6	1	-	**55**
	Waikato	5	3	7	10	6	8	6	8	11	7	5	9	**85**
	Bay of Plenty	5	3	5	6	2	7	5	4	8	8	7	2	**62**
	Hawkes Bay	4	5	7	4	6	-	1	-	5	7	2	5	**46**
	Taranaki	7	1	6	1	3	-	-	-	3	2	3	5	**31**
	Bunnythorpe	7	7	3	3	4	1	3	3	5	6	6	7	**55**
	Wellington	16	10	13	11	9	4	4	9	8	9	4	10	**107**
Total		50	34	51	50	42	28	25	36	54	52	32	47	**501**
South Island	Nelson Marlborough	8	4	6	7	2	1	4	3	8	11	7	8	**69**
	West Coast	9	3	8	11	8	4	3	3	7	12	6	8	**82**
	Christchurch	5	5	7	3	2	3	2	4	8	7	3	7	**56**
	Canterbury	6	3	3	5	4	1	3	3	4	4	3	4	**43**
	Otago	2	2	4	5	-	2	4	5	2	1	-	-	**27**
	Southland	3	6	9	2	3	8	5	5	3	-	1	4	**49**
Total		33	22	37	33	19	18	21	23	32	35	20	31	**324**

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	BPE_MTR1.1__HLY_SFD.1__$HLYSFD1__BPE__LN	This is an SFT generated constraint. Its purpose is to protect Bunnythorpe-Mataroa 1 for a tripping of Huntly-Stratford 1.	11
		BPE_WGN2.1__BPE_WGN1.1__BPE_WGN1__BPE__LN	This is an SFT generated constraint. Its purpose is to protect Bunnythorpe-Wanganui 2 for a tripping of Bunnythorpe-Wanganui 1.	1
	Edgecumbe	ATI_OHK.1__THI_WKM1.1__THIWKM1*__ATI__LN	This is an SFT generated constraint. Its purpose is to protect Atiamuri-Ohakuri 1 for a tripping of Te Mihi-Whakamaru 1.	2
	Hamilton	ARI_HAM1.1__ARI_HAM2.1__$ARIHAM2__HAM__LN	This is an SFT generated constraint. Its purpose is to protect Arapuni-Hamilton 1 for a tripping of Arapuni-Hamilton 2	4
		KIN_TRK1.2__KIN_TRK2.2__KIN_TRK2__TRK__LN	This is an SFT generated constraint. Its purpose is to protect Kinleith -Tarukenga 1 for a tripping of Kinleith -Tarukenga 2.	5
	Hawkes Bay	FHL_RDF2.1__RDF_TUI2.1__RDF_TUI2__RDF__LN	This is an SFT generated constraint. Its purpose is to protect Fernhill-Redclyffe 2 for a tripping of Redclyffe-Tuai 2.	1
		FHL_RDF2.1__RDF_TUI1.1__RDF_TUI1__RDF__LN	This is an SFT generated constraint. Its purpose is to protect Fernhill-Redclyffe 2 for a tripping of Redclyffe-Tuai 1.	1
South Island & HVDC	HVDC	BEN_HAYmax	The purpose of this constraint is to limit the flow on HVDC from Benmore to Haywards to the Asset Owner offered capability for HVDC.	1
	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.	142
		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.	23
	Southland	EDN_INV.1__GOR_ROX.1__GOR_ROX__INV__LN	This is an SFT generated constraint. Its purpose is to protect Edendale-Invercargill 1 for a tripping of Gore-Roxburgh 1.	38
		CYD_TWZ1.2__CYD_TWZ2.1__CYD_TWZ2__CML__LN	This is an SFT generated constraint. Its purpose is to protect Clyde-Twizel 1 for a tripping of Clyde-Twizel 2.	1
		CYD_TWZ2.2__CYD_TWZ1.1__CYD_TWZ1__CML__LN	This is an SFT generated constraint. Its purpose is to protect Clyde-Twizel 2 for a tripping of Clyde-Twizel 1.	4
	West Coast	COL_HOR2.1__COL_HOR3.1__COL_HOR3__COL__LN	This is an SFT generated constraint. Its purpose is to protect Coleridge-Hororata 2 for a tripping of Coleridge-Hororata 3	8
		COL_HOR3.1__COL_HOR2.1__COL_HOR2__COL__LN	This is an SFT generated constraint. Its purpose is to protect Coleridge-Hororata 3 for a tripping of Coleridge-Hororata 2	9
Grand Total				**251**

Constraints binding during last 12 months

The following table shows binding constraints with a duration of 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%
		BPE_MTR1.1__HLY_SFD.1__$HLYSFD1__BPE__LN	11	0.74%	0	0.00%
	Hamilton	ARI_HAM1.1__ARI_HAM2.1__$ARIHAM2__HAM__LN	4	0.27%	19	0.11%
		KIN_TRK1.2__KIN_TRK2.2__KIN_TRK2__TRK__LN	5	0.34%	8	0.05%
South Island & HVDC	West Coast	COL_HOR2.1__COL_HOR3.1__COL_HOR3__COL__LN	8	0.54%	22	0.13%
		COL_HOR3.1__COL_HOR2.1__COL_HOR2__COL__LN	9	0.60%	12	0.07%
	Otago	NSY_ROX.1__CYD_TWZ1.1__CYD_TWZ1__ROX__LN	23	1.55%	80	0.46%
		NSY_ROX.1__CYD_TWZ2.1__CYD_TWZ2__ROX__LN	142	9.54%	89	0.51%
	Southland	EDN_INV.1__GOR_ROX.1__GOR_ROX__INV__LN	38	2.55%	11	0.06%
		CYD_TWZ2.2__CYD_TWZ1.1__CYD_TWZ1__CML__LN	4	0.27%	0	0.00%
	HVDC	BEN_HAYP2max	0	0.00%	161	0.92%
		HAY_BENmax	0	0.00%	48	0.27%
		HAY_BENP2max	0	0.00%	50	0.29%
		BEN_HAYmax	1	0.07%	286	1.63%
		BEN_HAYP3max	0	0.00%	255	1.46%
		BEN_HAYP3min	0	0.00%	60	0.34%

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)
01/01/14	06:15	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.66 Hz
21/01/14	06:00	An emergency shutdown of a Tiwai potline resulted in a momentary rise in frequency in the South Island.	S	50.62 Hz

Connection point events

Date	Time	Summary Details	Generation / Load interrupted (MW)	Restoration time (minutes)
01/01/14	01:00	A fault on the 110 kV bus at Woodville Substation resulted in a loss of connection to Dannevirke, Woodville, and Waipawa Substations and Te Apiti Wind Farm.	DVK 5 WDV 1 WPW 10 TAP 14	56 98 50 102

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	4	These related to trippings of • Bunnythorpe-Tokaanu 1 (auto reclose) • Carrington Street-Motunui 1 (auto reclose) • Coleridge-Otira 1 (auto reclose) • Kinleith-Tarukenga 1 (auto reclose)
HVDC Start/ Stop	1	This related to • Simultaneous Commutation failures on HVDC Poles 2 & 3.
Supply Transformer	3	These related to trippings of • Dannevirke T1 • Rotorua T5 (2 x)
Loss of grid reactive plant	0	
Loss of single generation units	11	These related to trippings of • Aviemore G3 • Kinleith Co-generation • Kapuni GT2 • Karapiro G1, G3 • Kumara generation • Ohaaki G2 (3 x) • Stratford U22 • Te Mihi G1
Total during reporting period	**19**	

Extended contingent events

Event	Number	Summary
Loss of both HVDC poles	0	
Loss of interconnecting transformer	1	This related to tripping of • Bunnythorpe T1
Loss of bus bar section	1	This related to tripping of • Woodville 110 kV Bus
Total during reporting period	**2**	

Other events

Event	Number	Summary
Loss of multiple AC transmission circuits	3	These related to trippings of • Bunnythorpe-Tokaanu 1 A/R, commutation failures on HVDC Pole 2 & Pole 3 • Coleridge-Otira 1 (auto reclose), Kumara T1 and Kumara generation • Kumara-Otira 1 & Hokitika-Otira 2
Demand change	2	This related to tripping of • Tiwai NZAS Potline 1 (2 x)
Generation	1	This related to • Fast ramp down of Coleridge generation
Total during reporting period	**6**	

Other disturbances

Event	Number	Summary
Feeder trippings	70	Various locations
Total during reporting period	**70**	

4.3 SYSTEM EVENTS – TREND

	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Total	Average Events per month
Contingent Event – transmission	9	13	23	24	27	19	16	64	24	39	30	4	**292**	24.3
Contingent Event – generation	14	15	12	7	14	17	17	10	12	10	12	11	**151**	12.6
Contingent Event – Supply transformer	3	2	10	3	1	3	3	5	1	3	5	3	**42**	3.5
Contingent Event – Reactive plant	6	2	6	5	6	10	6	7	8	8	7	0	**71**	5.9
Contingent Event - HVDC	2	5	11	9	13	0	0	4	18	22	6	1	**91**	7.6
Extended Contingent Event HVDC	0	0	0	0	0	0	0	1	0	1	0	0	**2**	0.2
Extended Contingent Event Inter-connecting Transformers	0	1	1	0	0	1	0	0	0	1	1	1	**6**	0.5
Extended Contingent Event Busbar	1	0	2	0	1	0	0	3	0	0	1	1	**9**	0.8
Other Event – AC transmission	1	0	1	2	1	2	1	5	3	4	2	3	**25**	2.1
Other Event – Demand	0	0	1	0	2	2	1	1	1	1	0	2	**11**	0.9
Other Event – Generation	4	3	1	1	2	0	0	2	0	0	0	1	**14**	1.2