

# The Authority's draft determination of causer

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## Draft determination of the causer of the 8 September 2016 under-frequency event Consultation paper

Submissions close: 5pm 14 March 2017

14 February 2017



# Executive summary

## **An under-frequency event occurred on 8 September 2016**

The Electricity Industry Participation Code 2010 (Code) requires the Electricity Authority (Authority) to determine the causer of an under-frequency event, and prescribes the process for making its determination (clause 8.61).

The purpose of this paper is to:

- (a) set out the Authority's draft determination of the causer of the 8 September 2016 under-frequency event
- (b) consult with interested parties on the Authority's draft determination.

## **The Authority's draft determination**

The Authority's draft determination under clause 8.61 of the Code is that Transpower New Zealand Limited (Transpower), as grid owner, is the causer of the under-frequency event on 8 September 2016.

The Authority's reasons for this draft determination are:

- (a) The system operator has investigated this under-frequency event (in accordance with clause 8.60 of the Code), and has reported to the Authority that:
  - (i) The interruption/reduction of energy on 8 September 2016 occurred at the Maraetai bus, which is a set of assets belonging to Transpower as the grid owner.
  - (ii) No other asset was identified as having caused or potentially caused this under-frequency event.
  - (iii) In the system operator's view, Transpower, as grid owner, is the causer of this under-frequency event.
- (b) In a reply to a system operator letter, Transpower has accepted that, as grid owner, it is the causer of this event.
- (c) Having considered the system operator's report and the relevant elements of the Code, the Authority (based on the information available to it at this time) concurs with the system operator's findings.

## **Submissions are invited from interested parties**

The Authority must consult with interested parties before making its final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5pm on 14 March 2017.

The Authority will consider submissions received and make a final determination.

The Authority also invites comment on the system operator's calculation of the MW lost during the event, which is used for the purposes of calculating the under-frequency event charge. The system operator has applied its published methodology and determined that the loss of injection into the grid as a result of the event was 250.7 MW at the Maraetai grid injection point.

# Contents

Executive summary	ii
1 What you need to know to make a submission	1
What this consultation paper is about	1
How to make a submission	1
When to make a submission	1
2 The Authority's draft determination	2
3 How the Authority reached this draft determination	2
The system operator investigated the causer	2
The Authority has considered the system operator's report	3
4 The Authority will consider submissions and make a final determination	3
5 The system operator has calculated the MW lost during the event based on its investigations	4
Appendix A Format for submissions	5
Appendix B System operator report to the Authority 'Under Frequency Event Causation Report – 08 September 2016'	6

# 1 What you need to know to make a submission

## What this consultation paper is about

- 1.1 The purpose of this paper is to consult with interested parties on the Authority's draft determination that Transpower, as grid owner, is the causer of the 8 September 2016 under-frequency event when North Island frequency dropped below 49.25 Hz.

## How to make a submission

- 1.2 Your submission is likely to be made available to the general public on the Authority's website. If necessary, please indicate any documents attached in support of your submission and any information that is provided to the Authority on a confidential basis. However, you should be aware that all information provided to the Authority is subject to the Official Information Act 1982.
- 1.3 The Authority's preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix A. Submissions in electronic form should be emailed to [submissions@ea.govt.nz](mailto:submissions@ea.govt.nz) with "Consultation Paper—Draft determination of the causer of the 8 September 2016 under-frequency event" in the subject line.
- 1.4 If you cannot send your submission electronically, post one hard copy to either of the addresses below, or fax it to 04 460 8879.

### Postal address

Submissions  
Electricity Authority  
PO Box 10041  
Wellington 6143

### Physical address

Submissions  
Electricity Authority  
Level 7, ASB Bank Tower  
2 Hunter Street  
Wellington

- 1.5 Please note the Authority wants to publish all submissions it receives. If you consider that we should not publish any part of your submission, please
- (a) Indicate which part should not be published
  - (b) Explain why you consider we should not publish that part
  - (c) Provide a version of your submission that we can publish (if we agree not to publish your full submission).
- 1.6 If you indicate there is part of your submission that should not be published, we will discuss with you before deciding whether to not publish that part of your submission.
- 1.7 However, please note that all submissions we receive, including any parts that we do not publish, can be requested under the Official Information Act 1982. This means we would be required to release material that we did not publish unless good reason existed under the Official Information Act to withhold it. We would normally consult with you before releasing any material that you said should not be published.

## When to make a submission

- 1.8 Please deliver your submissions by **5pm** on 14 March 2017.
- 1.9 The Authority will acknowledge receipt of all submissions electronically. Please contact the Submissions' Administrator if you do not receive electronic acknowledgement of your submission within two business days.

## 2 The Authority's draft determination

- 2.1 The Authority's draft determination under clause 8.61 of the Code is that Transpower, as grid owner, is the causer of the under-frequency event on 8 September 2016.
- 2.2 The Authority's reasons for this draft determination are:
- (a) The system operator has investigated this under-frequency event (in accordance with clause 8.60 of the Code), and has reported to the Authority that:
    - (i) The interruption/reduction of energy on 8 September 2016 occurred at the Maraetai bus, which is a set of assets belonging to Transpower as the grid owner.
    - (ii) No other asset was identified as having caused or potentially caused this under-frequency event.
    - (iii) In the system operator's view, Transpower, as grid owner, is the causer of this under-frequency event.
  - (b) The system operator wrote to Transpower (on 15 September 2016) setting out its view that the event was initiated at the Maraetai bus resulting in a loss of injection from Maraetai and Waipapa power stations, and seeking any information Transpower could provide.
  - (c) In a reply to the system operator (dated 22 September 2016), Transpower has accepted that, as grid owner, it is the causer of this event.
  - (d) Having considered the system operator's report and the relevant elements of the Code, the Authority (based on the information available to it at this time) concurs with the system operator's findings.

## 3 How the Authority reached this draft determination

### **The system operator investigated the causer**

- 3.1 The system operator is required by clause 8.60 of the Code to investigate the causer of an under-frequency event and provide a report to the Authority.
- 3.2 The system operator has fulfilled its obligations under clause 8.60. The system operator's report to the Authority (dated October 2016) is attached as Appendix B of this draft determination. The report describes the circumstances of the event, which can be summarised as follows:
- (a) On 8 September 2016 at 22:23 hours there was an interruption of energy into the grid.
  - (b) The HVDC and instantaneous reserves operated in response, and the frequency was arrested at 49.24 Hz in the North Island and 49.34 Hz in the South Island.
  - (c) The frequency fall (below 49.25 Hz in the North Island) and the quantum of MW lost (greater than the 60 MW de minimis) meant that an under-frequency event, as defined in Part 1 of the Code, had occurred in the North Island.
  - (d) The frequency was restored to the normal band quickly and with no significant frequency overshoot.
  - (e) Analysis identified that the interruption occurred at Transpower's Maraetai substation.

- (f) No other event was identified as contributing to or causing the event.
  - (g) Context provided by Transpower, as grid owner, indicated that a bird strike and subsequent protection activation had tripped and disconnected the Maraetai bus.
- 3.3 The system operator report includes copies of the following correspondence with Transpower, as grid owner:
- (a) The system operator wrote to Transpower (15 September 2016) setting this out its view that the event was initiated at the Maraetai bus resulting in a loss of injection from Maraetai and Waipapa power stations, and seeking any information Transpower could provide.
  - (b) In a reply to the system operator (22 September 2016), Transpower accepted that, as grid owner, it was the causer of this event.

### **The Authority has considered the system operator's report**

- 3.4 Clause 8.61(2) requires the Authority to publish a draft determination that states whether the under-frequency event was caused by a generator or grid owner, and, if so, the identity of the causer. Clause 8.61(3) requires the Authority to give reasons for its findings in the draft determination.
- 3.5 The Authority has considered the system operator's report and liaised directly with system operator staff in relation to the investigation and the report.
- 3.6 Based on the information available to it, the Authority concurs with the system operator's findings that Transpower, as grid owner, is the causer of the under-frequency event of 8 September 2016. The Authority's draft determination and reasons are set out above.

**Q1. Do you agree with the Authority's draft determination that Transpower as grid owner is the causer of the 8 September 2016 under-frequency event? If not, please state your alternative view on the causer and give your reasons.**

## **4 The Authority will consider submissions and make a final determination**

- 4.1 Clause 8.61(4) requires the Authority to consult every generator, grid owner and other participant substantially affected by an under-frequency event in relation to the draft determination.
- 4.2 The Authority intends to ordinarily allow a period of four weeks for parties to make submissions on a draft determination. The Authority will never allow a consultation period of less than the minimum of 10 business days specified by clause 8.61. The Authority may allow for periods of longer than four weeks where it:
- (a) considers an under-frequency event is complex and/or contentious in nature
  - (b) is consulting on a number of other matters simultaneously
  - (c) is consulting during a period that spans public holidays.
- 4.3 The Authority has allowed a consultation period of four weeks for this particular draft determination. Accordingly, the deadline for submissions is 5pm on 14 March 2017.

- 4.4 The Authority will consider submissions received, and publish its final determination.
- 4.5 Clauses 8.62 and 8.63 of the Code set out provisions relating to any disputes regarding Authority determinations.

## 5 The system operator has calculated the MW lost during the event based on its investigations

- 5.1 Clause 8.64 of the Code prescribes how the event charge payable by the causer of an under-frequency event must be calculated. This in turn enables calculation of the rebates paid for under-frequency events (clause 8.65).
- 5.2 Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points as a result of the event.
- 5.3 The system operator determines the MW lost as part of its investigations into an under-frequency event.
- 5.4 The system operator has followed its published procedure “PR-RR-017 “Calculating the Amount of MW lost” to determine the MW value provided to the clearing manager for the purposes of calculating the under-frequency event charge.
- 5.5 Based on its investigations and application of its procedure, the system operator has determined that the loss of injection into the grid as a result of the event was 250.7 MW at the Maraetai grid injection point. This calculation is set out in the system operator’s report to the Authority (Appendix B) and referenced in correspondence attached to that report:
- (a) In its correspondence with Transpower, as grid owner, regarding the cause of this under-frequency event (15 September 2016), the system operator advised Transpower of its calculation that the MW lost due to the event was 250.7 MW.
  - (b) In its reply to the system operator (22 September 2016), Transpower, as grid owner, agreed with the system operator’s calculation and accepted that the MW lost was 250.7 MW.
- 5.6 Although included in its report to the Authority, the system operator’s calculation of the MW lost during the event for the purposes of calculating the under-frequency event charge does not form part of the Authority’s draft determination (refer clause 8.61 of the Code). However, the Authority acknowledges that the calculation is central to determining the event charge payable by the causer, and therefore also to the rebates paid for under-frequency events.
- 5.7 Accordingly, the Authority invites comment on the system operator’s calculation of the MW lost, as set out in the system operator’s report to the Authority.

**Q2. Do you agree with the system operator’s calculation that, for the purposes of calculating the under-frequency event charge, 250.7 MW was lost at the Maraetai grid injection point as a result of the 8 September 2016 under-frequency event? If not, please state your alternative view on the MW lost and give your reasons.**

## Appendix A    Format for submissions

Submitter	
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Question	Comment
<p>Q1. Do you agree with the Authority's draft determination that Transpower as grid owner is the causer of the 8 September 2016 under-frequency event? If not, please state your alternative view on the causer and give your reasons.</p> <p>Q2. Do you agree with the system operator's calculation that, for the purposes of calculating the under-frequency event charge, 250.7 MW was lost at the Maraetai grid injection point as a result of the 8 September 2016 under-frequency event? If not, please state your alternative view on the MW lost and give your reasons.</p>	
<p>Q2. Do you agree with the system operator's calculation that, for the purposes of calculating the under-frequency event charge, 250.7 MW was lost at the Maraetai grid injection point as a result of the 8 September 2016 under-frequency event? If not, please state your alternative view on the MW lost and give your reasons.</p>	



Appendix B    System operator report to the Authority  
‘Under Frequency Event Causation Report –  
08 September 2016’

# Under Frequency Event Causation Report - 08 September 2016

Under Frequency Event - 8 September 2016

## System Operator

**Transpower New Zealand Limited**

October 2016

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TRANSPOWER



Version	Date	Change
01	17 October 2016	Document Final

	Position	Date
Prepared By:	Scott Avery, Audit and Compliance Manager, System Operations	17 October 2016
Reviewed By:	Dean Eagle, Markets Operation Team Leader, System Operations	26 October 2016

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## IMPORTANT

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The information in this document is provided in good-faith and represents the opinion of Transpower New Zealand Limited, as the System Operator, at the date of publication. Transpower New Zealand Limited does not make any representations, warranties or undertakings either express or implied, about the accuracy or the completeness of the information provided. The act of making the information available does not constitute any representation, warranty or undertaking, either express or implied. This document does not, and is not intended to; create any legal obligation or duty on Transpower New Zealand Limited. To the extent permitted by law, no liability (whether in negligence or other tort, by contract, under statute or in equity) is accepted by Transpower New Zealand Limited by reason of, or in connection with, any statement made in this document or by any actual or purported reliance on it by any party. Transpower New Zealand Limited reserves all rights, in its absolute discretion, to alter any of the information provided in this document.

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### Contact Details

Address: Transpower New Zealand Ltd  
96 The Terrace  
PO Box 1021  
Wellington  
New Zealand

Telephone: +64 4 495 7000

Fax: +64 4 498 2671

Email: [system.operator@transpower.co.nz](mailto:system.operator@transpower.co.nz)

Website: <http://www.systemoperator.co.nz>

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Purpose..... 5

Under Frequency Event Details..... 6

Calculation of MW Lost ..... 8

Finding..... 10

Appendix 1: System Operations Correspondence ..... 11

    1.1 Confirmation of Event Notice ..... 11

    1.2 Prior Notification of Causer ..... 12

Appendix 2: Transpower Correspondence..... 14

    2.1 Transpower Response ..... 14

Appendix 3: Charts ..... 15

    3.1 Island Frequencies ..... 15

    3.2 Loss of Maraetai and Waipapa Generation ..... 16

## PURPOSE

1. On Thursday 8 September 2016 during the late evening at 22:23 an interruption or reduction of energy occurred in the power system. The frequency fell to 49.24 Hz in the North Island and 49.34 Hz in the South Island.
2. As the frequency fell to below 49.25 Hz and as per clause 8.60 of the Electricity Industry Participation Code (EIPC) Transpower, as system operator, investigated this event to assist the Electricity Authority in determining the causer of the under frequency event.
3. The result of this investigation is this report prepared under clause 8.60(5) of the EIPC, provided to the Authority, and includes:
  - Whether in Transpower's view the UFE was caused by the grid owner or a generator and identifies that potential causer;
  - The reasons for forming this view; and
  - The information considered in reaching this view.

## UNDER FREQUENCY EVENT DETAILS

4. On Thursday 8 September 2016 during the late evening at 22:23 an interruption or reduction of energy occurred into the grid. In response HVDC and reserves operated to prevent a substantial fall in the frequency. The frequency was arrested at 49.24 Hz in the North Island and 49.34 Hz in the South Island.
5. The frequency was restored to the normal band quickly with no significant over frequency overshoot.
6. Excursion Notices were sent immediately following the event

### North Island

Date	Time	Minimum Hz	Island
08-Sep-2016	22:23:02	49.239	North

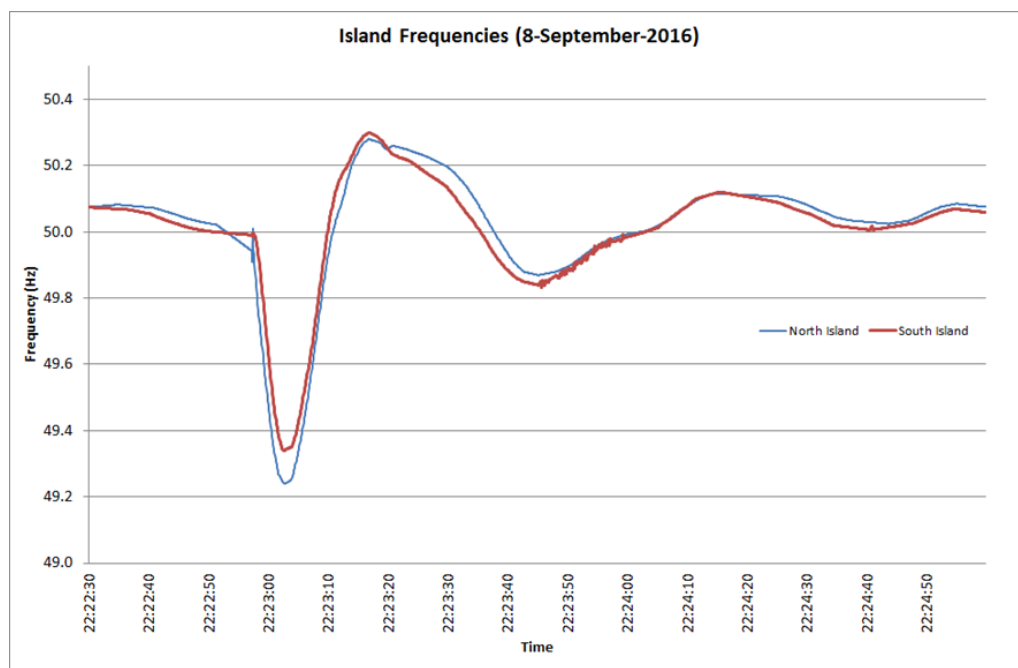
Date	Time	Maximum Hz	Island
08-Sep-2016	22:23:16	50.28	North

### South Island

Date	Time	Minimum Hz	Island
08-Sep-2016	22:23:02	49.339	South

Date	Time	Maximum Hz	Island
08-Sep-2016	22:23:16	50.30	South

7. On 9 September 2016 Transpower published a 'Confirmation of Event' notice. (see appendix 1.1).
8. Analysis identified that the interruption/reduction in energy occurred at Transpower's Maraetai substation. No other event was identified as contributing or causing the under frequency event.



For an enlarged Chart see Appendix 3.1

9. On 15 September a letter was sent (see appendix 1.2) that outlined the details of the event and asked Transpower, as the grid owner:
  - whether Transpower, as grid owner, considered itself to be the “causer” of the under-frequency event as defined in the Code;
  - whether Transpower, as the grid owner, agreed with the assessment of the loss of injection of electricity to the grid for the event was 250.7 MW (263.9 MW × 95% - to account for the margin of error); and
  - any additional information to support your views
10. On 22 September Transpower, as the grid owner, responded (see appendix 2.1) and accepted that they were the causer of the event and the assessed MW value of 250.7MW.
11. Context provided by Transpower, as the grid owner, as to the cause indicated that a bird strike and subsequent protection activation had tripped and disconnected the Maraetai Bus.



## CALCULATION OF MW LOST

12. To determine the MW value provided to the clearing manager for the purposes of calculating the under frequency event charge. Transpower, as system operator, follows procedure PR-RR-017 “Calculating the Amount of MW lost”.
13. This procedure follows the formula set out under section 8.64 of the EIPC for evaluating an event charge.

The **event charge** payable by the **causer** of an **under-frequency event** (referred to as “Event e” below) must be calculated in accordance with the following formula:

$$EC = ECR * (\sum y (INTye \text{ for all } Y) - INJd)$$

where

EC is the **event charge** payable by the causer

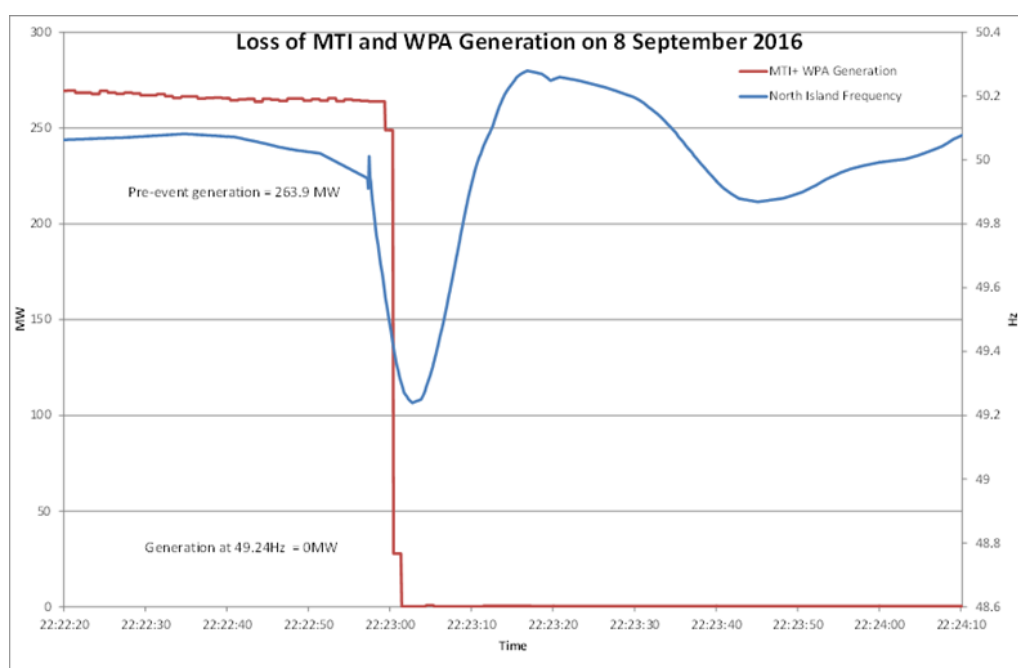
ECR is \$1,250 per **MW**

INJd is **60MW**

INTye is the electric power (expressed in **MW**) lost at point y by reason of Event e (being the net reduction in the **injection of electricity** (expressed in **MW**) experienced at point Y by reason of Event e) excluding any loss at point y by reason of secondary Event e

Y is a **point of connection** or the **HVDC injection point** at which the **injection of electricity** was interrupted or reduced by reason Event e

14. As the ECR and INJd values are constants the values to calculate and complete the formula are Y and INTye.



For an enlarged Chart see Appendix 3.2

15. For the event on 8 September 2016 the loss of the Maraetai Bus asset interrupted the electricity from Maraetai generation and Waipapa generation entering the network. The generation from Maraetai and Waipapa enters the network through the Maraetai Bus to the Maraetai GIP.
16. To establish the amount of MW lost SCADA data was extracted for the 60 seconds prior to the frequency reaching 49.25 Hz for generation (Maraetai and Waipapa) behind the Maraetai Bus. After evaluation, the amount of MW lost causing the frequency to fall below 49.25Hz was determined to be 263.9 MW. For this event the loss of MW was virtually instantaneous and the 263.9 MW of generation passing through the Maraetai Bus into the network was completely lost when the frequency reached 49.25 Hz.
17. A factor of 95% is applied to the MW lost value to account for any margin of error, reducing the MW lost value to 250.7 MW.
18. As a result, the final formula is as follows
 
$$EC = ECR * (\sum_y (INT_y \text{ for all } Y) - INJ_d)$$

$$EC = \$1250 * (1 * (250.7\text{MW}) - 60\text{MW})$$

$$EC = \$238,375$$

## FINDING


19. Initial analysis identified the interruption/reduction of energy on 8 September 2016 occurring at the Maraetai bus. This set of assets belongs to Transpower, as the grid owner.
20. In the response of 22 September 2016 Transpower, as the grid owner, accepted that they were the causer of the event on 8 September 2016.
21. No other asset was identified as having caused or potentially causing the under frequency event.
22. As such, Transpower, as the system operator, recommends that Transpower, as the grid owner, be determined as the causer of the under frequency event on 8 September 2016.

10

## Appendix 1: SYSTEM OPERATIONS CORRESPONDENCE

### 1.1 CONFIRMATION OF EVENT NOTICE

11


**TRANSPower**

SYSTEM OPERATOR

**Date:** 9 September 2016

**To:** Market Participants  
**cc:** Clearing Manager  
**From:** System Operator

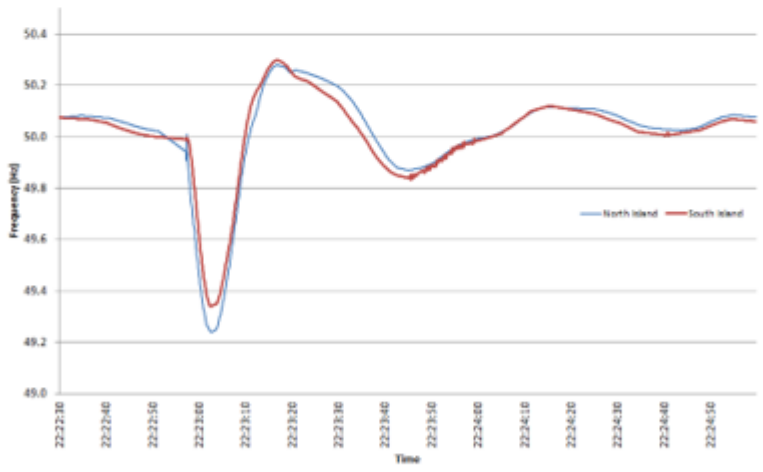
**Under-frequency Event Confirmation**

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The System Operator wishes to advise market participants of the under-frequency event which occurred in the North Island on 8 September 2016.

**Event ID:** 112  
**Affected Islands:** North Island  
**North Island Minimum Frequency:** 49.24 Hz  
**Time (of min. frequency):** 22:23:02  
**South Island Minimum Frequency:** 49.34 Hz  
**Time (of min. Frequency):** 22:23:02

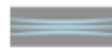
Island Frequencies (8-September-2016)



Transpower New Zealand Ltd The National Grid

## 1.2 PRIOR NOTIFICATION OF CAUSER

12



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Dean Eagle  
Tel: (04) 590 7130  
Fax: (04) 495 7154

Transpower House  
96 The Terrace  
PO Box 1021  
Wellington 6140  
New Zealand  
P 64 4 495 7000  
F 64 4 495 7100  
[www.transpower.co.nz](http://www.transpower.co.nz)

15 September 2016

Kent Murrell  
Transpower NZ Limited  
PO Box 17188  
Wellington

Dear Kent,

### 8 September 2016 North Island Under-frequency Event

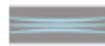
On 8 September 2016, an under-frequency event occurred in the North Island at 22:23. Based on the information available we believe that the event was initiated at the Maraetai bus resulting in a loss of injection from Maraetai and Waipapa power stations.

In order to report to the Electricity Authority as required by clause 8.60 of the Electricity Industry Participation Code I would appreciate any information you can provide around this event, and whether you believe Transpower New Zealand (as Grid Owner) is the causer of the under-frequency event.

We have also calculated the loss of injection of electricity to the grid for the event was 250.7 MW (263.9 MW × 95% - to account for the margin of error). If you have a view on the amount of electricity lost during this event please include that information in your response.

After receipt of your information the System Operator will prepare and send a report to the Electricity Authority with our view on whether the under-frequency was caused by a generator or grid owner, the identity of the causer, the reasons for our view and all of the information considering in reaching our view.

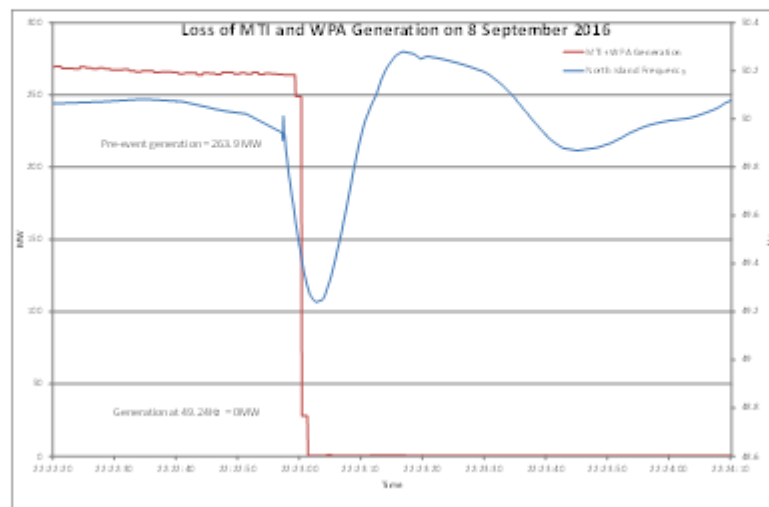
Transpower New Zealand Ltd [The National Grid](http://www.transpower.co.nz)



TRANSPower

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Transpower House  
96 The Terrace  
PO Box 1021  
Wellington 6140  
New Zealand  
P 64 4 495 7000  
F 64 4 495 7100  
[www.transpower.co.nz](http://www.transpower.co.nz)



Please respond to the System Operator with your information relating to this event no later than 10 October 2016.

Regards,

Dean Eagle  
Market Operations Team Leader

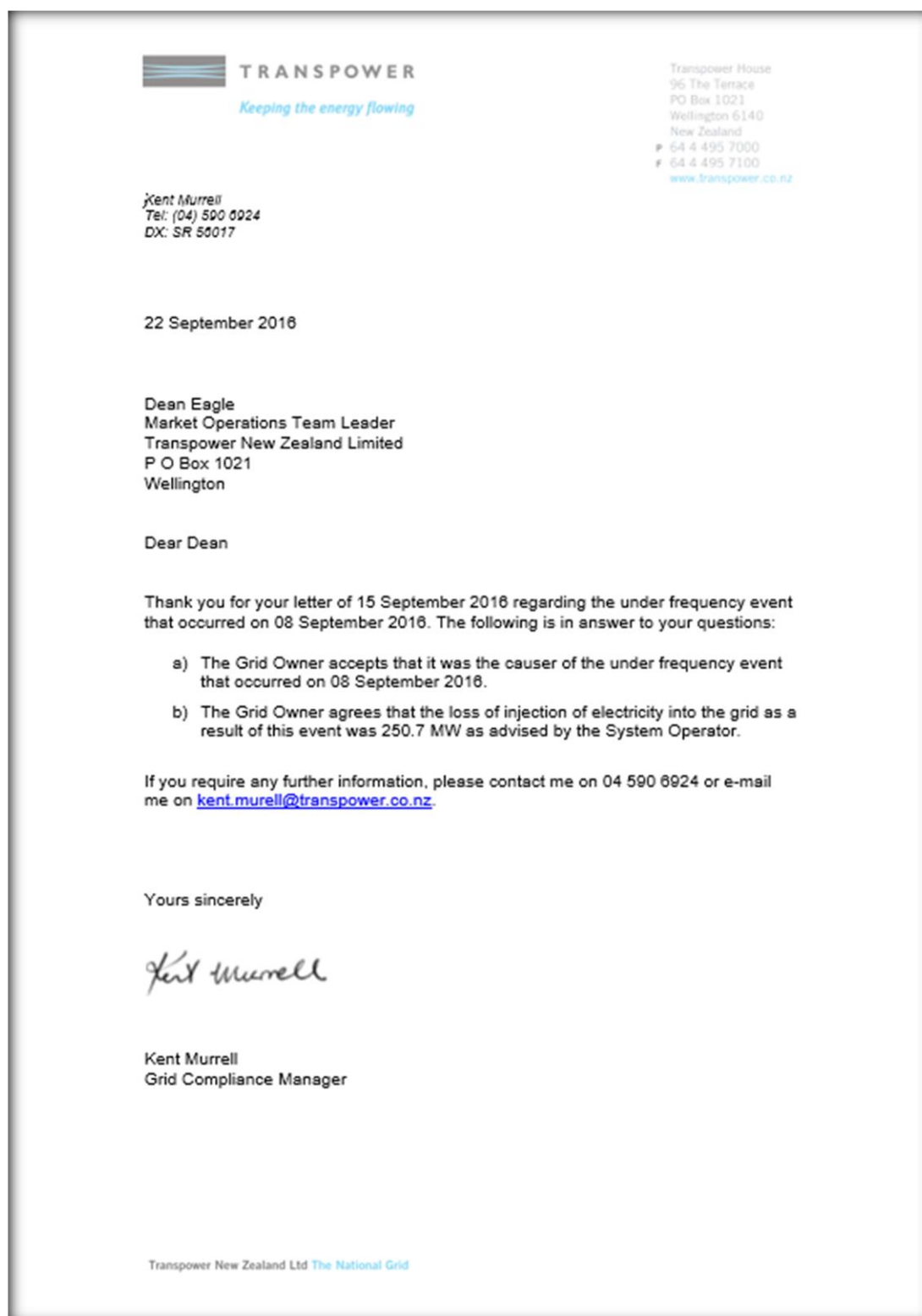
CC Scott Avery (System Operator)

Transpower New Zealand Ltd The National Grid

## Appendix 2: TRANSPower CORRESPONDENCE

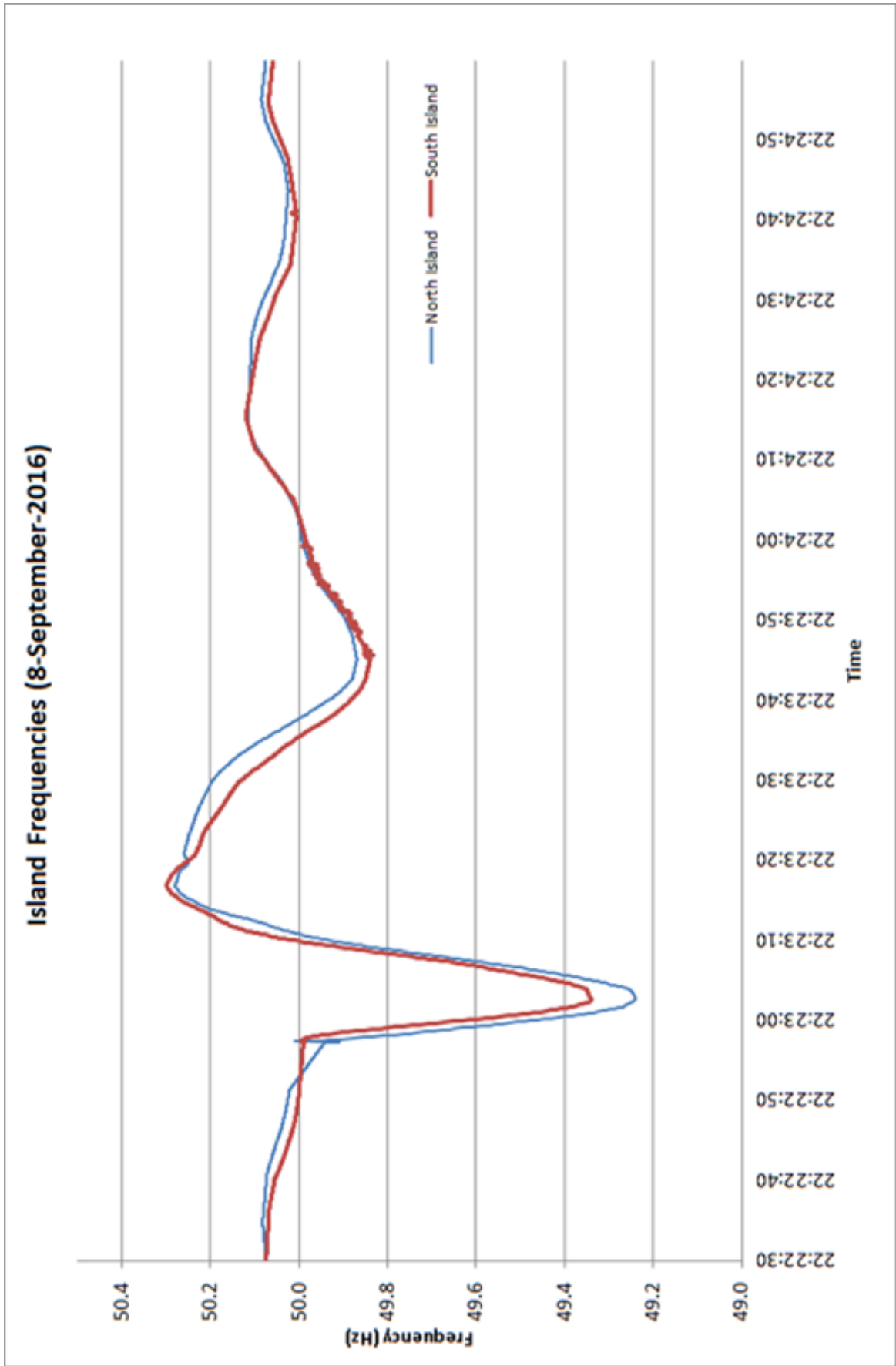
### 2.1 TRANSPower RESPONSE

14



Appendix 3: CHARTS

3.1 ISLAND FREQUENCIES





### 3.2 LOSS OF MARAETAI AND WAIPAPA GENERATION

