

Draft determination of causer: 27 June 2024 under- frequency event

Consultation paper

8 August 2024

Executive summary

The normal frequency band in New Zealand is between 49.8Hz and 50.2Hz. An under-frequency event (UFE) occurs when the frequency falls below 49.25Hz because of a loss of more than 60 megawatts (MW) injected into the grid. The Electricity Industry Participation Code 2010 (Code) requires the Electricity Authority Te Mana Hiko (Authority) to determine the causer of a UFE and sets the process for making the determination.

The Authority's draft determination is that Genesis Energy Limited (Genesis) was the causer of the 27 June 2024 UFE.

At 12:32pm on 27 June 2024 a UFE occurred when 236.44MW of generation injection was interrupted or lost at the Huntly grid connection point. This resulted in a drop in frequency of 49.21Hz in the North Island and 49.25Hz in the South Island.

The Authority has determined Genesis is the causer of the 27 June 2024 UFE. The reasons for the draft determination are:

- the interruption of energy injected into the grid occurred at Unit 1 of the Huntly power station, which belongs to Genesis.
 - (a) no other asset was identified as having caused or potentially caused the UFE.
 - (b) in the system operator's view, Genesis is the causer of the UFE.
 - (c) Genesis has accepted that it was the causer.

Submissions are invited from interested parties

Clause 8.61 of the Code requires the Authority to consult with interested parties on the reasons of its findings before making a final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5pm on 15 November 2024. The Authority will then consider all submissions received and make a final determination on the causer of the UFE.

The Authority also invites comment on the system operator's calculation of the megawatts of power lost during the event, which the system operator uses for calculating the UFE event charge.

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1. What you need to know to make a submission

What this consultation is about

- 1.1. This paper consults with interested parties on the Authority's draft determination that Genesis, as the generator which owns Huntly Unit 1, was the causer of the UFE at 12:32pm on 27 June 2024.

How to make a submission

- 1.2. The Authority's preference is to receive submissions in electronic format (Microsoft Word) in the format shown in Appendix B. Submissions in electronic form should be emailed to compliance@ea.govt.nz with 'Consultation paper – 27 June 2024 under-frequency event' in the subject line.
- 1.3. If you cannot send your submission electronically, please contact the Authority (compliance@ea.govt.nz or 04 460 8860) to discuss alternative arrangements.
- 1.4. Please note the Authority intends to publish all submissions it receives. If you consider that the Authority 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, and
 - (c) provide a version of your submission the Authority can publish (if we agree not to publish your full submission).
- 1.5. If you indicate part of your submission should not be published, the Authority will discuss this with you and make any necessary redactions before publishing.
- 1.6. All submissions received by the Authority, including any parts that the Authority does not publish, can be requested under the Official Information Act 1982. This means the Authority would be required to release material not published unless good reason existed, under the Official Information Act, to withhold it. The Authority would normally consult with you before releasing any material that you said should not be published.

When to make a submission

- 1.7. Please provide your submission by 5pm on 15 November 2024.
- 1.8. Compliance staff will acknowledge receipt of all submissions electronically. Please contact us via compliance@ea.govt.nz or 04 460 8860 if you do not receive electronic acknowledgement of your submission within two business days.

The Authority will consider submissions and make a final determination

- 1.9. The Code requires the Authority to consult with every generator, grid owner and other participant substantially affected by a UFE event in relation to a draft determination. The consultation period is 10 business days.
- 1.10. The Authority will consider submissions received and publish its final determination. The Code sets out provisions relating to any disputes regarding the Authority's determination. These requirements and provisions are in clause 8.62 of the Code.

2. Introduction

- 2.1. Under clauses 8.60, 8.61(2) and 8.61(3) of the Code, the system operator is required to investigate the causer of a UFE and provide a report to the Authority.

The Authority must then publish a draft determination that states whether a UFE was caused by a generator or grid owner, and, if so, the identity of the causer. The draft determination must include reasons for the findings.

3. Genesis is the causer of the 27 June 2024 UFE

- 3.1. The Authority's draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 1, is the causer of the UFE at 12:32pm 27 June 2024.

The system operator investigated the causer of the UFE

- 3.2. The system operator's report (dated September 2024) is attached as Appendix A.

- 3.3. The circumstances described in the report are summarised below:

- (a) At 12:32pm 27 June 2024, Huntly Unit 1 tripped removing 236.44MW of generation.
 - (b) North Island frequency fell to 49.21Hz.
 - (c) The frequency fall and the quantity of MW lost (greater than the 60MW minimum) meant that a UFE, as defined in Part 1 of the Code, had occurred because there was an interruption/reduction of energy injected into the grid.
 - (d) Instantaneous reserve providers in the North and South Islands responded, returning the frequency to the normal band within two seconds.
- Huntly Unit 1 tripped on low drum level due to a loss of feed water. Genesis believes this is what caused the UFE.
 - (e) No other event or asset operation was identified as occurring at or around the time of the UFE.
 - (f) On 4 July 2024, the system operator requested the grid owner provide information on the circumstances of the UFE.
 - (g) On 4 July 2024, the system operator wrote to Genesis requesting it provide information on its assessment of whether or not it was the causer of the UFE.
 - (h) On 8 July 2024, the grid owner provided its assessment of the UFE. The grid owner did not believe it was the causer of the 27 June 2024 UFE.
 - (i) On 8 July 2024, Genesis replied, agreeing that it was the causer and provided the circumstances that led to the Huntly Unit 1 tripping.

The Authority considered the circumstances of the UFE

- 3.4. The Authority has considered the system operator's report and correspondence with Genesis and the grid owner. The Authority's reasons for the draft determination that Genesis is the causer are:

- (a) A UFE occurred at 12:32pm 27 June 2024 when frequency dropped to 49.21Hz in the North Island.
- The interruption of electricity occurred at the grid injection point for Huntly Unit 1, which belongs to Genesis.

- (b) No other asset was identified as potentially causing the UFE.
 - (c) The system operator and Genesis agree that Genesis was the causer of the UFE.
- 3.5. The Authority agrees with the system operator's findings on the causer of the 27 June 2024 UFE having considered the relevant clauses of the Code and based on the information available at this time.

Q1. Do you agree with the draft determination that Genesis Energy Limited (Genesis) is the causer of the UFE event on 27 June 2024 at 12:32pm? If not, please advise your view on the causer and give reasons.

4. The system operator has calculated the MW lost during the event based on its investigation

- 4.1. Clauses 8.64 and 8.65 of the Code sets out how to calculate the event charge payable by the causer of a UFE. This in turn enables calculation of the rebates paid for UFE.
- 4.2. Central to the event charge calculation is determining the MW of injection lost at one or more grid injection points because of the UFE. The system operator determines the MW lost as part of its investigation into a UFE.
- 4.3. The system operator has determined the loss of injection into the grid for the 27 June 2024 event was 236.44MW at the grid injection point for Huntly Unit 1, resulting in an event charge of \$220,550.00.
- 4.4. The system operator's calculation of the MW lost for this event is included in the report (Appendix A). The system operator's calculation does not form part of the Authority's draft determination. However, the Authority acknowledges that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate (calculated by the clearing manager) paid for a UFE. The Authority invites comment on the system operator's calculation of the MW lost.
- 4.5. Any comments received will be passed to the system operator.

Q2. Do you agree with the system operator's assessment that 236.44MW was lost from the power system in the 27 June 2024 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A System operator causation report 27 June 2024 under-frequency event

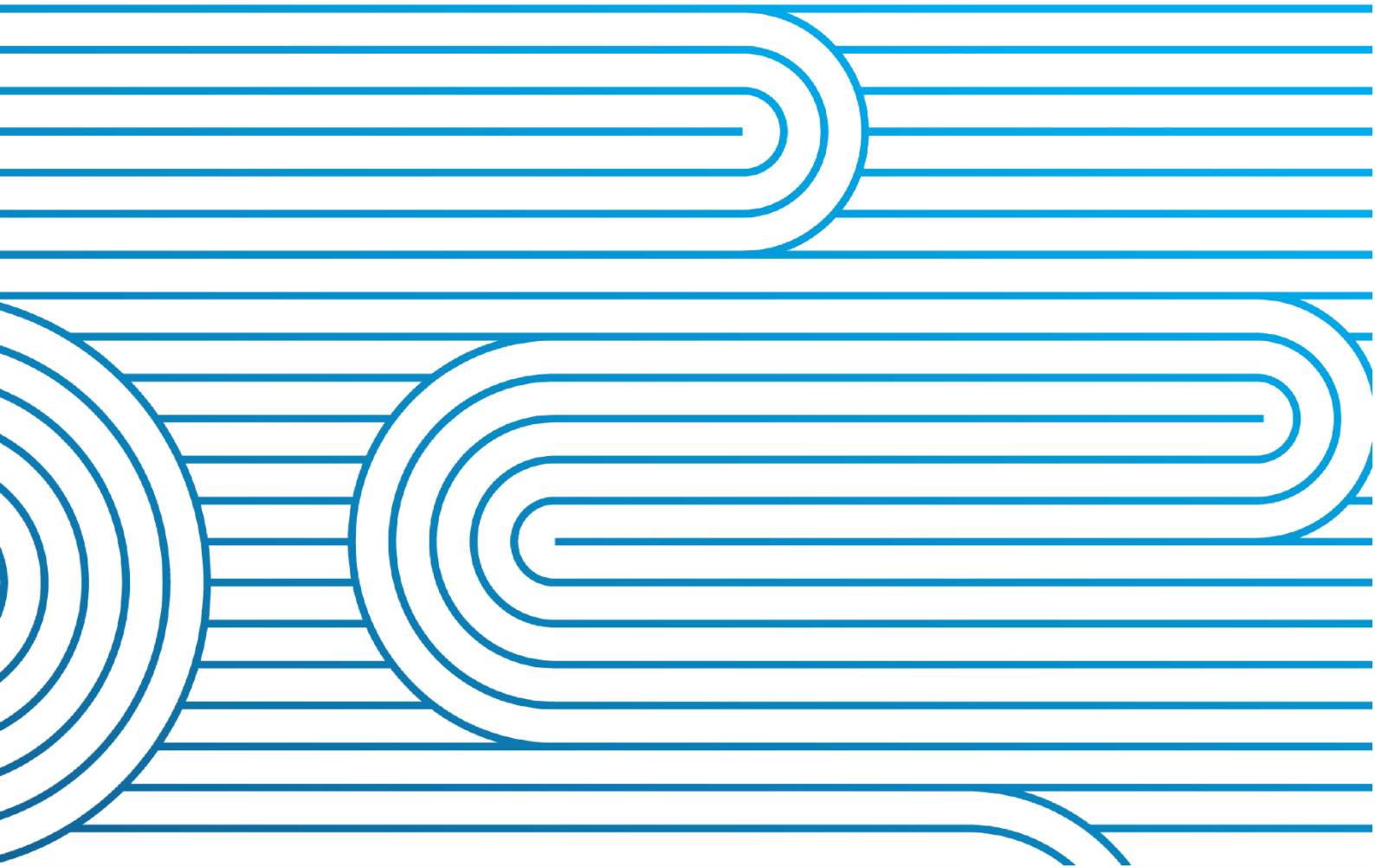
Causation Report

27th June 2024

Under-Frequency Event

System Operator event 4470

September 2024



IMPORTANT

Disclaimer

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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PURPOSE

On 27th June 2024 a reduction of energy into the power system caused the system frequency in the North Island to fall below 49.25 Hz, resulting in an under-frequency event.

Pursuant to clause 8.60 of the Electricity Industry Participation Code (**Code**), the System Operator investigated the event to assist the Electricity Authority (**Authority**) in determining a causer of the under-frequency event.

This Causation Report is provided to the Authority pursuant to clause 8.60(5) of the Code and includes the following:

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- The System Operator's recommendation of the causer of the under-frequency event.
- The System Operator's reasons for forming its view.
- The information considered in reaching this view.

EXECUTIVE SUMMARY

At 12:32:34 on 27th June 2024 Genesis Energy's Huntly Unit 1 tripped.

The disconnection of generation from Huntly Unit 1 removed 236.440MW of injection into the power system.

At 12:32:35 the North Island frequency fell to 49.21 Hz. Either of the North or South Island frequencies falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis has stated that it believes the tripping of Huntly Unit 1 was the cause of the under-frequency on 27th June 2024.

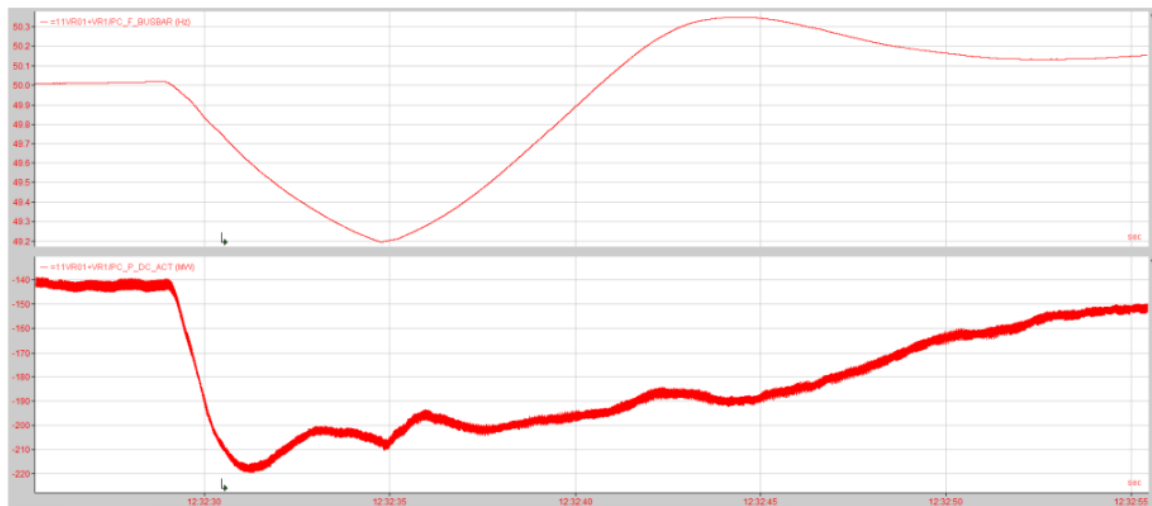
Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 1 caused the under-frequency event.

Accordingly, the System Operator recommends Genesis be found as the causer of the under-frequency event on 27th June 2024.

SYSTEM EVENTS – 27TH JUNE 2024

Prior to the under-frequency event

According to the Grid Owner, there were no protection operations of any grid assets in the vicinity of Huntly on 27th June 2024 that may have contributed to the frequency falling below 49.25 Hz. There were no HVDC events that contributed to this event. On the contrary, the HVDC system responded to lessen the severity of the UFE. Prior to the event, the HVDC was transferring 142MW north (received power). The transfer was modulated up to 218MW north (received power) during the event to lessen the severity of the UFE.



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The under-frequency event

According to Genesis Huntly Unit 1 tripped on low drum level due to loss of feed water.

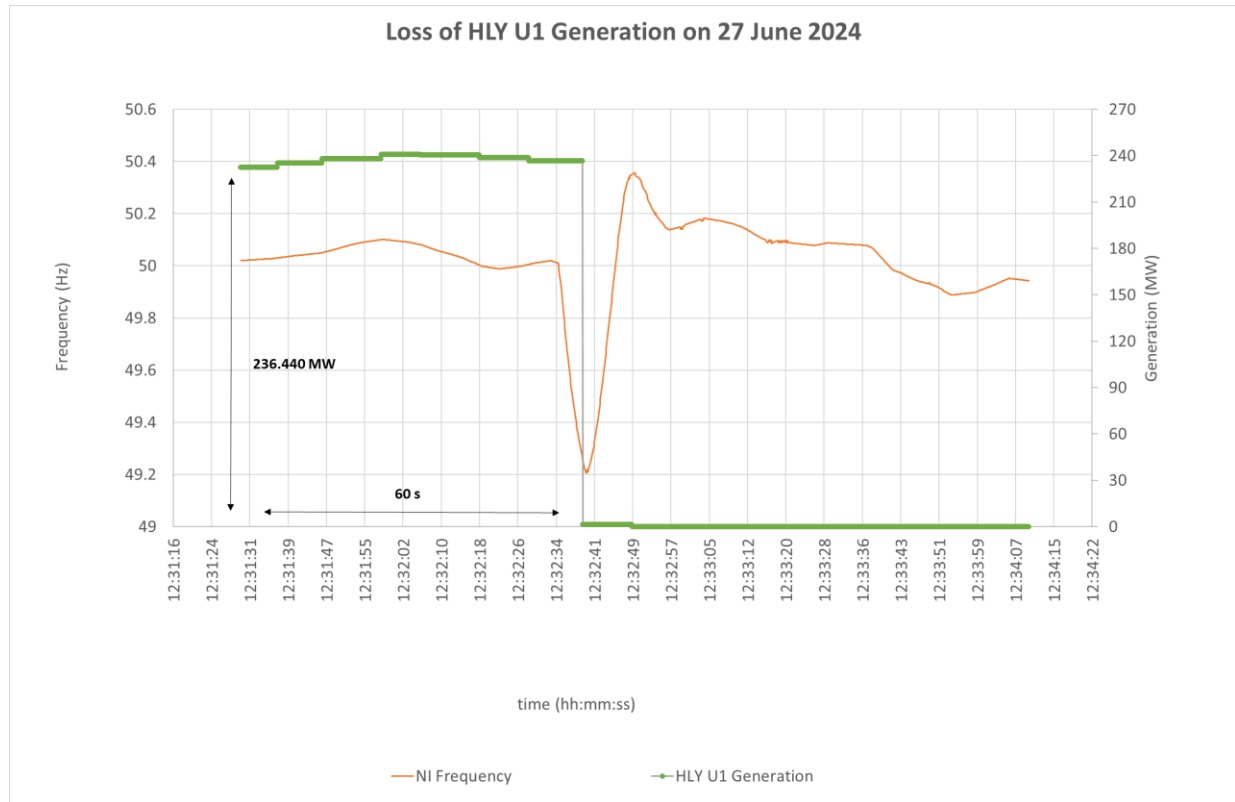
At 12:32:34 the disconnection of Huntly Unit 1 removed 236.440MW of generation injection into the power system. Consequently, this reduced the system frequency in the North Island to 49.21 Hz at 12:32:35.

Genesis confirmed the MW lost as 236.440MW.

Please note the system operator’s graph below does not precisely time the tripping of Huntly Unit. This is because there is a time delay in the system operator’s SCADA data (which resulted in the delayed recording of Huntly Unit 1 tripping).

North Island Frequency

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After the under-frequency event

At the time of the event, the System Operator had dispatched:

- North Island (generation) instantaneous reserve providers to be available to provide 95.80MW FIR and 147.80MW SIR.
- North Island interruptible load providers to be available to trip 90.80MW FIR and 104.40MW SIR.

These reserve providers responded, returning the frequency to the normal band within two seconds.

Performance of instantaneous reserve providers in an under-frequency event is assessed by the system operator to ascertain if these providers are meeting their respective ancillary service contracts. Assessment confirmed that all ancillary service contract obligations were met satisfactorily.

Interruptible load providers are not required to respond until the frequency drops below 49.20 MW. Six interruptible load providers were scheduled for dispatch; at least two responded in full and the remainder provided partial responses, due to local frequency discrepancies being sufficiently close to 49.20 Hz. The response of the interruptible load providers was consistent with their contractually agreed trip settings.

No other event or asset operation was identified as occurring at or around the time of the under-frequency event.

RATIONAL FOR RECOMMENDATION

Factors considered

Only one event occurred in close proximity to the North Island frequency falling below 49.25 Hz, namely the tripping of Huntly Unit 1 at 12:32:34 on 27th June 2024.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 1 can be linked with the North Island frequency falling below 49.25Hz.

Genesis Energy and the Grid Owner were both asked if they considered themselves the causer of the under-frequency event.

Genesis Energy confirmed that the tripping of Huntly Unit 1 caused the under-frequency event.

The Grid Owner does not believe it caused the under-frequency event.

CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for the purposes of calculating the under-frequency event charge.

The System Operator follows the procedure 'Calculating the Amount of MW lost' (PR-RR-017) to determine the MW lost. This procedure follows the formula set out in clause 8.64 of the Code for calculating 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:

$$EC = ECR * (\sum y (INT_{ye} \text{ for all } y) - INJ_d)$$

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJ_d is 60 MW

INT_{ye} 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

As the ECR and INJ_d values are constants the values to calculate and complete the formula are y and INT_{ye}.

Using the event charge formula the calculation is as follows:

$$\text{Event Charge} = \$1250/\text{MW} * (236.440\text{MW} - 60\text{MW})$$

$$\text{Event Charge} = \$220,550.00$$

Appendix 1: CORRESPONDENCE

1.1 CONFIRMATION OF EVENT NOTICE



TRANSPower



Customer Advice Notice

To: CAN NZ Participants
Sent: 01-Jul-2024 14:14
Ref: 5477793269

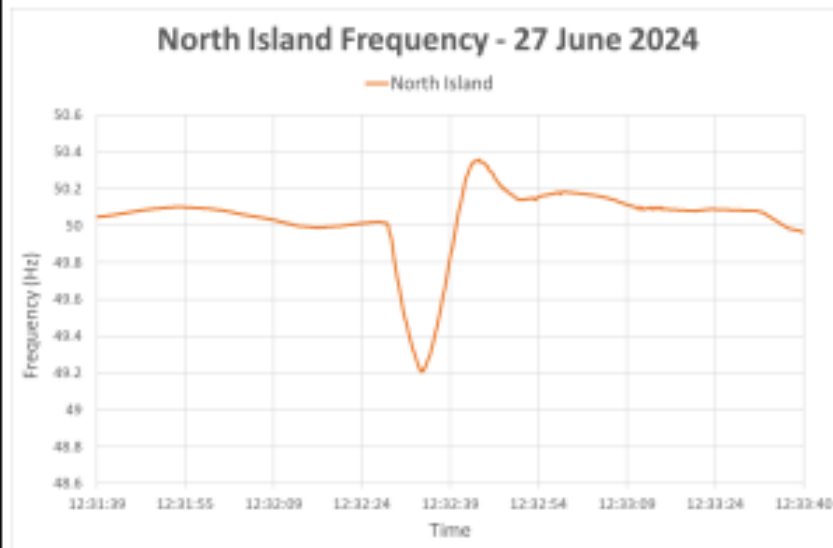
From: The System Operator
Telephone: 0800 488 500
Email: NMData@transpower.co.nz

Revision of:

Under Frequency Event Confirmation

The system operator wishes to advise market participants of an under-frequency event which occurred in the North Island on 27 June 2024.

Event ID:	4470
Affected Islands:	North Island
North Island Minimum Frequency:	49.21 Hz
Time (start of UFE):	12:32:34
Time (of min. frequency):	12:32:35



Market Operations

Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,
 New Zealand

A revision of this notice will be issued if there is any change to the situation above.

Transpower New Zealand Ltd The National Grid

Telephone: 04 590 7470
 market.operations@transpower.co.nz

1.2 SYSTEM OPERATOR REQUEST FOR INFORMATION – GENESIS ENERGY



TRANSPower

Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100

4 July 2024

Steve Leppien
Genesis Energy Limited
Private Bag 3131
Hamilton

Dear Steve

28 June 2024 Under-Frequency Event

On 28 June at 12:32:34 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 28 June 2024.
- We have assessed the MW lost during the event as 236.44 MW at HLY Unit 1. Can you please confirm this assessment or provide data that indicates a different value of MW lost. We rely on SCADA data, but your data from site may be more accurate.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

Chris Birkinshaw
Acting SO Compliance & Impartiality Manager

1.3 SYSTEM OPERATOR REQUEST FOR INFORMATION – GRID OWNER



Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100

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4 July 2024

Mao Reyes
Grid Compliance Manager
Grid Owner
Transpower
Wellington

Dear Mao,

28 June 2024 Under-Frequency Event

On 28 June at 12:32:34 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 28 June 2024.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Chris Birkinshaw".

Chris Birkinshaw
Acting SO Compliance & Impartiality Manager

1.4 GENESIS RESPONSE



Genesis Energy Limited
The Genesis Energy Building
94 Bryce Street
Private Bag 3131
Hamilton 3204
New Zealand

T. 07 982 7909

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08 July 2024

Chris Birkinshaw
Acting SO Compliance and Impartiality Manager
Transpower New Zealand Limited
P O Box 1021
WELLINGTON 6140

By email: Chris.Birkinshaw@transpower.co.nz

Dear Chris,

RE: 27th June 2024 Under-Frequency Event

I refer your letter dated 4 July 2024 requesting information from Genesis to help identify the causer of the 28th of June 2024 under-frequency event. As per Transpower Excursion Notice 5470347915, we believe the event occurred on the 27th of June and our response below is based on this date.

Information regarding the event

Huntly Unit 1 tripped on low drum level due to loss of feed water.

Loss of Injection Figure:

Genesis concurs with Transpower's assessment of the loss of injection figure.

Causer:

Genesis considers it (Huntly Unit 1) was the causer of the 27th of June 2024 under-frequency event.

Yours faithfully

GENESIS ENERGY LIMITED

A handwritten signature in black ink, appearing to read "Steve Leppien".

Steve Leppien
Regulatory and Quality Assurance Manager

1.5 GRID OWNER RESPONSE



Waikoukou
22 Boulcott Street
PO Box 1021
Wellington 6140
New Zealand
P 64 4 590 7000
F 64 4 590 6968
www.transpower.co.nz

08 July 2024

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Chris Birkinshaw
Acting SO Compliance and Impartiality Manager
System
Operations
Transpower
Wellington

Dear Chris

27th June 2024 North Island Under-Frequency Event

I am writing in response to your letter dated 4th July 2024, concerning the under-frequency event (UFE) that transpired on the 28th of June 2024 in the North Island. Upon reviewing our records, it appears there may be a discrepancy in the date of the event. Our data indicates that the event occurred on the 27th of June not the 28th.

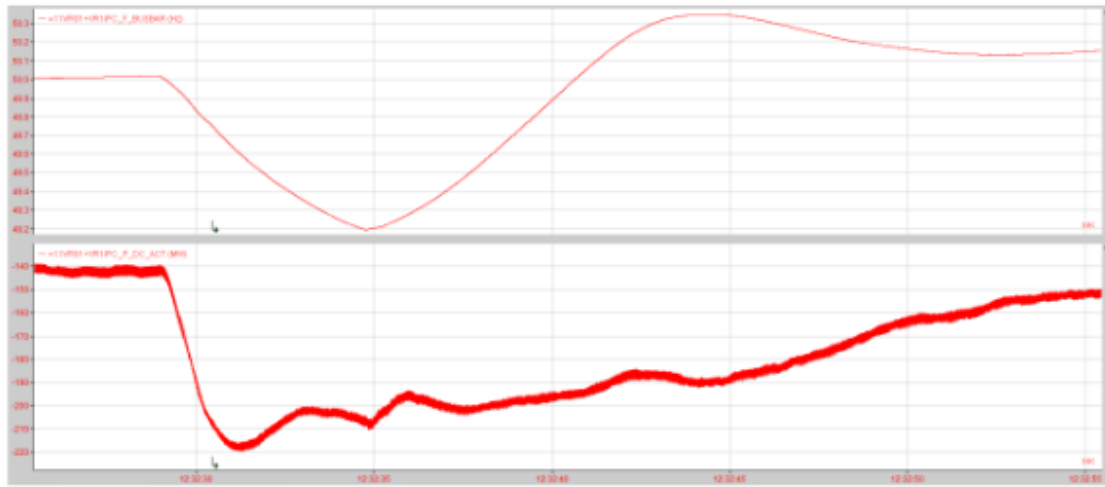
Our understanding of the event is as follows:

- At 12:32:34 on the 27th of June, a unit or units at Huntly tripped, resulting in an under-frequency event occurring in the North Island.
- Market participants were promptly informed of this occurrence through a frequency excursion notice (please refer to Attachment A). This notice, issued at 12:38 on 27th June, stated that Huntly generation had tripped, causing the frequency in the North and South Islands to drop to 49.21Hz and 49.33Hz, respectively.
- A customer advice notice (please refer to Attachment B), issued at 14:14 on 1st July, confirmed the occurrence of an under-frequency event in the North Island at 12:32:34 on 27th June 2024.
- It is important to note that there were no protection operations of any grid assets in the vicinity of Huntly on 27th June 2024.
- Furthermore, there were no HVDC events that contributed to this event. In fact, the HVDC system responded in a manner that mitigated the severity of the UFE. Prior to the event, the HVDC was transferring 142MW north (received power). During the event, this transfer was modulated up to 218MW north (received power) to lessen the impact of the UFE.

Below graph shows the response of the HVDC during the event.



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www.transpower.co.nz



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Considering the above information, I do not believe that the Grid Owner was the causer of the under-frequency event that occurred on this day.

I trust this clarifies our understanding of the event. Please do not hesitate to contact us should you require further information.

Yours sincerely

Mao Reyes
 Grid Compliance Manager

Attachment A



Excursion Notice

To: Excursion NZ Participants
Sent: 27-jun-2024 12:38
Ref: 5470347915

From: The System Operator
Telephone: 0800 488 500
Email: NMData@transpower.co.nz

Revision of:

Excursion:	Frequency		
Time:	27-jun-2024 12:32		
Location:	National		
Affected Plant:	Huntly Generation Tripped		
SI Hz Level:	49.33	NI Hz Level:	49.21
Comments:			

Frequency Excursion notices are only issued if the deviation is out side 49.5 and 50.5 Hz.

A revision of this notice will be issued if there is any change to the situation above.



Attachment B



Customer Advice Notice

To: CAN NZ Participants
Sent: 01-jul-2024 14:14
Ref: 5477793269

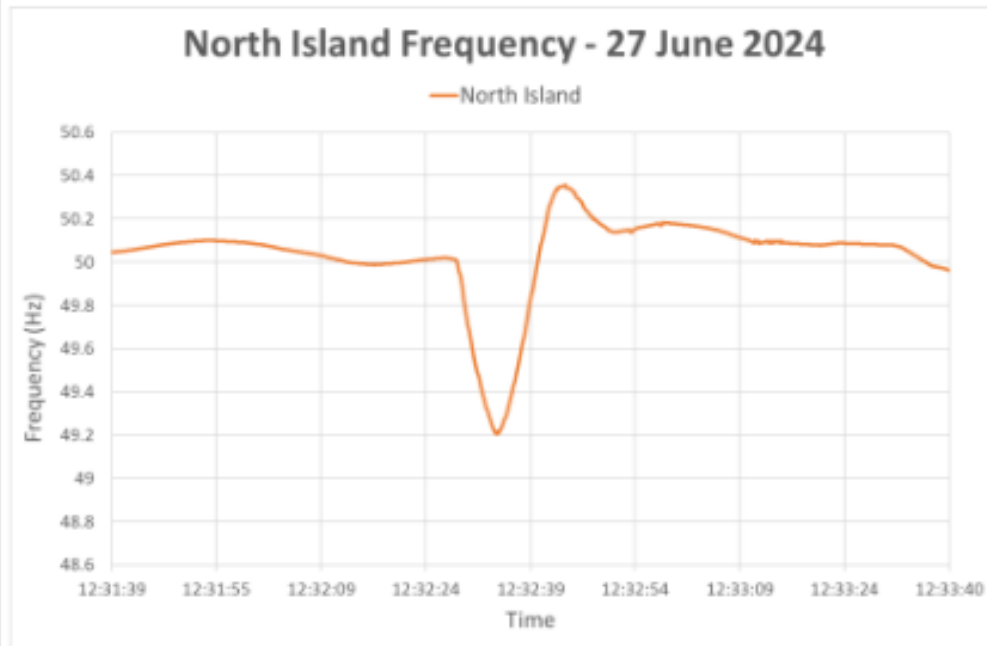
From: The System Operator
Telephone: 0800 488 500
Email: NMDData@transpower.co.nz

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Affected Islands:	North Island
North Island Minimum Frequency:	49.21 Hz
Time (start of UFE):	12:32:34
Time (of min. frequency):	12:32:35



Market Operations

Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,
 New Zealand

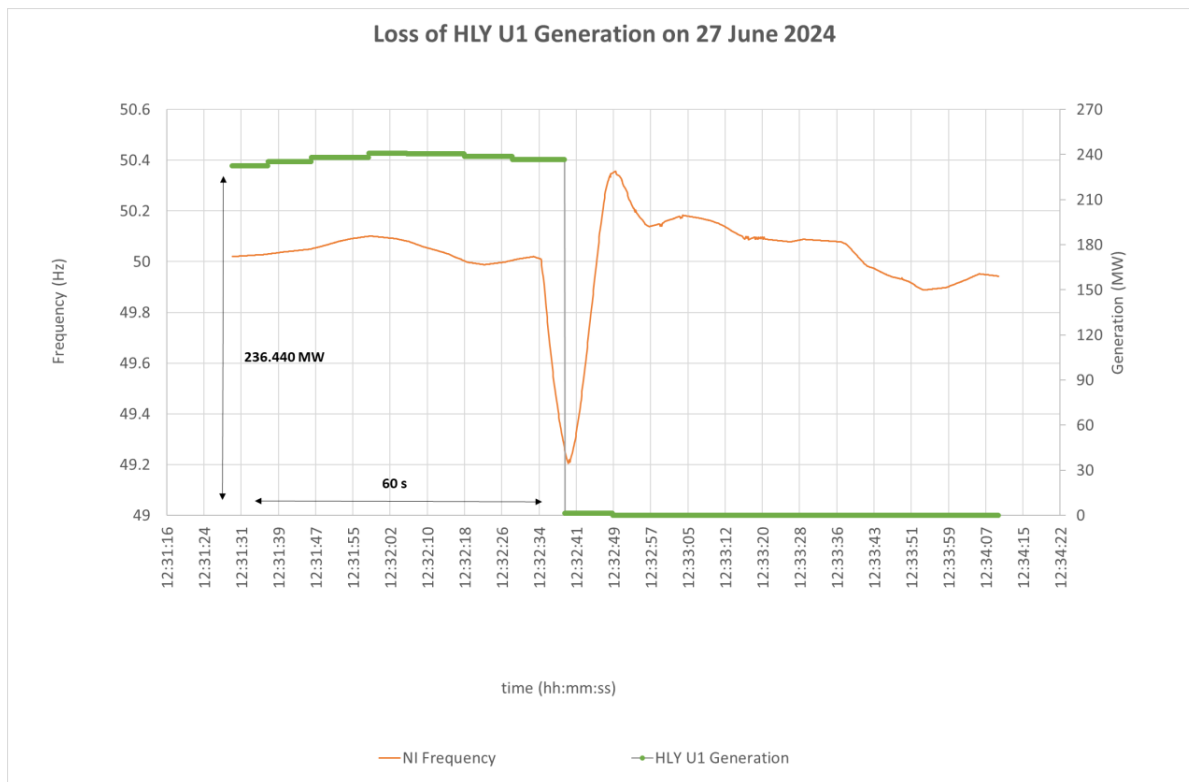
A revision of this notice will be issued if there is any change to the situation above.

Telephone: 04 590 7470
market.operations@transpower.co.nz

Appendix 2: CHARTS

System Frequency (North Island) and MW Trace 27th June 2024

North Island Frequency



Appendix B Format for submissions

Submitter	
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Questions	Comments
Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the UFE at 12:32pm 27 June 2024? If not, please advise your view on the causer and give reasons.	
Q.2 Do you agree with the system operator's assessment that 236.44MW was lost from the power system in the 27 June 2024 UFE? If not, please advise your view on the MW lost and give reasons.	