

Draft determination of causer: 11 April 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 11 April 2024 UFE

At 12:25am on 11 April 2024 a UFE occurred when 224MW of generation injection was interrupted or lost at the Huntly grid connection point. This resulted in a drop of frequency of 49.17Hz in the North Island and 49.25Hz in the South Island.

The Authority has determined Genesis is the causer of the 11 April 2024 UFE. The reasons for the draft determination are:

- (a) the interruption/reduction of energy injected into the grid occurred at Unit 4 of the Huntly power station, which belongs to Genesis.
- (b) no other asset was identified as having caused or potentially caused the UFE.
- (c) in the system operator's view, Genesis is the causer of the UFE.
- (d) 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 22 August 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 4, was the causer of the UFE at 12:25am on 11 April 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 – 11 April 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 22 August 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 11 April 2024 UFE

- 3.1. The Authority's draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 4, is the causer of the UFE at 12:25am 11 April 2024.

The system operator investigated the causer of the UFE

- 3.2. The system operator's report (dated June 2024) is attached as Appendix A.
- 3.3. The circumstances described in the report are summarised below:
- (a) At 12:25am 11 April 2024, Huntly Unit 4 tripped removing 224MW of generation.
 - (b) North Island frequency fell to 49.17Hz and 49.25Hz in the South Island.
 - (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 four seconds.
 - (e) Huntly Unit 4 tripped on low drum level due to loss of feed water. Genesis believes this is what caused UFE.
 - (f) No other event or asset operation was identified as occurring at or around the time of the UFE.
 - (g) On 19 April 2024, the system operator requested the grid owner provide information on the circumstances of the UFE. On 22 April 2024, the grid owner provided its assessment of the UFE. The grid owner did not believe it was the causer of the 11 April 2024 UFE.
 - (h) On 19 April 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. On 24 April 2024, Genesis replied, agreeing that it was the causer and provided the circumstances that led to the Huntly Unit 4 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 12:25am 11 April 2024 when frequency dropped to 49.17Hz in the North Island and 49.25Hz in the South Island.
 - (b) The interruption/reduction of electricity occurred at the grid

injection point for Huntly Unit 4, which belongs to Genesis.

- (c) No other asset was identified as potentially causing the UFE.
 - (d) 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 11 April 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 11 April 2024 at 12:25am? 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 11 April 2024 event was 224MW at the grid injection point for Huntly Unit 4, resulting in an event charge of \$205,003.75.
- 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 224MW was lost from the power system in the 11 April 2024 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A System operator causation report 11 April 2024 under-frequency event

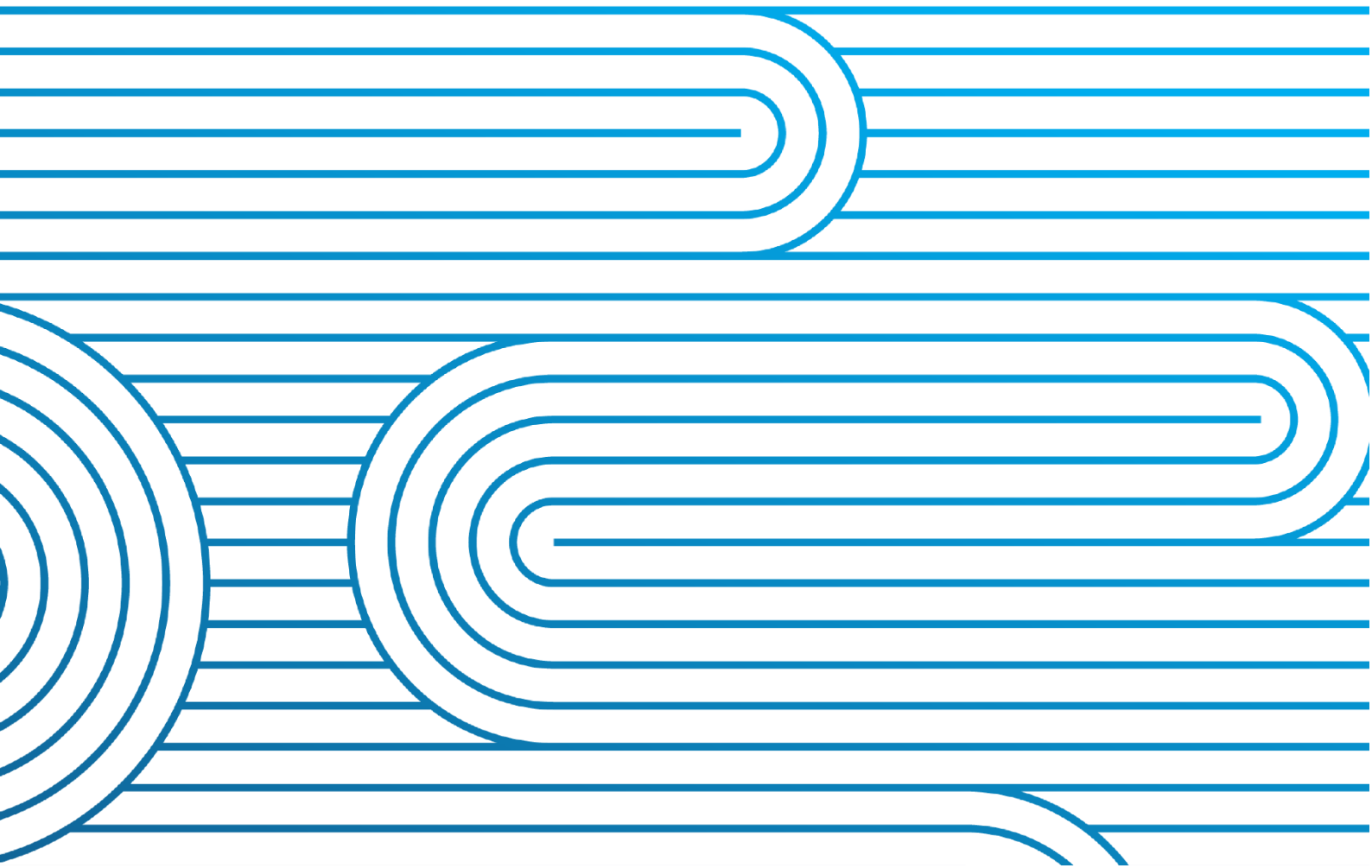
Causation Report

11th April 2024

Under-Frequency Event

System Operator event 4446

June 2024



IMPORTANT

Disclaimer

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PURPOSE

On 11th April 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 00:25:17 on 11th April 2024 Genesis Energy's Huntly Unit 4 tripped.

The disconnection of generation from Huntly Unit 4 removed 224.003MW of injection into the power system.

At 00:25:18 the North Island frequency fell to 49.17 Hz and at 00:25:18 the South Island frequency fell to 49.25 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 4 was the cause of the under-frequency on 11th April 2024.

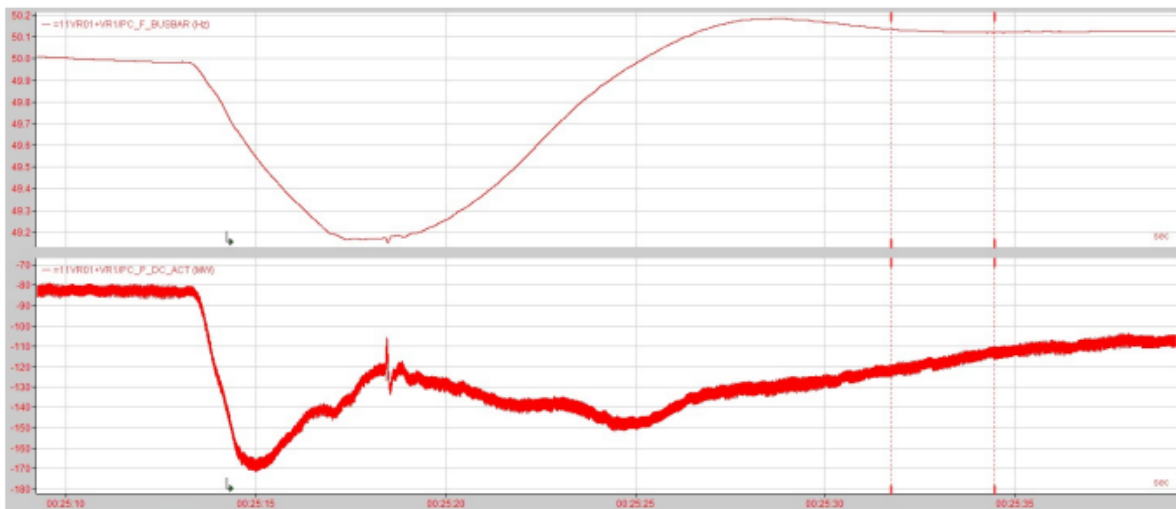
Investigation into the tripping and other system events supports Genesis's position that the trip of Huntly Unit 4 caused the under-frequency event.

Accordingly, the System Operator recommends Genesis be found as the causer of the under-frequency event on 11th April 2024.

SYSTEM EVENTS – 11TH APRIL 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 11th April 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 82MW north (received power). The transfer was modulated up to 168MW north (received power) during the event to lessen the severity of the UFE.



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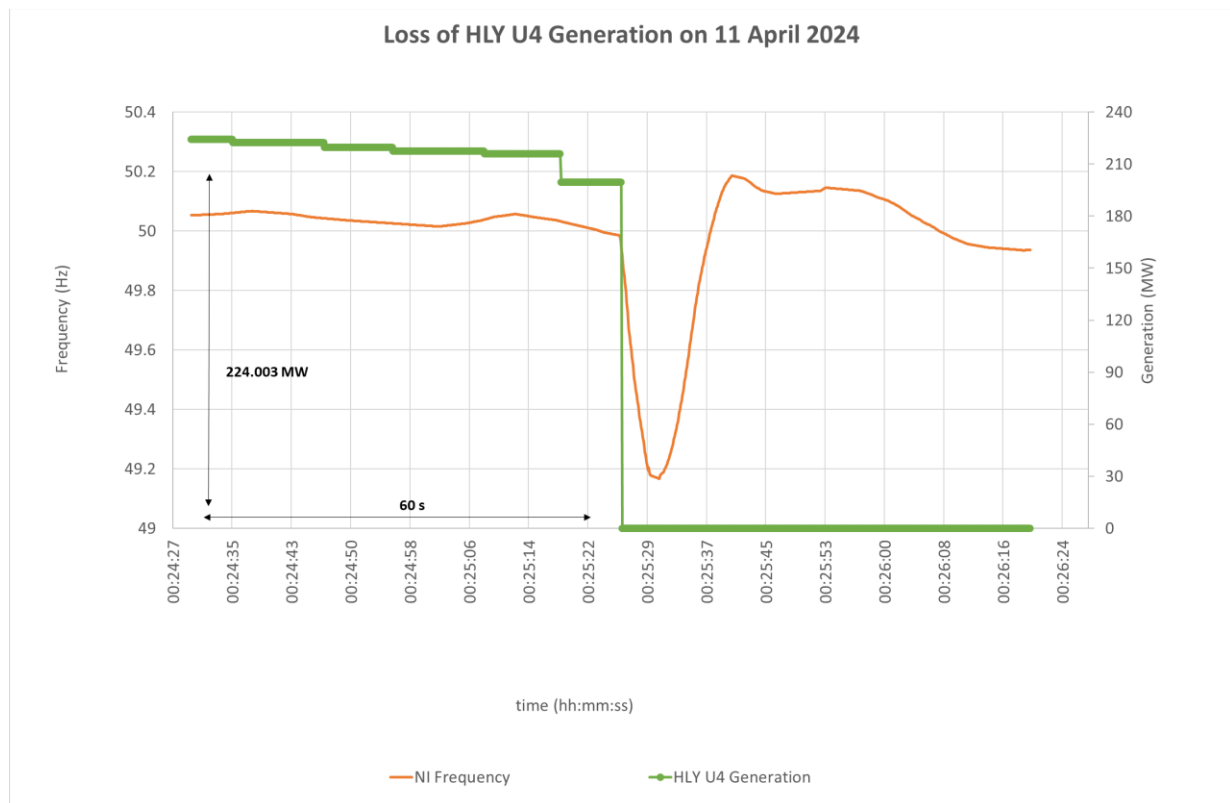
The under-frequency event

According to Genesis Huntly Unit 4 tripped on low drum level due to loss of feed water.

At 00:25:17 the disconnection of Huntly Unit 4 removed 224.003MW of generation injection into the power system. Consequently, this reduced the system frequency in the North Island below 49.25 Hz at 00:25:18 (49.17 Hz) and in the South Island at 00:25:18 (49.25 Hz).

Genesis confirmed the MW lost as 224.003MW.

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 122.7MW FIR and 181.4MW SIR.
- North Island interruptible load providers to be available to trip 35.90MW FIR and 59.90MW SIR.
- South Island (generation) instantaneous reserve providers to be available to provide 30MW FIR and 40MW SIR.

These reserve providers responded, returning the frequency to the normal band within four 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. Five interruptible load providers were scheduled for dispatch, the response of the dispatched 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 4 at 00:25:17 on 11th April 2024.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 4 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 4 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:

$$\text{Event Charge} = \$1250/\text{MW} * (224.003\text{MW} - 60\text{MW})$$

$$\text{Event Charge} = \$205,003.75$$

Appendix 1: CORRESPONDENCE

1.1 CONFIRMATION OF EVENT NOTICE



Customer Advice Notice

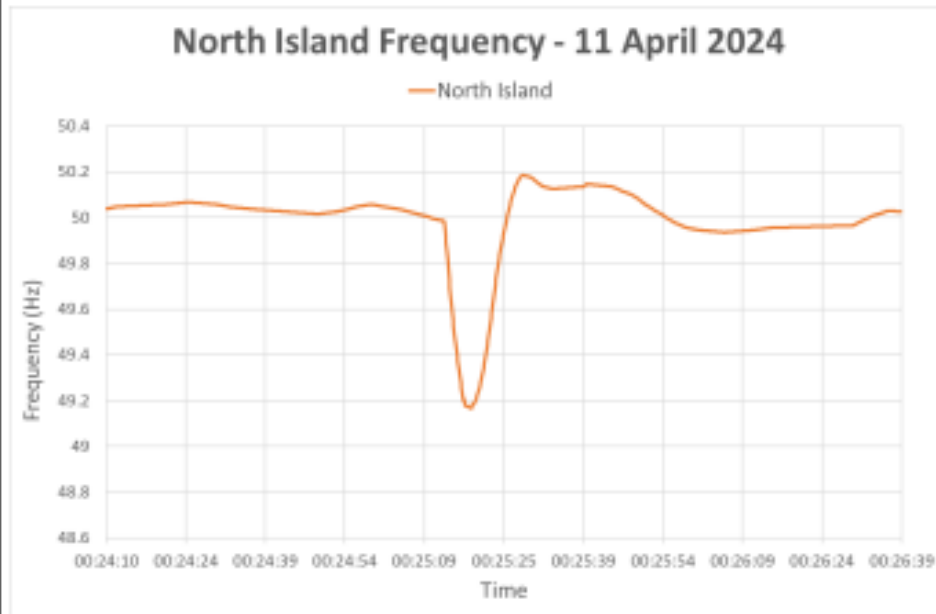
To: CAN NZ Participants **From:** The System Operator
Sent: 15-apr-2024 16:46 **Telephone:** 0800 488 500
Ref: 5331368696 **Email:** NMData@transpower.co.nz

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 11 April 2024.

Event ID:	4446
Affected Islands:	North Island
North Island Minimum Frequency:	49.17 Hz
Time (start of UFE):	00:25:17
Time (of min. frequency):	00:25:18



Market Operations
 Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,
 New Zealand
 Telephone: 04 590 7470
 market.operations@transpower.co.nz

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

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

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19 April 2024

Steve Leppien
Genesis Energy Limited
Private Bag 3131
Hamilton

Dear Steve

11 April 2024 Under-Frequency Event

At 11 April 2024 on 00:25:17 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 11 April 2024.
- We have assessed the MW lost during the event as 224.003MW MW at HLY Unit 4. 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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19 April 2024

Mao Reyes
Grid Compliance Manager
Grid Owner
Transpower
Wellington

Dear Mao,

11 April 2024 Under-Frequency Event

At 00:25:17 on 11 April 2024 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 11 April 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 blue ink, appearing to read "Chris Birkinshaw".

Chris Birkinshaw
Acting SO Compliance & Impartiality Manager

1.4 GENESIS RESPONSE

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

T. 07 982 7909

24 April 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: 11th April 2024 Under-Frequency Event

I refer your letter dated 19 April 2024 requesting information from Genesis to help identify the causer of the 11th of April 2024 under-frequency event.

Information regarding the event

Huntly Unit 4 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 4) was the causer of the 11th of April 2024 under-frequency event.

Yours faithfully

GENESIS ENERGY LIMITED

A handwritten signature in black ink, appearing to read "Steve", written over a light blue horizontal line.

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

22 April 2024

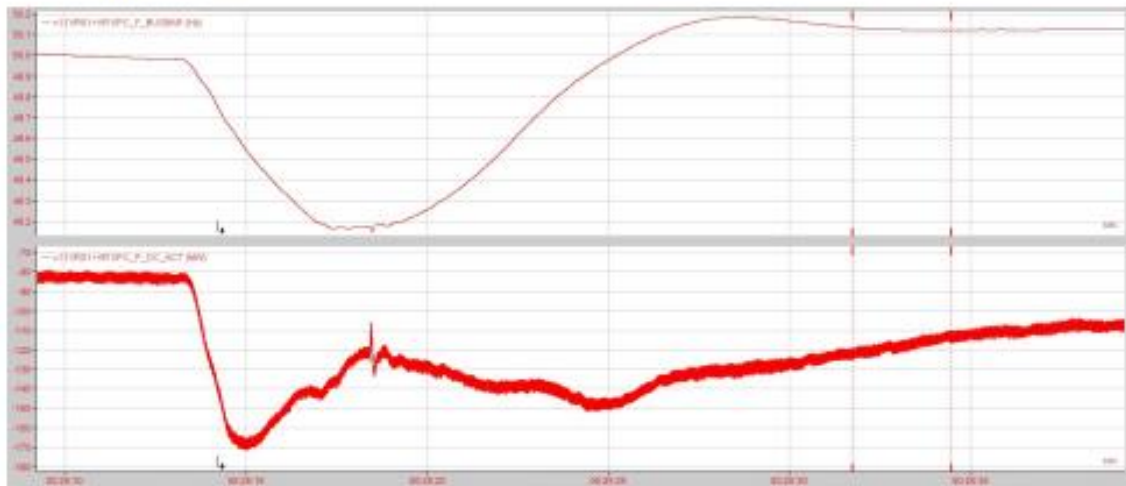
Chris Birkinshaw
 Acting SO Compliance and Impartiality Manager
 System Operations
 Transpower
 Wellington

Dear Chris

11th April 2024 North Island Under-Frequency Event

Thank you for your letter dated 19 April 2024 regarding the under-frequency event (UFE) that occurred on 11th April 2024 in the North Island. My understanding of the event is as follows:

- At 00:25:17 11th April a Huntly unit/s tripped, resulting in an under-frequency event occurring in the North Island.
- Market participants were notified by a frequency excursion notice issued at 00:40 on 11th April, that Huntly generation had tripped and that the North and South Islands' frequency had fallen to 49.17Hz and 49.25Hz, respectively.
- A customer advice notice issued at 16:46 on 15th April confirmed that an under-frequency event occurred in the North (00:25:17) Island on 11th April 2024.
- There were no protection operations of any grid assets in the vicinity of Huntly on 11th April 2024.
- 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 82MW north (received power). The transfer was modulated up to 168MW north (received power) during the event to lessen the severity of the UFE.



Transpower New Zealand Ltd The National Grid



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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.

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Yours sincerely

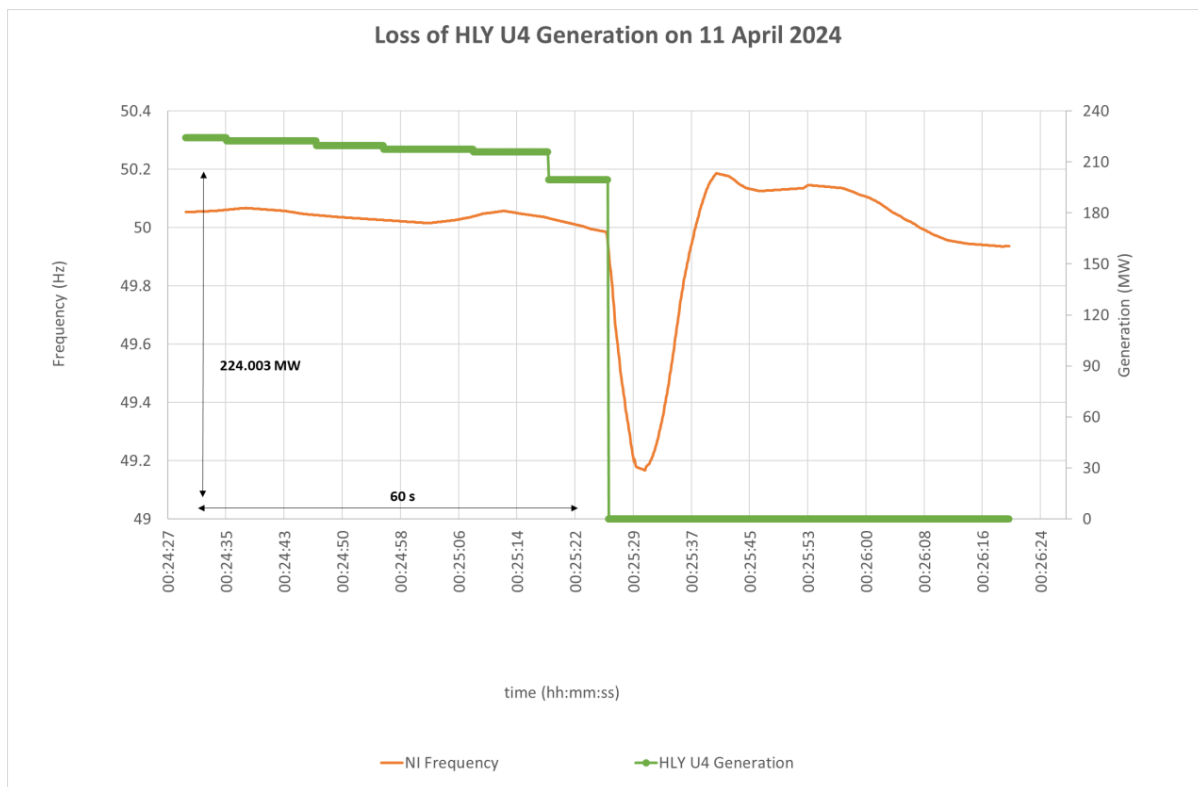
A handwritten signature in blue ink, appearing to read "Mao Reyes".

Mao Reyes
Grid Compliance Manager

Appendix 2: CHARTS

System Frequency (South and North Islands) and MW Trace 11th April 2024

North Island Frequency



Appendix B Format for submissions

Submitter	
Questions	Comments
Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the UFE at 12:25am 11 April 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 224MW was lost from the power system in the 11 April 2024 UFE? If not, please advise your view on the MW lost and give reasons.	