

The Authority's draft determination of causer

30 October 2020 under-frequency event
Consultation paper

Submissions close: 5pm, 13 April 2021

16 March 2021



Executive summary

An under-frequency event occurred on 30 October 2020

The normal frequency band in New Zealand is between 49.8 and 50.2 Hz. An under-frequency event (UFE) occurs when the frequency falls below 49.25 Hz because of a loss of more than 60 MW injected into the grid. The Electricity Industry Participation Code 2010 (Code) requires us to determine the causer (as defined in the Code) of a UFE and sets the process for making the determination (clause 8.61).

The purpose of this paper is to:

- (a) set out our draft determination of causer for the 30 October 2020 UFE
- (b) consult with interested parties on the draft determinations.

Our draft determination is that Genesis is the causer for the 30 October 2020 UFE

Our draft determination under clause 8.61 of the Code is that Genesis Energy Limited (Genesis), as a generator, was the causer of the UFE on 30 October 2020.

The reasons for the draft determination are:

- (a) the interruption/reduction of energy occurred at Unit 4 at 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) in reply to a system operator letter, Genesis has accepted that it was the causer.

Submissions are invited from interested parties

We must consult with interested parties before making a final determination. Interested parties are invited to make a submission on the Authority's draft determination by 5 pm on Tuesday 13 April 2021. We will consider all submissions received and make a final determination on each UFE.

We also invite comment on the system operator's calculations of the megawatts (MW) lost during the events, which the system operator uses for calculating the UFE charge.

Contents

Executive summary	ii
An under-frequency event occurred on 30 October 2020	ii
Our draft determination is that Genesis is the causer for the 30 October 2020 UFE	ii
Submissions are invited from interested parties	ii
2 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 Introduction	2
3 The 30 October 2020 UFE draft determination	2
Genesis was the causer of the 13 December UFE	2
The system operator investigated the causer of the UFE	2
We considered the circumstances of the UFE	2
4 We 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	3
Appendix A Format for submissions	4
Appendix B Causation report 30 October 2020 under-frequency event	5

2 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 Genesis Energy Limited, as the generator that owns Huntly Unit 4, was the causer of the UFE on 30 October 2020 at 01:07 hours.

How to make a submission

- 1.2 Our 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 UFEconsultations@ea.govt.nz with "Consultation Paper—30 October 2020 under-frequency event" in the subject line.
- 1.3 If you cannot send your submission electronically, post one hard copy to either of the addresses below, or fax it to 04 460 8879.

<u>Postal address</u>	<u>Physical address</u>
Submissions Electricity Authority PO Box 10041 Wellington 6143	Submissions Electricity Authority Level 7, Harbour Tower 2 Hunter Street Wellington

- 1.4 Please note we want to publish all submissions we receive. 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).
- 1.5 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.
- 1.6 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

- 1.7 Please deliver your submissions by **5pm** on Tuesday **13 April 2021**.
- 1.8 We will acknowledge receipt of all submissions electronically. Please contact the Authority info@ea.govt.nz or 04 460 8860 if you don't receive electronic acknowledgement of your submission within two business days.

2 Introduction

- 2.1 Clause 8.60 of the Code requires the system operator to investigate the causer of a UFE and provide a report to us.
- 2.2 Clause 8.61(2) requires us to 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. Clause 8.61(3) requires us to give reasons for our findings in the draft determination.

3 The 30 October 2020 UFE draft determination

Genesis was the causer of the 30 October 2020 UFE

- 3.1 Our draft determination under clause 8.61 is that Genesis, as the generator that owns Huntly Unit 4, was the causer of the UFE on 30 October 2020 at 01:07 hours.

The system operator investigated the causer of the UFE

- 3.2 The system operator's report (dated December 2020) is attached as Appendix B.
- 3.3 The circumstances described in the report are summarised below:
 - (a) At 01:07 Huntly Unit 4 tripped removing 144.4 MW of generation, the frequency fell to 49.22 Hz in the North Island and 49.34 Hz in the South Island.
 - (b) The frequency fall and the quantum of MW lost (greater than the 60 MW minimum) meant that a UFE, as defined in Part 1 of the Code, had occurred.
 - (c) Interruptible load and instantaneous reserves in the North Island responded, returning the frequency to the normal band.
 - (d) A misunderstanding of the Huntly Unit 4 Main Boiler Feed Pump (MBFP) shutdown sequence operation when changing over the feedwater pumps resulted in the boiler tripping on low drum level.
 - (e) No other event or asset operation was identified as occurring at or around the time of the under-frequency event.
 - (f) On 3 December 2020, the system operator wrote to Genesis setting out its view that Huntly Unit 4 tripped resulting in a loss of injection and requesting any information Genesis could provide. On 8 December 2020, Genesis agreed it was the causer.
 - (g) On 3 December 2020, the system operator requested the grid owner provide information on the circumstances of the UFE. On 8 December 2020, the grid owner provided some supporting information. The grid owner didn't believe it was the causer.

We considered the circumstances of the UFE

- 3.4 We have considered the system operator's report and correspondence with Genesis and the grid owner. Our reasons for the draft determination that Genesis is the causer are:
 - (a) a UFE occurred on 30 October 2020 at 01:07 hours when frequency dropped to 49.22 Hz in the North Island and 49.34 Hz 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 having caused or potentially caused the UFE

(d) the system operator and Genesis agree that Genesis was the causer of the UFE.

3.5 Having considered the relevant elements of the Code, we (based on the information available to us at this time) agree with the system operator's findings on the 30 October 2020 UFE.

Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 30 October 2020 at 01:07 hours? If not, please advise your view on the causer and give reasons.

4 We will consider submissions and make a final determination

4.1 Clause 8.61(4) of the Code requires us to consult every generator, grid owner and other participant substantially affected by a UFE in relation to a draft determination. We have allowed a consultation period of five weeks for this draft determination.

4.2 Accordingly, the deadline for submissions is 5 pm on 13 April 2021.

4.3 We will consider submissions received and publish the Authority's final determination. Clauses 8.62 and 8.63 of the Code set out provisions relating to any disputes regarding our determination.

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

5.1 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 UFEs (clauses Clause 8.64 of 8.65 of the Code).

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 UFE. The system operator determines the MW lost as part of its investigations into a UFE.

5.3 The system operator followed its procedure *PR-RR-017 Calculating the Amount of MW lost* to determine the MW value (provided to the clearing manager for calculating UFE charges).

5.4 The system operator has determined the loss of injection into the grid. The 30 October 2020 event was 144.4 MW at the grid injection point for Huntly Unit 4, resulting in an event charge of \$105,500.

5.5 The system operator's calculation of the MW lost is included in its report. The calculation doesn't form part of the Authority's draft determination. However, we acknowledge that the calculation is central to determining the UFE charge payable by the causer, and therefore also to the rebate paid for a UFE. Accordingly, we invite comment on the system operator's calculation of the MW lost.

Q2. Do you agree with the system operator's calculation that 144.4 MW was lost from the power system as a result of the 30 October 2020 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A Format for submissions

Submitter	
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Question	Comment
<p>Q1. Do you agree with the draft determination that Genesis Energy Limited is the causer of the under-frequency event on 30 October 2020 at 01:07 hours? If not, please advise your view on the causer and give reasons.</p>	
<p>Q2. Do you agree with the system operator's calculation that 144.4 MW was lost from the power system as a result of the 30 October 2020 UFE? If not, please advise your view on the MW lost and give reasons.</p>	

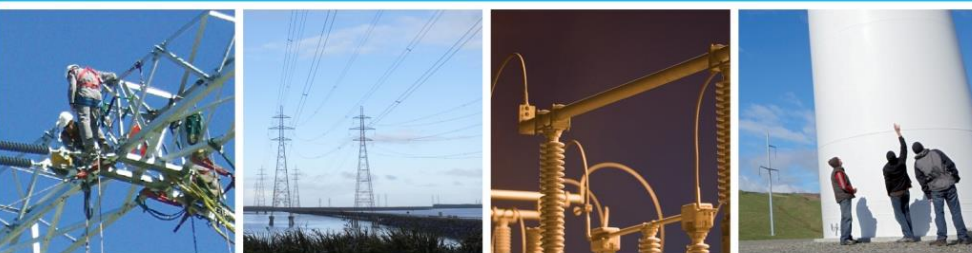
Appendix B Causation report 30 October 2020 under-frequency event

Causation Report 30 October 2020 Under-Frequency Event

System operator event 4096

December 2020

Keeping the energy flowing



TRANSPower



IMPORTANT

Disclaimer

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Purpose 4

Executive summary 5

System events – 30 October 2020 6

 Prior to the under-frequency event 6

 The under-frequency event 6

 After the under-frequency event 6

Rational for recommendation 8

 Factors considered 8

Calculation of MW Lost 9

Appendix 1: Correspondence 10

 1.1 Confirmation of event notice 10

 1.2 System Operator request for information – Genesis Energy 11

 1.3 System Operator request from information – Grid Owner 12

 1.4 Genesis Energy response 13

 1.5 Grid Owner response 14

Appendix 2: Charts 15

 System Frequency and MW Trace 30 October 2020 15



PURPOSE

On 30 October 2020 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.

4

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

- 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 01:07:34 on 30 October 2020 Genesis Energy's Huntly Station Unit 4 generator (Huntly Unit 4) tripped.

The disconnection of Huntly generation from Huntly Unit 4 removed 144.4 MW of injection into the power system.

At 01:07:35 the North Island frequency fell to 49.22 Hz, and the South Island frequency fell to 49.34 Hz.

The North Island frequency falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis Energy have stated that it believes the tripping of Huntly Unit 4 was the cause of the under-frequency on 30 October 2020.

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 Energy be found as the causer of the under-frequency event on 30 October 2020.

SYSTEM EVENTS – 30 OCTOBER 2020

Prior to the under-frequency event

According to the grid owner, there were no protection operations on any grid assets in the vicinity of Huntly either before or after Huntly Unit 4 tripped.

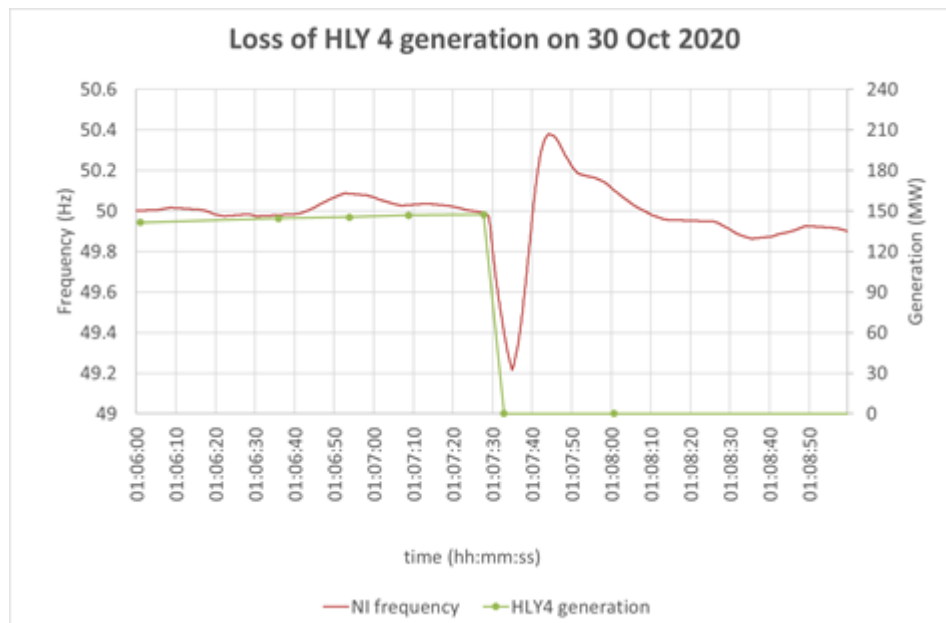
Huntly – Stratford circuit 1 was manually removed from service at the request of the system operator at 01:25 on 30 October 2020.

6

The under-frequency event

According to Genesis, a recently qualified operator at Huntly (experienced overseas on similar plant) misunderstood how the Huntly Unit 4 Main Boiler Feed Pump (MBFP) shutdown sequence operated when changing over the feedwater pumps. This resulted in the boiler tripping on low drum level.

At 01:07:35 the disconnection of Huntly Unit 4 removed 144.4 MW of generation injection into the power system and, as a consequence, reduced the system frequency to 49.22 Hz in the North Island and 49.34 Hz in the South Island.



After the under-frequency event

At the time of the event, the system operator had dispatched North Island instantaneous reserve providers to be available to provide 216 MW FIR and 262 MW SIR. These reserve providers responded, returning the frequency to the normal band within 17 seconds. Interruptible load providers are not required to respond until the frequency drops below 49.20 MW, so the reserve response was primarily from PLSR

and TWD spinning reserve. Two interruptible load providers also responded, due to their local frequency being sufficiently close to 49.20 Hz.

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. The responses 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 4 at 01:07:34.

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:

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

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJd is 60 MW

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

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

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 into the Huntly grid injection point.

After evaluation, the amount of MW lost causing the frequency to fall below 49.25 Hz was determined to be 144.4 MW.

Using the event charge formula the calculation is as follows:

$$\text{Event Charge} = \$1250 * (144.4\text{MW} - 60\text{MW})$$

$$\text{Event Charge} = \$105,500$$

Genesis Energy confirmed the calculation of MW lost in its response to the system operator dated 8 December 2020 (see Appendix 1.3).

SYSTEM OPERATOR REQUEST FOR INFORMATION – GENESIS ENERGY

**TRANSPower**

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Telephone +64-4-590 7000
Facsimile: +64-4-495 7100
richard.renouf@transpower.co.nz

3 December 2020

Steve Leppien
Genesis Energy
Private Bag 3131
Hamilton

Dear Steve,

30 October 2020 North Island Under-Frequency Event

At 01:07 on 30 October 2020 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 30 October 2020.
- We have assessed the MW lost during the event as 144.4 MW at Huntly. 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,

A handwritten signature in blue ink, appearing to read 'RJR'.

Richard Renouf
SO Compliance & Impartiality Manager

1.2 SYSTEM OPERATOR REQUEST FROM INFORMATION – GRID OWNER



Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100
richard.renouf@transpower.co.nz

12

3 December 2020

Kent Murrell
Compliance Manager
Grid Owner
Transpower
Wellington

Dear Kent,

30 October 2020 North Island Under-Frequency Event

At 01:07 on 30 October 2020 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 30 October 2020.
- 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 "RJR", is positioned above the printed name of the sender.

Richard Renouf
SO Compliance & Impartiality Manager

1.3 GENESIS ENERGY RESPONSE



Genesis Energy Limited
 The Genesis Energy Building
 94 Bryce Street
 Private Bag 3131
 Hamilton 3204
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 T. 07 982 7909

13

08 December 2020

Richard Renouf
 SO Compliance and Impartiality Manager
 Transpower New Zealand Limited
 P O Box 1021
 WELLINGTON 6140

By email: Richard.Renouf@transpower.co.nz

Dear Richard,

RE: 30 October 2020 North Island Under-Frequency Event

I refer your letter dated 03 December 2020 requesting information from Genesis Energy to help identify the causer of the 30 October 2020 North Island under-frequency event.

Information regarding the event

A recently qualified operator at Huntly (experienced overseas on similar plant) misunderstood how the Huntly Unit 4 Main Boiler Feed Pump (MBFP) shutdown sequence operates when changing over the feedwater pumps. This resulted in the boiler tripping on low drum level.

The Operator has undertaken additional training and has since demonstrated competency in the MBFP changeover process. Additionally, the whole Operations team has discussed this sequence as a toolbox refresher opportunity.

Loss of Injection Figure:

Genesis confirms Transpower's assessment of the loss of injection figure.

Causer:

Genesis Energy considers it (Huntly Unit 4) was the causer of the 30 October North Island under-frequency event.

Yours faithfully

GENESIS ENERGY LIMITED

Steve Leppien
 Regulatory and Quality Assurance Manager

1.4 GRID OWNER RESPONSE



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8 December 2020

14

Richard Renouf
Compliance and Impartiality Manager
System Operations
Transpower
Wellington

Dear Richard

30 October 2020 North Island Under-Frequency Event

Thank you for your letter of 3 December 2020 regarding the under-frequency event that occurred on 30 October 2020. My understanding of the event is as follows:

- At 01:07 on 30 October 2020 Huntly unit 4 tripped, resulting in an under-frequency event occurring in the North Island.
- Market participants were notified by a frequency excursion notice issued at 01:25 on 30 October, that Huntly generation had tripped and that the North Island frequency had fallen to 49.22Hz.
- A customer advice notice issued at 09:39 on 03 November 2020 confirmed that an under-frequency event occurred in the North Island at 01:07 on 30 October 2020.
- There were no protection operations of any grid assets in the vicinity of Huntly either before or after Huntly unit 4 tripped.
- Huntly – Stratford circuit 1 was manually removed from service at the request of the system operator at 01:25.

Considering the above information, I do not believe that the Grid Owner was the causer of the under-frequency event that occurred at 01:07 on 30 October 2020.

Yours sincerely

Kent Murrell
Grid Compliance Manger

Appendix 2: CHARTS

System Frequency and MW Trace 30 October 2020

