Draft determination of causer: 11 July 2025 under-frequency event

Consultation paper

ELECTRICITY AUTHORITY
TE MANA HIKO

Executive summary

An under-frequency event (UFE) occurred on 11 July 2025. The purpose of this paper is to set out the Electricity Authority Te Mana Hiko's (Authority) draft determination of causer for the UFE. It invites feedback from affected industry participants on the draft determination of causer and the System Operator's calculation of megawatts of power lost during the event.

The normal frequency band in the New Zealand power system is between 49.8Hz and 50.2Hz. A UFE occurs when the frequency falls below 49.25Hz because of a loss of more than 60 megawatts (MW) of power injected into the grid.

The Electricity Industry Participation Code 2010 (Code) requires the Authority to determine the causer of a UFE and sets out the process for making the determination.

The Authority's draft determination is that the System Operator was the causer of the 11 July 2025 UFE

On 11 July 2025 at about 1.04pm, there was a sudden ramp down of the HVDC power transfer to the North Island grid, from 178MW to 68MW, which caused the North Island system frequency to drop to 49.24Hz, resulting in a UFE.

The Authority's draft determination is that Transpower New Zealand Limited as the System Operator was the causer of the 11 July 2025 UFE. The reasons for the draft determination are:

(a) During a planned outage of 220 kV Bus D at Haywards substation (HAY), the HVDC northward transfer power ramped down from 178MW to 68MW. This sudden ramp down caused the North Island grid frequency to drop to 49.24Hz, resulting in the UFE.

(b) The ramp down occurred because incorrect control settings were applied during the Bus D outage, which imposed a power limit on the HVDC.

(c) These incorrect control settings were in place because the following key Harmonic Performance Control (HPC) settings were not applied:

   I. selecting HPC Roundpower to "Monopole" at HAY

   II. selecting HPC Switch Level to "Increased" at HAY.

(d) As part of the process of removing transmission assets (including HVDC equipment) from service, the System Operator's National Coordination Centre (NCC) coordinators issue permissions, and potentially instructions, to grid asset controllers at the grid owner's National Grid Operations Centre (NGOC).

(e) The System Operator's own standing temporary written instructions (*TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages)* specify that the System Operator issues instructions to apply the correct control settings in respect of HPC Roundpower and Switch Level.

(f) The System Operator deviated from its own written procedures and decided not to instruct the grid owner to apply the correct control settings listed above.

(g) About an hour before the scheduled outage, the System Operator informed the grid asset controller (GAC) by telephone, that it would not issue instructions to apply the correct control settings as it considered them unnecessary.

(h) The System Operator issued permission to proceed with the existing control settings in place.

(i) The failure to issue the instructions to apply the correct control settings resulted in a power limit being applied to the HVDC, which ultimately caused the UFE.

The System Operator's causation report identified the grid owner as the alleged causer of the UFE. This is disputed by the grid owner, who considers the System Operator to be the causer.

Although the UFE was resolved without widespread impact, the event exposed risks from procedural deviations and raised concerns about clarity and independence in operational decision-making.

Submissions are invited from affected parties

Under clause 8.61 of the Code, the Authority must consult with every participant substantially affected by a UFE on its draft determination before making its final determination. We invite affected participants to make a submission on our draft determination by 5pm, Friday 23 January 2026 to compliance@ea.govt.nz.

We also welcome feedback 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.

After reviewing all submissions, the Authority will then make a final determination on the causer of the UFE.

Contents

1. What you need to know to make a submission

What this consultation is about

1.1. This paper sets out the Electricity Authority Te Mana Hiko's (Authority) draft determination that the System Operator was the causer of the under-frequency event (UFE) at approximately 1.04pm on 11 July 2025.

1.2. It invites feedback from industry participants substantially affected by the UFE on the draft determination of causer and the System Operator's calculation of megawatts of power lost during the event.

How to make a submission

1.3. The Authority welcomes submissions in Microsoft Word in the format shown in **Appendix A** to compliance@ea.govt.nz with 'Consultation paper – UFE 11 July 2025' in the subject line by 5pm, 23 January 2026.

1.4. We will acknowledge receipt of all submissions via email. Please contact compliance@ea.govt.nz or 04 460 8860 if you do not receive acknowledgement of your submission within two business days.

1.5. If you cannot send your submission electronically, please contact the Authority (compliance@ea.govt.nz or 04 460 8860) to discuss alternative arrangements.

1.6. Please note the Authority intends to publish all submissions it receives. If you consider 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).

1.7. If you indicate part of your submission should not be published, the Authority will discuss this with you before deciding whether to not publish that part of your submission.

1.8. However, please note 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.

The Authority will consider submissions and make a final determination

1.9. The Electricity Industry Participation Code 2010 (Code) requires the Authority to consult with every generator, grid owner and other participant substantially affected by a UFE event for a draft determination. The required consultation period is 10 business days. However, due to the Christmas and New Year holiday period, we have extended this until 23 January 2026.

1.10. The Authority will consider all submissions received and publish its final determination. Clause 8.62 of the Code sets out provisions for any disputes on the Authority's determination.

2. Introduction

2.1. Clauses 8.60 and 8.61 of the Code contain provisions for investigating and determining the causer of a UFE. The System Operator is required to investigate the causer of a UFE and provide a report to the Authority.

2.2. Where the causer of a UFE is not identified in the System Operator's report, or the alleged causer as identified in the System Operator's report denies it is the causer, the Authority must publish a draft determination that states whether a UFE was caused by a participant, and, if so, the identity of the causer.

2.3. The draft determination must include reasons for the findings.

3. The System Operator investigated the causer of the UFE

3.1. The System Operator's *Causation Report*, dated 1 October 2025, is attached as **Appendix B**.

3.2. The circumstances described in the report are summarised below:

(a) most UFEs are caused by a fault that results in a disconnection of a generation asset or the HVDC

(b) however, in this event, the UFE was caused by the sudden ramp down of the HVDC transfer into the North Island, when a power limit was applied by the HVDC control system

(c) an HVDC power limit that is lower than the existing power transfer level will automatically ramp down the power transfer between the two islands to ensure system stability and prevent overloads or voltage excursions

(d) on the day the UFE occurred, an outage of 220kV Bus D at Haywards (HAY) was planned

(e) for situations involving the outage of Bus D, there was a standing written temporary instruction set out in the System Operator document "*TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*" (**Appendix C**)

(f) this document requires the NCC to instruct the NGOC operators to set the configuration for the HVDC. Part of these instructions relate to when the Reactive Power Controller (RPC) switches in/out harmonic filters based on the HVDC power level. These settings are set as part of what is called the Harmonic Performance Control (HPC). The HPC settings were:

- HPC Roundpower set to Monopole at Haywards
- HPC Switch Level set to Increased at Haywards

(g) NCC coordinators then instruct NGOC to proceed with the outage

(h) the HVDC link can operate in this configuration, but the RPC will regulate the voltage of each remaining in-service bus independently. If it cannot control voltage or harmonic filtering requirements, this can result in equipment tripping or a power transfer limit being applied to the HVDC transfer

(i) prior to the Bus D outage, at 6.57 am, the NCC security coordinator called the NGOC HVDC controller and discussed not selecting HPC Roundpower to Monopole, and not selecting HPC Switch Level to Increased at HAY

(j) the deviation from the procedure was due to an assessment by the NCC that these steps were considered unnecessary due to temporary operating conditions at the time

(k) Bus D was taken out of service at 8.02am on 11 July 2025.

(l) at about 1.04pm the UFE occurred. The cause of the UFE was the incorrect control settings in place at the time of outage

(m) after the cause of the UFE was identified, NGOC requested an instruction from NCC to select HPC Roundpower to Monopole

(n) this resolved the ramp down and at about 1.40pm all constraints were removed and normal dispatch resumed.

3.3. The System Operator asked the grid owner whether it considered itself to be the causer of this UFE.

3.4. The grid owner denies it is the causer and stated that it considers the System Operator to be the causer. The grid owner stated that NCC did not instruct NGOC to change the HPC Roundpower and Switch Level settings and that the grid owner only acts “under instruction”.

3.5. The System Operator acknowledges that it communicated with the grid owner prior to the outage about not instructing the grid owner to select HPC Roundpower to “Monopole” and selecting HPC Switch Level to “Increased”. However, the System Operator believes that the grid owner:

(a) is better placed than the System Operator to know how to operate the HVDC

(b) should be well informed about the operational limits of its equipment

(c) had an opportunity to disagree with the System Operator about not selecting HPC Roundpower to Monopole at Haywards and not selecting HPC Switch Level to “Increased” at Haywards but did not do so.

3.6. The System Operator accepts that it played a role in the decision to not select HPC Roundpower to Monopole at Haywards and not select HPC Switch Level to Increased, but does not agree that the role it played meets the threshold required by the definition of causer under the Code.

3.7. The System Operator stated that the grid owner has no clear Code or other legal basis for it to claim it was compelled to follow advice or suggestions from the System Operator, or that it required an “instruction” to be able to act.

3.8. The System Operator recommended the grid owner be found to be the causer of the 11 July 2025 UFE.

3.9. The System Operator’s report also referred to recommendations following its investigation of the UFE. These related to reviewing decision making and operating procedures, and controls for deviations from procedures.

4. The grid owner disputes that it is the causer of the UFE

4.1. The grid owner does not accept that it was the causer of the 11 July 2025 UFE. Its position is that it operates under a framework in which the System Operator makes real-time operational decisions and issues instructions, and the grid owner implements those instructions. The grid owner’s position is summarised as follows:

(a) **Obligation to act under instruction:** Transpower policy and procedures require NGOC operators to act only under NCC instructions, citing operational procedures such as QR-DC-664 *Acting on System Operator Instructions* and TP OG 41.01 *Operational Control of Power System Equipment,* which the grid owner considers require NGOC operators to follow instructions from the System Operator without discretion to override or challenge them. This is reinforced by clause 3(1) of Technical Code C of Schedule 8.3 of the Code, which mandates that every voice instruction must be repeated back and confirmed before being actioned. The use of the term "instruction" indicates a mandatory requirement.

(b) **Acting under instruction consistent with roles and responsibilities:** NCC's role is to operate the grid in order the meet the System Operator's principal performance obligations as set out in Part 7 of the Code. NGOC's role is to take actions in respect of grid assets to give effect to NCC's decisions and instructions in respect of the operation of the grid.

(c) **No authority to deviate:** no policies or procedures provide authority for the grid owner to override or refuse instructions from the System Operator. While it may raise concerns or seek clarification, it cannot substitute its own judgment for that of the System Operator.

(d) **System Operator's omission caused the UFE:** The System Operator decided not to issue an instruction to apply Harmonic Performance Control (HPC) settings prior to the Bus D outage. The grid owner asserts that this omission led directly to the HVDC power limit and subsequent UFE. Had the instruction been given to implement the two settings changes, the event would not have occurred.

(e) **Expertise limitations:** NGOC operators are not required to be engineering experts with experience across the breadth of electrical systems on the grid. Their role is to implement instructions, not to assess or challenge operational decisions.

4.2. The grid owner concludes that under the Code's definition of "causer", the System Operator is the causer due to its failure to issue instructions which caused the UFE. It rejects the suggestion that its failure to challenge the System Operator's decision makes it the causer, noting that no procedure or Code provision it is aware of grants it authority to override instructions.

5. The draft determination is the System Operator was the causer of the 11 July 2025 UFE

5.1. The Authority's draft determination under clause 8.61 is that the System Operator was the causer of the UFE at approximately 1.04pm on 11 July 2025.

The Authority considered the circumstances of the UFE

5.2. The Authority has considered the System Operator's report and correspondence with the grid owner and agrees with:

(a) the description of the circumstances leading up to the UFE

(b) that a UFE occurred at about 1.04pm on 11 July 2025.

5.3. The Authority does not agree with the System Operator's finding that the grid owner was the causer of the UFE.

5.4. While the UFE was resolved without widespread impact, the Authority considers that the circumstances presented a risk of a much more significant event. This underlines the importance of adherence to procedures and robust decision-making processes where there is deviation from those procedures.

A procedure was in place but not followed

5.5. On the day of the UFE, a planned outage of HAY Bus D was scheduled. Before an outage, the System Operator typically issues permissions and instructions to the grid owner.

5.6. For planned outages of Bus D, the instructions and grid owner actions are documented in a standing written temporary instruction set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*. This temporary instruction was issued on 4 July 2025 and is owned by the System Operator. The temporary instruction specifies that, prior to removing Bus D from service, the energy coordinator (System Operator) is to instruct the grid owner to set:

(a) HPC Roundpower to Monopole at HAY

(b) HPC Switch Level to Increased at HAY.

5.7. However, the System Operator deemed the steps in the procedure unnecessary due to the temporary operating conditions at the time and decided not to instruct the GAC to apply the correct control settings.

5.8. This decision by the System Operator was made without any involvement by the grid owner. Just one hour before the planned outage, the System Operator telephoned the grid asset operator and informed him that the energy coordinator would not be issuing instructions to set HPC Roundpower to Monopole, or HPC Switch Level to Increased (as stated in the temporary instruction). The Authority has reviewed the voice recording of this communication.

5.9. It was confirmed in the conversation that the grid asset controller would proceed with the sequence to remove Bus D from service at 8.00am without receiving instructions regarding HPC Roundpower and Switch Level settings from the NCC energy coordinator. The grid asset controller confirmed their understanding by repeating back the security coordinator's message.

5.10. The GAC acting on instruction by the System Operator in respect of the control settings to be applied, is consistent with the standing written temporary instruction which requires the System Operator to issue those instructions. Permission to proceed for HAY Bus D was issued by the System Operator at 7:38am.

5.11. This event has raised questions about the independence of the System Operator and the grid owner in operational decision-making. The deviation from established procedures, the System Operator's responsibility for issuing instructions for the correct control settings to be applied to the grid owner's asset, and the grid owner's acceptance of those instructions without challenge, highlights potential risks where operational roles and responsibilities may become blurred. The Authority considers that clarity and independence in decision making are critical to maintaining confidence in the integrity of system operations.

The Authority does not agree with the System Operator's causer finding

5.12. The Authority disagrees with the findings in the causer report that the grid owner was the causer of the UFE and considers the System Operator to be the causer.

5.13. The Authority accepts that the grid owner cannot override an instruction from the System Operator. This behaviour and relationship is underpinned by the System Operator and grid owner's respective roles and responsibilities, various operating procedures, and the Code.

5.14. The Authority considers that the System Operator should have followed its own procedure (as set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*) for removing HAY Bus D, by instructing the grid owner to apply the prescribed HPC setting changes.

5.15. When the cause of the UFE was identified, the grid owner requested an instruction from the System Operator to select HPC Roundpower to Monopole. This adds weight to the view that the grid owner can only act under instruction from the System Operator – if not, then the grid owner could have made the change without requesting an instruction.

5.16. The grid owner had an opportunity to question or seek further explanation for the deviation from the procedure, but did not do so. However, the grid owner has advised that its grid asset controllers are not required to be experts in electrical engineering and all the systems of the grid. In this context, it was reasonable for the grid owner to accept the System Operator's decision on the morning of the UFE that NCC's energy coordinator would not issue an instruction to apply the prescribed HPC setting changes at 8.00am, as previously planned.

5.17. The Authority considers the nature of the voice call at 6.57am was not that of a "discussion" as the System Operator described it in paragraph 3.2(i) above. More correctly, it was a communication to the NGOC GAC of a decision that had been made by the System Operator.

System Operator meets the definition of causer

5.18. The Authority's draft determination is that the System Operator meets the definition of causer in the Code. A causer in relation to an under-frequency event, means:

(a) if the UFE is caused by an interruption to or reduction of electricity supply, or an increase in electricity demand, from a single participant's asset or assets, the participant, unless another participant's act or omission or property causes the interruption to or reduction of electricity supply or the increase in electricity demand, in which case the other participant is the causer;

5.19. The definition of causer was replaced on 1 May 2025, which widened the scope of potential causers to include all participants which includes the System Operator. The previous definition of causer was limited to generators or grid owners.

5.20. The System Operator's decision to not issue an instruction to apply the prescribed HPC setting changes prior to removing HAY Bus D from service led to a reduction of electricity supply through the HVDC and consequently, the UFE event on 11 July 2025.

Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE event on 11 July 2025 at approximately 1.04pm? If not, please advise your view on the causer and give reasons.

6. The System Operator has calculated the MW lost during the event based on its investigation

6.1. Clause 8.64 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 under clause 8.65.

6.2. 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.

6.3. The System Operator has determined the electric power lost as a result of the 11 July 2025 event was 119.84MW, resulting in an event charge of $74,800.

6.4. 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.

6.5. Any comments received will be passed to the System Operator.

Q2. Do you agree with the System Operator's assessment that 119.84MW was lost from the power system in the 11 July 2025 UFE? If not, please advise your view on the MW lost and give reasons.

Appendix A Format for submissions

Submitter	

Questions	Comments
Q1. Do you agree with the draft determination that the System Operator was the causer of the UFE at approximately 1.04pm 11 July 2025? If not, please advise your view on the causer and give reasons.	
Q.2 Do you agree with the System Operator's assessment that 119.84MW was lost from the power system in the 11 July 2025 UFE? If not, please advise your view on the MW lost and give reasons.	

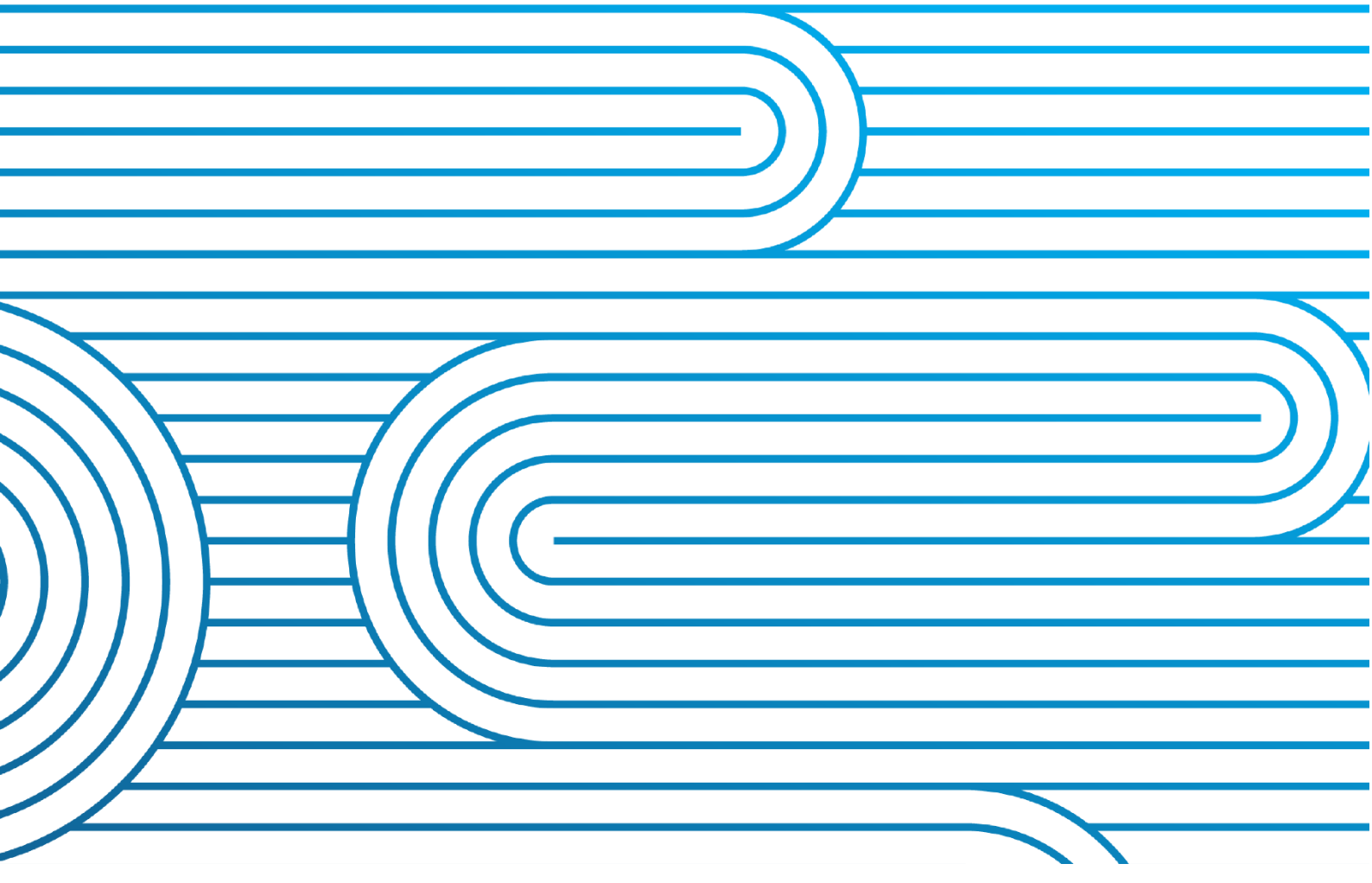
Appendix B System Operator Causer Report

TRANSPOWER

Causation Report
11 July 2025
Under-Frequency Event

System Operator event 4586 & 4587

1 October 2025



IMPORTANT

Disclaimer

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Contents

1 PURPOSE

On 11 July 2025 the system frequency in the North Island fell below 49.25 Hz, resulting in an under-frequency event (**UFE**).

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:

- 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.

2 EXECUTIVE SUMMARY

On 11 July 2025, a sudden ramp down in HVDC power transfer from 178 MW to 68 MW into the North Island caused the frequency to drop to 49.24 Hz at 13:04:36.

Investigations by the System Operator have identified the root cause of this UFE is incorrect HVDC Harmonic Performance Control (HPC) settings for a split bus configuration which led to an HVDC power limit being applied.

2.1 RECOMMENDATION OF UFE CAUSER

In accordance with clause (a) of the definition of "causer" in Part 1 of the Code, the System Operator recommends that Transpower in its capacity as Grid Owner be found as the causer of the UFE.

2.2 OTHER RECOMMENDATIONS

The investigation involved reviewing the HVDC control settings under a specific bus configuration and reviewing Transpower internal operations procedures, involving both the System Operator and Grid Owner, and the communications between them.

This investigation has raised some procedural areas for further review and consideration, in particular:

- System Operator and Grid Owner control room communications and decision making process on deviations from HVDC operating procedures.
- Deviations from procedures beyond HVDC operating procedures. It is critical that operators of the power system remain empowered to make operational decisions, particularly in emergencies. However, this event indicates that there is value in reviewing how operators (in both the System Operator National Coordination Centre (**NCC**) and the Grid Owner's National Grid Operating Centre (**NGOC**)) make decisions that result in deviations from procedures or policy, particularly for complex technologies.
- The adequacy of controls around deviations that present a potential risk and/or require more in-depth analysis and additional approval steps before proceeding.

3 SYSTEM EVENT – 11 JULY 2025

3.1 PARTICULAR ASPECTS OF THIS EVENT

Most UFEs are caused by a fault which results in a disconnection of generation or the HVDC. Assessment of these types of events focuses on electrical faults and associated protection operations of generators and/or the Grid Owner to identify the causer.

In this event, the trigger for the UFE was a sharp reduction in HVDC transfer to the North Island caused by an HVDC power limit being applied. An HVDC power limit below the existing power transfer MW will automatically ramp down the power transfer between the two islands to ensure system stability and prevent overloads or voltage excursions.

In this case, the assessment involves the following considerations:

- HVDC control system settings, under a specific bus configuration.
- Transpower's internal procedures, involving both the System Operator and the Grid Owner, and the communications between them. No other parties have been identified.

These considerations mean that this investigation focused on the actions and decision making by both the System Operator and Grid Owner. At the start of this investigation process we acknowledged and declared to the Authority the conflict of interest that this presents for the System Operator, and we have managed this assessment as required under the Code and with the necessary internal information barriers in place.

3.2 BACKGROUND INFORMATION

In order to assist the Authority, some background information is included to help explain how the internal procedures and the interactions between the System Operator and Grid Owner work.

3.2.1 HVDC Operations

The HVDC is operated by the Grid Owner's National Grid Operations Centres (NGOC). The HVDC Bipole Operating Policy[1] is the operating standard used by the NGOC to direct the operation of the HVDC. It also provides information to the System Operator of the HVDC capability and standard operating procedures. Other procedures, involving both NGOC and the System Operator's National Coordination Centres (NCC) set out the roles and responsibilities of the operators in both centres. These are referenced later in this report.

These documents include instructions on configuration and control settings for different HVDC equipment outages.

3.2.2 Bus outage during this event and associated configuration and control settings

The UFE occurred during a planned outage of Bus D at Haywards (HAY). The removal of Bus D splits the 220 kV bus. Figure 1 below shows the bus layout, indicating buses A, B and C are separated electrically (split) when Bus D is removed from service (i.e. is on outage).

[1] TP.OG 48.02 HVDC: Bipole Operating Policy, Issue 18

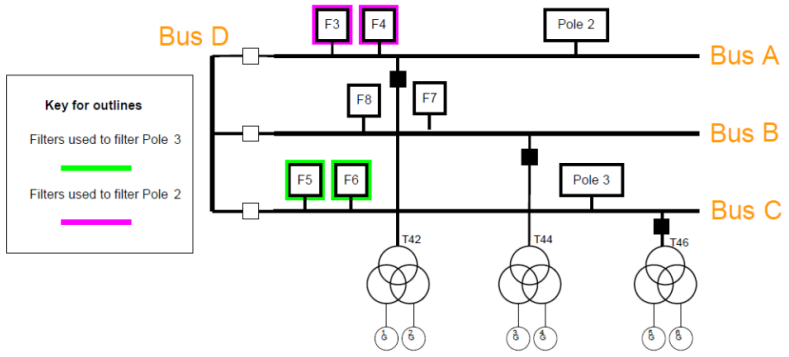
Network Status	Operation
Bus split, both poles split from each other	**Filters:** Not closely connected to either pole and made unavailable to the RPC **Filters:** Closely connected to either pole are made not available to RPC for regulation but are still used for filtering 

Figure 1: Bus D removed, splits the 220 kV bus

3.2.3 NGOC and NCC outage procedures and relevant control settings for this outage

Before transmission assets (including HVDC equipment) are taken out of service, the NCC operators, who are responsible for both energy dispatch and system security, issue permissions and potentially instructions to NGOC. This is to enable outages to be coordinated across the system and for NCC to perform security checks ahead of outages, before outages proceed.

In the case of the Bus D outage these instructions and the NGOC actions were a standing written temporary instruction set out in *TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages*.

Under this procedure, before the 220 kV bus is split, NCC instructs the NGOC operators to set the following configuration for the HVDC in relation to the Harmonic Performance Control (HPC).

1. HPC Roundpower to Monopole at Haywards.
2. HPC Switch Level to "Increased" at Haywards.

NCC operators then instruct NGOC to proceed with the outage.

These requirements for a split bus configuration are specified in *TP.OG 48.02 HVDC: Bipole Operating Policy*, Issue 18. The HVDC can still run in bipole operation with a split bus, but the Reactive Power Controller (RPC) will try to maintain control of each bus independently, and if it cannot control voltage or harmonic filtering requirements, this may result in equipment tripping or a limit being applied to the HVDC transfer.

3.3 SITUATION PRIOR TO THE UNDER-FREQUENCY EVENT

The following context helps to explain the conditions leading up to the UFE.

Prior to the Bus D outage, there was communication between NCC and NGOC about **not** selecting HPC Round power to Monopole at HAY and **not** selecting HPC Switch Level to "Increased" at HAY.

The key driver for this deviation from the procedure was due to an assessment by NCC, communicated to NGOC ahead of the outage, that these steps appeared to be unnecessary due to the temporary operating conditions at the time.

These temporary operating restrictions at Haywards required some filters to be switched in manually and left in service and not available to the RPC. All filters at Haywards were not available to the RPC. As the RPC could not automatically switch out filters, a decision was made to omit the steps. Further details about the reasoning and contributing factors behind this decision are provided in Section 3.5.

Bus D was then taken out of service at 08:02.

3.4 THE UNDER-FREQUENCY EVENT

During the outage of Bus D at Haywards, at 13:04, the HVDC ramped down to 68 MW from a pre-event transfer of 178 MW[2]. As the HVDC was transferring power north, the sudden ramp down to 68 MW caused the frequency to drop to 49.24 Hz at 13:04:36, triggering the UFE. The MW lost during the HVDC runback was 119.84 MW which was lower than the highest risk in the North Island at the time of the event. The following diagram shows the PMU data for HVDC MWAC and frequency in the North Island[3].

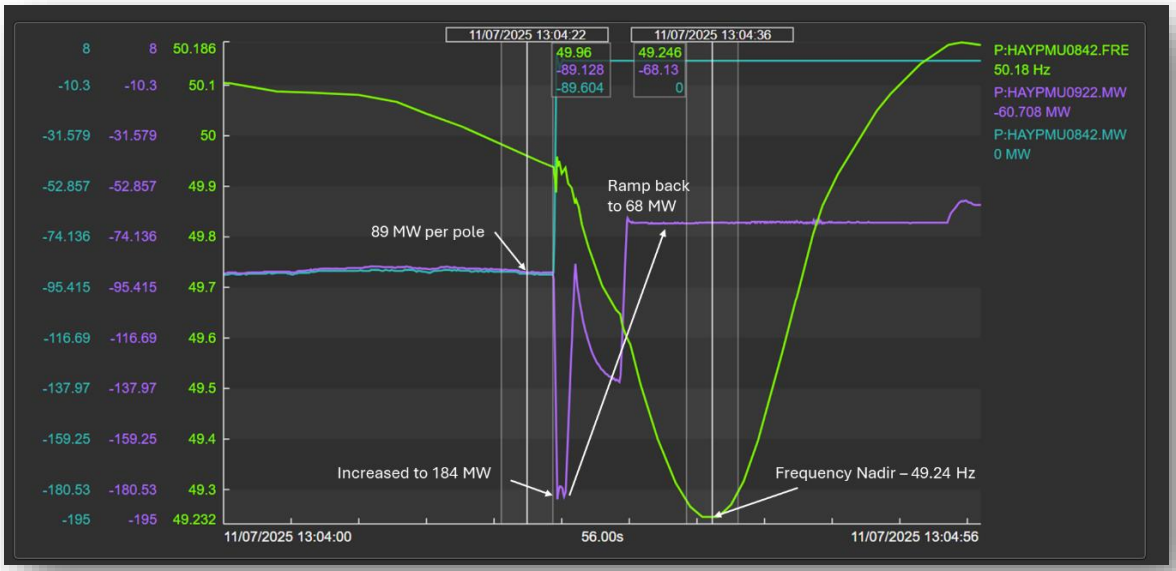


Figure 2: Frequency and HVDC injection at Haywards.

In response, temporary HVDC constraints were applied at 13:12 to limit dispatch while the cause of the run back was being identified. Once identified, NGOC requested an instruction from NCC to select HPC Round power to Monopole at 13:13 — 9 minutes after the event. By 13:40, all constraints were removed, and normal dispatch resumed.

[2] The graph and MW values were obtained from PMU data where there VTs are located on the AC side of the HVDC transformers.
[3] Note the frequency in the South Island increased to 50.7 Hz.

3.5 EVENT INVESTIGATION

The System Operator undertook an investigation taking into account System Operator data and information as well as information provided by the Grid Owner. Details of this investigation are provided in the attached System Operator Engineering 26 September 2025.

The investigation found that the trigger for the UFE was the ramp down of the HVDC transfer north when a power limit was applied by the HVDC control system.

The root cause for the power limit being applied was a failure to select key control settings for the HPC – **not** selecting HPC Round power to Monopole at HAY and **not** selecting HPC Switch Level to "Increased" at HAY.

This decision was based on an assessment by NCC, and communication between NCC and NGOC prior to the outage. The HVDC controls are complex and as a result the impact of the decision to **not** instruct the configuration may not have been fully understood by both the NGOC and NCC individuals involved, particularly as there were temporary operational limitations on Haywards filters.

There are other contributing factors which increased the likelihood of the event:

1. The complexity of the HVDC control systems. The HVDC has filtering requirements which specify which filters are required to be in service at Haywards and Benmore, and depends on the HVDC MW transfer and if operating in bipole or monopole. The roundpower functionality defaults to bipole filtering requirements, but the operators can select to use monopole filtering requirements when only one pole is in operation; this is often done to help manage AC voltage as the Reactive Power Controller (RPC) requires fewer filters in service. In this case, all Haywards filters were in manual and not available to the RPC. The RPC has the ability to automatically switch filters based on the requirements of the HVDC. As the RPC could not automatically switch out filters, the usual benefit of selecting monopole filter requirements would not be seen. It was not anticipated that by omitting to select this, the HVDC would still apply bipole filtering requirements during monopole operation - despite the 220kV bus split - and having insufficient filters on the one bus section would trigger a power limit and therefore ramp down.

2. Operational limitations imposed by *TI-DP 1195 HVDC filter operating restrictions* contributed to the decision-making process. Operational restrictions at Haywards required some filters to be switched in manually and left in service and not available to the RPC. All filters at Haywards were not available to the RPC.

3.6 RECOMMENDATIONS FOLLOWING EVENT INVESTIGATION

Since this event Transpower, Operations Division has updated TI-DP-1139 to prevent this *specific event* from reoccurring.

This investigation has raised some procedural areas for further review and consideration, in particular:

- System Operator and Grid Owner control room communications and decision making process on deviations from HVDC operating procedures.
- Deviations from procedures beyond HVDC operating procedures. It is critical that operators of the power system remain empowered to make operational decisions, particularly in emergencies. However, this event indicates that there is value in reviewing how operators (in both NCC and NGOC) make decisions that result in deviations from procedures or policy, particularly for complex technologies.
- The adequacy of controls around deviations that present a potential risk and/or require more in-depth analysis and additional approval steps before proceeding.

4 RATIONALE FOR CAUSER RECOMMENDATION

The assessment confirms that the sudden ramp down of the HVDC to 68 MW caused the frequency to drop to 49.24 Hz at 13:04:36, triggering the UFE. This investigation found no other events that contributed to this UFE.

The reason for this ramp down, and the root cause of the UFE, was the incorrect control settings in place for the bus outage which began earlier in the day. The correct settings should have been actioned by the Grid Owner, following an instruction by the System Operator.

The HVDC assets, including the control systems, are owned by the Grid Owner and physically operated by the NGOC. The Grid Owner's HVDC Bipole Operating Policy sets out the Operating Standard for the HVDC equipment. Coordination of configuration changes is managed through internal procedures involving both NGOC and NCC.

The Grid Owner was asked if it considered itself to be the causer of the under-frequency event. The Grid Owner does not believe it caused the under-frequency event.

The Grid Owner considers that the System Operator is the causer. The Grid Owner says that NCC did not instruct NGOC to change settings and that the Grid Owner acts only "under instruction".

The System Operator acknowledges that it communicated with the Grid Owner, ahead of the outage, about **not** instructing the Grid Owner to select HPC Round power to Monopole at HAY and selecting HPC Switch Level to "Increased" at HAY. However, the System Operator believes that the Grid Owner:

- is better placed than the System Operator to know how to operate the HVDC and;
- should be well informed about the operational limits of its equipment and;
- had an opportunity to disagree with the System Operator about **not** selecting HPC Roundpower to Monopole at HAY and **not** selecting HPC Switch Level to "Increased" at HAY and notes that the Grid Owner's HVDC Operator did not disagree.

The System Operator believes there is no clear Code or other legal basis for the Grid Owner to claim in this case that it was compelled to follow any advice and/or suggestion of the System Operator in relation to the Grid Owner's asset or that it required an "instruction" to be able to act. The Grid Owner has confirmed, in their response, that they have the capability to question a decision should it appear incorrect.

The System Operator acknowledges that it played a role in the decision to not select HPC Round power to Monopole at HAY and not select HPC Switch Level to "Increased" at HAY, but does not agree that the role it played meets the threshold required by the definition of causer under the Code.

The System Operator's recommendation is therefore that the causer is Transpower as Grid Owner.

5 CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for 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:

$$EC = ECR \times \left(\sum_{y} (INT_{y,e} \; for \; all \; y) - INJ_D \right)$$

where

EC is the event charge payable by the causer

ECR is $1,250 per MW

INJ_D is 60 MW

$INT_{y,e}$ 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 $INT_{y,e}$.

Using the event charge formula the calculation is as follows:

Event Charge = $1,250/MW * (119.84 – 60MW)

Event Charge = $74,800

6 CORRESPONDENCE

6.1 RESPONSE FROM THE SYSTEM OPERATOR

6.1.1 Memo to the System Operator:

TRANSPOWER

Waikoukou
22 Boulcott Street
PO Box 1021
Wellington 6140
New Zealand

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Date: 24/07/2025

To: Chantelle Bramley
Cc: Samantha Naidoo
From: Ivani Molver

Subject: Investigation – 11 July 2025 under-frequency event

As you are aware, at 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. PSG is currently investigating the event, and we have identified the following information as relevant in assessing the actions of the System Operator in relation to this event:

- PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).
    - SO to confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level.
- Responsibilities:
    - SO to confirm if the responsibility sits with the Energy Coordinator (System Operator) to only send the instruction for setting HPC Round Power and HPC Switch Level to the HVDC Operator (Grid Owner)?
    - Is it correct to state if no instruction is sent, the previous instruction or setting for HPC Round Power and HPC switch level would be retained?
    - Who is responsible for ensuring that the HVDC is offered with the correct configuration?
- TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.
    - It is assumed that NCC staff were aware of this document. SO to confirm this and to also confirm that the Energy Coordinator was aware of the need to:
        - Instruct HPC Round power to Monopole at HAY.
        - Instruct HPC Switch Level to Increased at HAY.
    - SO to confirm what instruction was sent to the HVDC operator at NGOC?
- At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.
    - SO to confirm its criteria for identifying negotiable and non-negotiable steps when instructing a deviation from a joint SO/GO procedure or a GO procedure.
    - SO to confirm that when instructing a deviation from a joint SO/Asset Owner procedure or an Asset Owner procedure, the SO uses the same process and criteria with Asset Owner as it does with the GO.

- SO to confirm what the intended benefits were of the proposed deviation.
- Accountabilities: The SO to confirm who it thinks is accountable for the results i.e. the HVDC ramp down which resulted in an under-frequency event?

- The SO to form a view as to whether or not the SO could have been the causer of the under-frequency event as per the Code.

PSG will need this information by **COB on Wednesday, 21 August 2025** to be able to complete its investigation**.** The information provided in response to the questions above will be used in the SO recommendation to the Electricity Authority on 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.

6.1.2 Response from the System Operator:

From: Ivani Molver
Sent: Tuesday, 5 August 2025 4:18 pm
To: Matthew Hansen; Samantha Naidoo
Cc: Katherine Moore
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Thanks Matt

Kind Regards

Ivani Molver (She/Her)
Power Systems Engineer
SO Power System Group | Operations

Transpower New Zealand Ltd.
Waikoukou, 22 Boulcott St, PO Box 1021, Wellington 6140
M: +64 21 229 7260
www.transpower.co.nz

From: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Sent: Tuesday, 5 August 2025 3:58 pm
To: Ivani Molver <Ivani.Molver@transpower.co.nz>; Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

There is multiple documents / procedure that feed into this process that all have different owners, the GO is responsible for the Bi-pole policy and the SO for the temporary instructions.
Noting none of the written process that formed part of this event where wrong ! just missing the why which is why the SC questioned the process as he did not fully understand they why.

Matt

From: Ivani Molver <Ivani.Molver@transpower.co.nz>
Sent: Tuesday, 5 August 2025 9:33 am
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>; Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Good morning Matt,

Thank you for the information. Like Sam, I am also going through the information. However, could you clarify question 11.

The intention of the question was to ensure that there is no formal governance around responsibility and accountability where accountability is pre-determined for the procedure. Note, it is common practice internationally to have a pre-determined responsible and accountable party for procedures, standards and processes and I needed to confirm or rule this out. From your response, I have gathered that there is no pre-determined accountability for the procedure. Please correct me if I am wrong.

Thanks again for the time in getting this response to us in a speedy fashion.

Kind Regards

Ivani Molver (She/Her)
Power Systems Engineer
SO Power System Group | Operations

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From: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>
Sent: Monday, 4 August 2025 5:14 pm
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>; Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Thanks for getting all this to us Matt – still going through it.

Will be in touch.

Thanks
Sam

From: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Sent: Monday, 4 August 2025 11:55 am
To: Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

1. Time line of event

10th July

During the pre-outage checks the Security Support Coordinator identified a potential inefficacy for the planned HAY 220kV bus zone and CB fail work which removed two of the ABB HVDC filters (HAY F4A and F4B) and HAY bus D (creates a split 220kV bus). Starts discussion within team and Ops planning

1.1. 11th July

1.2. 06:15 Security Coordinator discusses upcoming outage with his team, The Security Coordinator included a discussion around the HAY D bus outage and if selecting HPC Round Power to Monopole was necessary due to the temporary operating restrictions on the Siemens filters and the fact every available filter was already in service. Believing it was a way to reduce complexity and simplify the switching It was decided not to proceed with selecting HPC Round Power to Monopole and HPC switch level to increase at HAY and his belief the step of selecting HVDC

1.3. 06:50 Security Coordinator advised off-duty Operations manager who came into the control room of the intention not to select the HPC during the D Bus outage, the Operations Manager who did not raise objections as the SC logic seemed sound.

1.4. 06:57 Security Coordinator rang and advised the HVDC operator prior to the outage, with no objections raised by the GAC

1.5. 07:38 PTP for HAY D bus issued

1.6. 08:00 HAY D bus outage started no issues

1.7. 13:04 HVDC run back to 70MW (from approx. 200MW). NI frequency dropped to 49.24 Hz and SI frequency increased to 50.70 Hz
1.8. 13:06 TWI potline offload (reduction of approx. 170MW off the South Island)
1.9. 13:12 The Energy Coordinator constrained the HVDC to the 70MW to ensure a secure dispatch could be maintained, while the cause of the run back was being identified.
1.10. 13:13 The HPC Round power to Monopole was selected. (9 minutes after event)
1.11. 13:16 HVDC MW max of 70MW override removed and re dispatched. (12 minutes after event)
1.12. 13:16 HVDC MW max of 120MW override applied and re dispatched at 13:16 and remained in place until 13:40. This override was applied to limit the HVDC movement during a Tiwai offload that was in progress at the same time.
1.13. 13:19 TWI potline complete, MAN return to economic dispatch
1.14. 13:22 Energy Coordinator phoned IL providers and all IL load lost due to UFE was restored (18 minutes after event)
1.15. 13:40 HVDC MW max of 120MW override removed, dispatch returned to normal

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From: Matthew Hansen
Sent: Friday, 1 August 2025 3:50 pm
To: Ivani Molver <Ivani.Molver@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: RE: Request for information - UFE 11 July 2025 (Involving the HVDC)

Answers below in red, I will try pull a time line together next week.

Matt

From: Ivani Molver <Ivani.Molver@transpower.co.nz>
Sent: Friday, 1 August 2025 11:00 am
To: Matthew Hansen <Matthew.Hansen@transpower.co.nz>
Cc: Samantha Naidoo <Samantha.Naidoo@transpower.co.nz>; Katherine Moore <Katherine.Moore@transpower.co.nz>
Subject: Request for information - UFE 11 July 2025 (Involving the HVDC)

Kia ora Matt,

As you are aware, at 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. PSG is currently investigating the event, and we have identified the following information as relevant in assessing the actions of the System Operator in relation to this event.

In our view, you may be able to answer the following questions in relation to the event. **Where you can answer the questions, can you please provide extracts of policies or procedures, or references to the relevant sections of documents. If you do not think you are the right person to answer a question, please contact me or Sam in the first instance.**

Here are the questions:
PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).

1. Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set Round Power and HPC switch level? Yes correct procedure, how to but not why or when

2. Can you confirm if the responsibility sits with the Energy Coordinator (System Operator) to only send the instruction for setting HPC Round Power and HPC Switch Level to the HVDC Operator (Grid Owner)? In normal operations yes instruction comes from EC, however during planned outages when PTP is given the GAC will do sub tasks when it is normal process to achieve the primary task
3. Is it correct to state if no instruction is sent, the previous instruction or setting for HPC Round Power and HPC switch level would be retained? Yes unless as above, it is part of a primary task covered by PTP
4. Who is responsible for ensuring that the HVDC is offered with the correct configuration? And what document covers who is responsible for ensuring that the HVDC is offered with the correct configuration? The Grid owner must offer the HVDC standard configuration (code requirement) which is done via TP.OG.48.02 bi-pole operating policy, the NGOC must offer any changes to availability or capacity (also code requirement) and covered by PR-AO-699 Management of grid owner offers and PR-SH 244 Manage and assess grid owner offers , however the SO will instruct the NGOC of the required HVDC configuration the best suits the current situation (should be within the grid owners offer) it the question was "Who is responsible for ensuring that the HVDC is operated ~~offered~~ with the correct configuration? Then this is the SC\EC who is responsible.

TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.

5. We have assumed that NCC staff were aware of this document. Can you confirm this? Yes the NCC team where aware if the TI and its content, but suspected the TI had an unnecessary step

6. Can you also confirm that the energy coordinator was aware of the need to:

- Instruct HPC Round Power to Monopole at HAY
- Instruct HPC Switch Level to Increased to HAY

Yes was aware but instructed not to by the Security Coordinator

6. Can you confirm what instruction was sent to the HVDC operator at NGOC? The TI's are made available to the GAC's, I cannot confirm if the GAC on the day had read it, Tony N should be able to check

At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.

7. Can you confirm the SO criteria for identifying negotiable and non-negotiable steps when instructing a deviation from a joint SO/GO or a GO procedure? No, The Security Coordinator are empowered and trained to make operation discissions where they deem it is prudent to very form a documented plan or procedure. This is common practice and necessary as often errors in planning or process are not picked up until real time or system conditions have changed since the plan or process had been written.

9. Can you confirm that when instructing a deviation from a joint SO/Asset Owner procedure or an Asset Owner procedure, the SO uses the same process and criteria with Asset Ownes as it does with

the GO. They are trained to treat all asset owners the same, however many of the actions the security coordinator will take is on behalf of the GO

10. What were the intended benefits of the proposed deviation?

Reduce complexity by removing tasks believed to be redundant due to operational limitations imposed by "TI-DP 1195 HVDC filter operating restrictions" and reduce risk of error

11. Can you confirm as per the relevant procedure/process who is accountable for the results (i.e. the HVDC ramp down which resulted in an underfrequency event?)

No, that should be determined by author of the causer report who has an independent view of the facts

Finally,

12. Can you please provide a timeline of events leading up to the UFE? This should include key decision points in 48 hours ahead of the UFE as well as the UFE.

Yes but will take some time to pull together

Thank you for your time in assisting us in our investigation.

Kind Regards

Ivani Molver (She/Her)
Power Systems Engineer
SO Power System Group | Operations

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6.2 RESPONSE FROM THE GRID OWNER

6.2.1 Letter to the Grid Owner:

TRANSPOWER

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

24 July 2025

Melanie Marr
Grid Compliance Manager
22 Boulcott Street, Wellington

Dear Melanie,

11 July 2025 Under-Frequency Event

At 13:04 on 11 July 2025 an under-frequency event occurred in North Island as the frequency dropped to 49.24 Hz, which is below the threshold defined in the Code i.e. 49.25 Hz. We are investigating the event and require the following information from you:

- PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round Power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).
  - Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level?
- Responsibilities (tasks or duties assigned):
  - Can you confirm if the responsibility sits with the HVDC Operator (Grid Owner) to only correctly act on the instruction received from the Energy Coordinator (System Operator) to set HPC Round Power and HPC Switch Level?
  - Is it correct to state if no instruction is sent, the NGOC HVDC Operator has no instruction to act on and hence any previous instruction or setting for HPC Round Power and HPC switch level would be retained.
  - Who is responsible for ensuring that the HVDC is offered with the correct configuration?
- TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.
  - Was NGOC aware that this document states that the Energy Coordinator was supposed to instruct HPC Round Power to Monopole and HPC Switch Level to Increased at Haywards?
  - Did the HVDC operator at NGOC receive an instruction from the Energy Coordinator at NCC?
- At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised.
  - The HVDC is an asset that is offered. The configurations at which the HVDC can be offered is documented in TP.OG 48.02 HVDC: Bipole Operating Policy, Issue 18.
    - Why did NGOC agree to a configuration that is contrary to what is required in the HVDC Bipole Operating Policy?
    - Can you explain why a configuration that should not be applied is available in the HMI interface?

    - Can you confirm if there are any GO documents (for example procedures, standards and/or guidance) that prevent this configuration from being offered?
  - Accountabilities: Can you comment on who you think is accountable for the results i.e. the HVDC ramp to 70 MW which resulted in an under-frequency event?
- Could you provide any other information regarding the event and what you believe may have caused the under-frequency to occur on 11 July 2025.
- We have assessed the MW lost during the event as 119.84 MW at Haywards. Can you please confirm this assessment or provide data that indicates a different value of MW lost.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

Kindly provide the information by **COB on Wednesday, 21 August 2025.** 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,

Ivani Molver
System Operator Investigator
Power System Engineer

CC:
Samantha Naidoo
Corporate Counsel-Compliance & Impartiality

6.2.2 Response from the Grid Owner:

TRANSPOWER

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15 August 2025

Ivani Molver
System Operator Investigator
22 Boulcott Street
Wellington

Subject: Response to 11 July 2025 Under-Frequency Event – Request for Information

Dear Ivani,

Thank you for your letter dated 24 July 2025 regarding the under-frequency event that occurred on 11 July 2025.

We acknowledge the importance of this investigation and appreciate the opportunity to provide the requested information. Please find our responses to all the questions outlined in your letter in Appendix A – Response to System Operator Queries Regarding 11 July 2025 UFE.

Should you require any clarification or further information, please do not hesitate to contact me.

Yours sincerely,

Melanie Marr
Grid Compliance Manager

CC:
Samantha Naidoo
Corporate Counsel – Compliance & Impartiality Manager

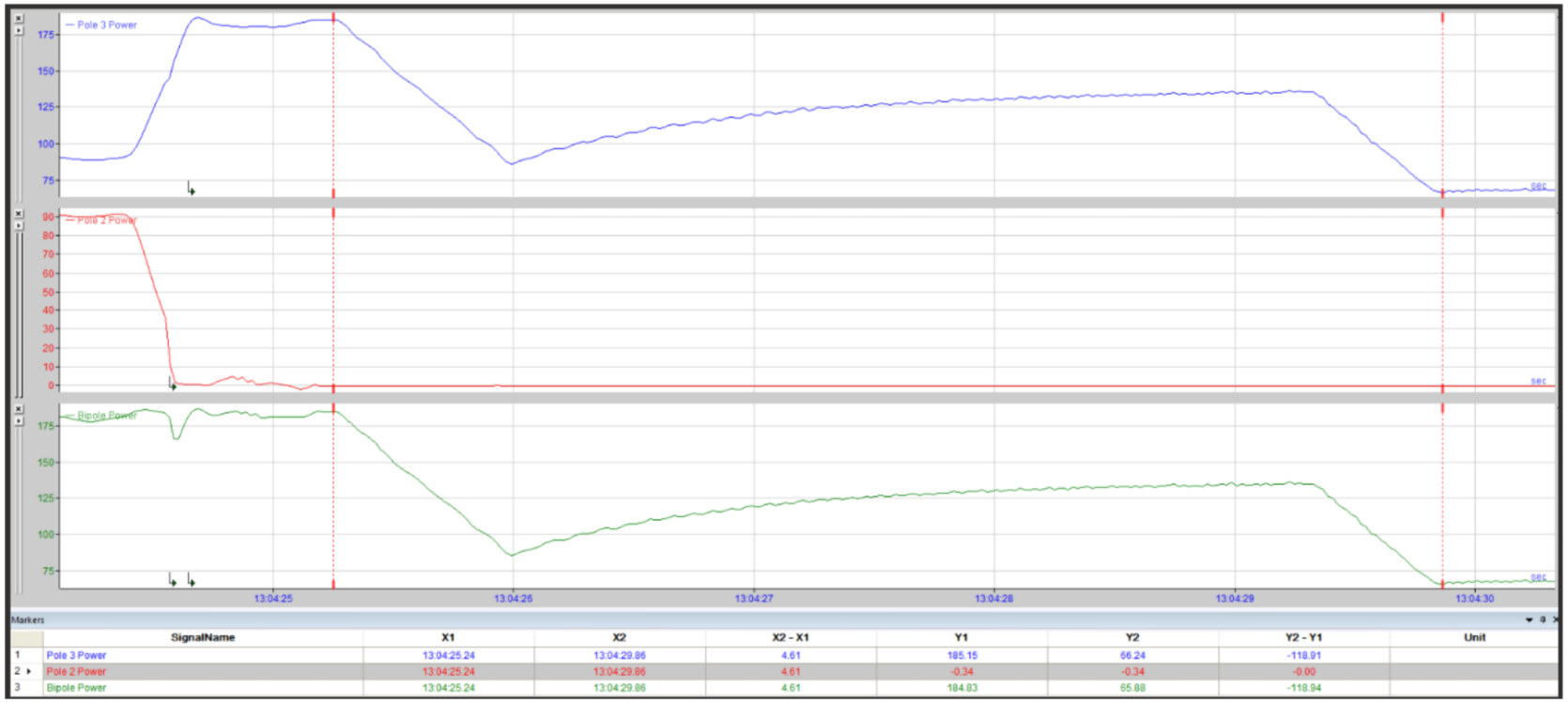
Appendix A – Response to System Operator Queries Regarding 11 July 2025 UFE

Reference	Question	Grid Owner's Reply
PR-DC-663 HVDC Operator Bipole Operating Procedures states that the input to setting HPC Round Power and HPC Switch Level is an instruction provided by the Energy Coordinator in NCC (System Operator) to the HVDC Operator in NGOC (Grid Owner).	Can you confirm if this is the correct procedure that defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level?	Yes, PR-DC-663 HVDC Operator Bipole Operating Procedure defines how NGOC HVDC Operator would set HPC Round Power and HPC switch level.
Responsibilities (tasks or duties assigned):	Can you confirm if the responsibility sits with the HVDC Operator (Grid Owner) to only correctly act on the instruction received from the Energy Coordinator (System Operator) to set HPC Round Power and HPC Switch Level?	Yes, the Grid Owner only acts on instruction from the Energy Coordinator (System Operator) regarding HPC Round Power and HPC Switch Level settings.
	Is it correct to state if no instruction is sent, the NGOC HVDC Operator has no instruction to act on and hence any previous instruction or setting for HPC Round Power and HPC switch level would be retained.	Yes, correct. Though the instruction is verbal and not electronically sent.
	Who is responsible for ensuring that the HVDC is offered with the correct configuration?	NCC (System Operator) holds responsibility. NGOC (Grid Owner) may question instructions or decisions if they appear incorrect.
TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages, issue number V13 is an Operations Division Temporary Instruction published on 4 July 2025 and updated for outages on 09 July, 11 July and 14 July.	Was NGOC aware that this document states that the Energy Coordinator was supposed to instruct HPC Round Power to Monopole and HPC Switch Level to Increase at Haywards?	Yes.
	Did the HVDC operator at NGOC receive an instruction from the Energy Coordinator at NCC?	No.

Reference	Question	Grid Owner's Reply
At the time of the event, the Bus D at Haywards was on outage. The System Operator NMData event log states that a decision was made to NOT select HPC Round Power to Monopole and HPC switch level to "Increased". This decision was based on a discussion that was held between NCC and NGOC (System Operator and Grid Owner) prior to the outage, with no objections raised. The HVDC is an asset that is offered. The configurations at which the HVDC can be offered is documented in TP.OG.48.02 HVDC: Bipole Operating Policy, Issue 18.	Why did NGOC agree to a configuration that is contrary to what is required in the HVDC Bipole operating Policy?	NGOC followed guidance (instruction) from the System Operator's Security Coordinator (SC) during a discussion at 06:57 on 11/07/2025. The SC confidently advised that, since all filters were set to Manual and capacity was locked, switching to Monopole operation was not necessary and therefore, no instruction would be issued by the EC.
	Can you explain why a configuration that should not be applied is available in the Human Machine Interface (HMI)?	The configuration is available in the Human Machine Interface (HMI) because the SCADA system allows full operator control. This flexibility is common in SCADA systems and is managed through operator training and procedures. Currently, there is no automation in place to restrict Monopole or Bipole selections based on system status.
	Can you confirm if there are any GO documents (for example procedures, standards and/or guidance) that prevent this configuration from being offered?	Yes, the GO document TP.OG.48.02 HVDC Bipole Operating Policy provides guidance that affects configuration options. Specifically, Section 4.7.6.2 states that if Roundpower mode is enabled during a 220 kV split bus event, the 'HPC Round Power' filtering must be set to 'Monopole'.
	Can you comment on who you think is accountable for the results i.e. the HVDC ramp to 70 MW which resulted in an under-frequency event?	The System Operator is accountable for the results. The decision not to change the 'HPC Round Power' setting to 'Monopole' was made by the NCC's SC and NCC's EC did not instruct the NGOC to change settings. The Grid Owner acts under instruction.
	Could you provide any other information regarding the event and what you believe may have caused the under-frequency to occur on 11 July 2025.	
	We have assessed the MW lost during the event as 119.84 MW at Haywards. Can you please confirm this assessment or provide data that indicates a different value of MW lost.	The Haywards transient fault recorder embedded in the HVDC controls recorded a loss of 118.94 MW at the HAY 220kV bus. This value is based on the under-frequency event starting at 13:04:25.24 and ending at 13:04:29.86.

Reference	Question	Grid Owner's Reply
		Please refer to Appendix B – HVDC Fault Recorder Graph: MW Loss at HAY 220kV Bus (11 July 2025) for the visual representation of this data.
	Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.	We consider that the System Operator is the causer. The definition of "causer" is set out in Part 1 of the Code. Paragraph (a) provides that the participant whose asset or assets cause the interruption/reduction of supply, or increase in demand, is the causer *unless* another participant's act or omission causes the interruption/reduction/increase, in which case the other participant is the causer. The System Operator is a participant. As set out above in response to earlier questions, the System Operator failure to instruct the grid asset controller to change the 'HPC Round Power' setting to 'Monopole', in a situation when the instruction should have been given (i.e. an omission by the System Operator) caused the reduction. As such, we consider the System Operator is the causer.

Appendix B – HVDC Fault Recorder Graph: MW Loss at HAY 220kV Bus (11 July 2025)



Markers

	SignalName	X1	X2	X2 - X1	Y1	Y2	Y2 - Y1	Unit
1	Pole 3 Power	13:04:25.24	13:04:29.86	4.61	185.15	66.24	-118.91	
2	Pole 2 Power	13:04:25.24	13:04:29.86	4.61	-0.34	-0.34	-0.00	
3	Bipole Power	13:04:25.24	13:04:29.86	4.61	184.83	65.88	-118.94	

Transpower New Zealand Ltd The National Grid

Appendix C TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages

TRANSPOWER	Operations Division TEMPORARY INSTRUCTION

Section 1 Document Information

Temp Document ID No	TI-DP-1139	Issue Number: V13	Approval Status: **Issued** Date Last Changed: 4/07/2025
Document Title:	**TI-DP-1139 HAY Bus D Removal for HAY Bus Zone and CB Fail outages**		

Publish Date	Review Period:	Next Review Date:	Owner:
4/07/2025	**3 Months**	**4/10/2025**	**Tim Connolly or Matthew Hansen**

List of Procedures Affected by Temp Instruction

Procedure	Being Updated by
Click or tap here to enter text.	Click or tap here to enter text.

1.1 Purpose

This Instruction outlines how to manage HAY Bus Zone/CB Fail outages by splitting the 220kV buses via removal of Bus D.

1.2 Changes

Updated for outages on 09 July, 11 July and 14 July

1.3 Background

A lengthy program of work has commenced to replace HAY 220 kV Bus Zone and CB Fail protection. This requires a significant number of BZ/CBFail outages. This puts the total HAY 220 kV bus at risk for bus fault.

Although not obligated to manage, it's been deemed reasonable and prudent to try and reduce the impact of such a fault by splitting the 220kV buses with approximately half the equipment connected to two different 220kV buses. This can then be easily achieved by removal of bus D with the protection outages.

1.4 Equipment configuration

Equipment will be pre-selected onto two in-service buses (equipment is not to be spread amongst the three buses if this is a possible option). This will vary along with the two buses depending on Bus Zone /outage work.

Outages: HAY SC1, F4A & F4B

One bus (Bus A):

HAY WIL LTN 2, BPE PRM HAY 2, HAY T24, HAY T5 (SC 3, SC 4, R5), Pole 3 (T25), F5A&B, F6A

Second Bus (Bus B):

HAY T1 (R1), HAY_WIL_LTN_1, BPE PRM HAY 1, HAY T2 (SC 2), Pole 2 (T23), T22, F3A & F3B

1.5 Items of note for Bus D outage

Bus D offered as out as an OPE and is effectively conditional. If security is compromised with Bus D out, due to any unplanned events etc, then the security coordinator is to request its return.

Removal of Bus D

- Round power mode remains enabled
- RPC remains in automatic control

Security Coordinator:

- Check conditions conducive to split bus configuration (no N-1 issues). Note loss of a bus will generally cause significant issues, but we're not managing for this outcome pre-event.

Energy Coordinator:

- Instruct HPC Round power to Monopole at HAY.
- Instruct HPC Switch Level to Increased at HAY.

Security Coordinator:

- Remove Bus D

RPC:

- The RPC sees 2 monopoles and switches in filters accordingly. Pole 3 should have a filter combination with a Monopole Rating Limit of 1001MW; for example, F3A&B and F6A.
- When either Pole is blocked, all filters on that pole's bus will be automatically set to Manual. Those filters will remain in Manual and cannot be selected to Auto until the pole is deblocked.
- At the start of a Bus D outage, if all filters on a single bus are out of service, one A and one B filter will need to be manually switched in to allow the associated pole to deblock.
- If filters remain in service and are not manually switched out, the pole will be able to deblock again.
- Once all filters are selected to Auto once a pole is deblocked, the RPC will look for available filters and switch them in if the HVDC transfer increases. If nothing changes with the Pole filters, it should have adequate filtering to automatically transition to Bipole or Roundpower operation.
- The RPC will switch filters in as they are required based on Monopole Performance Limits. However, redundant filters may not be switched out when the HVDC transfer decreases. This is because the RPC is looking at the inductive loading on the synchronous condensers and they are no longer tasked with returning STC31 to zero output (see next bullet point). For each pole, one A and one B filter will be sufficient up to 630MW bipole transfer with HPC Switch Level set to Increased. This means there will be a minimum of 4 filters in service.

  It is safe to have the NGOC manually switch a redundant (third) filter out on the Pole 2 and/or Pole 3 bus once the bipole transfer drops below 500MW. This involves the filter being selected to Manual, switched out, and selected back to Auto.
- With each pole on its own 220kV bus (110kV bus solid):
  - STC31 controls the 220 kV bus it is connected to using the setpoint entered before the 220kV bus was split.
  - SC 1, 2, 3 & 4 condensers will try to zero STC31 however the condensers on 'the other bus', to STC31 may not regulate as expected. Each 220kV bus voltage may be different so awareness of VT locations/analogues may be required.
  - HAY T1, T2, T5 & WIL T8 Interconnectors will be in Manual (NARPC) and may have to be tapped manually to relieve 110 kV condensers (see below). Do not select to ARPC as they may hunt.

- SC 7, 8, 9, 10 condensers. Those with direct connection to 110kV bus will control the 110 kV voltage, otherwise will be in Manual (NARPC). Interconnectors may need to be manually tapped to alleviate condensers and regulate the 110kV bus voltage.

Modelling:

- HAY CB 408/418/428 will remain Forced Close = Yes.
- SPD/SFT will see a solid 220kV bus. SPD doesn't model flows accurately on the Poles (and therefore circuits) so there's risks with having it modelled separately. SFT check also won't have the correct configuration.

Contingencies

- Special contingencies HAYBUSA and HAYBUSB have been built in CTGS on 23/10 They won't be enabled but the two relevant contingencies can be loaded if SCs want to check for situational awareness purposes.
- If outages occur and/or N-1 issues start to appear for circuit contingencies then depending on the impact to HVDC transfer levels, returning Bus D could be the best course of action.
- As the GZ8 load is increasing going into colder season, HVDC north or south transfer with split HAY bus configuration is limited. If the HVDC is restricted because of the Bus D outage, then consider returning to service if weather conditions are suitable.

For example:

If generation or the HVDC must be reduced to resolve, then returning Bus D to service will usually be the best course of action.

Alternative options can be considered if there is a higher risk of bus faults occurring, i.e. strong winds, or if reducing HVDC transfer/generation by a small quantity alleviates an N-1 violation, and likely for a short duration, then this might be the preferred option.

Discuss with duty OM as required.

- Before returning Bus D ensure potential violations aren't resolvable by adjusting voltages and MVAr flows. For example, if excessive Var flows are a significant contributor to an overload, check whether changing voltage/MVAr dispatches on lower NI windfarms (that reduce flows through potentially overloaded equipment), will solve the violation.

Appendix D Definition of causer

causer, in relation to an **under-frequency event**, means—

(a) if the **under-frequency event** is caused by an interruption to or reduction of **electricity** supply, or an increase in **electricity demand**, from a single **participant's asset** or **assets**, the **participant**, unless another **participant's** act or omission or property causes the interruption to or reduction of **electricity** supply or the increase in **electricity demand**, in which case the other **participant** is the causer; or

(b) if the **under-frequency event** is caused by more than 1 interruption to or reduction of **electricity** supply or increase in **electricity demand**, the **participant** who, in accordance with paragraph (a), would be the **causer** of the **under-frequency event** if it had been caused by the first in time of the interruption to or reduction of **electricity** supply or increase in **electricity demand**; but

(c) if an interruption to or reduction of **electricity** supply, or an increase in **electricity demand**, occurs in order to comply with this Code, the interruption to or reduction of **electricity** supply or the increase in **electricity demand** must be disregarded for the purposes of determining the **causer** of the **under-frequency event**.

Clause 1.1(1) **causer**: replaced on 1 May 2025, by clause 4(1) of the Electricity Industry Participation Code Amendment (Common Quality Related Amendments) 2025.