Operations Division

PR-DP-264 Manage Insufficient Generation Offers and Reserve Shortfalls

This Procedure is part of the Dispatch (DP) process within Transpower and forms part of the System Operator function. The document can be found in the Operational Documentation Library

Document Status: **Issued**

Published Date: **25/09/2025**

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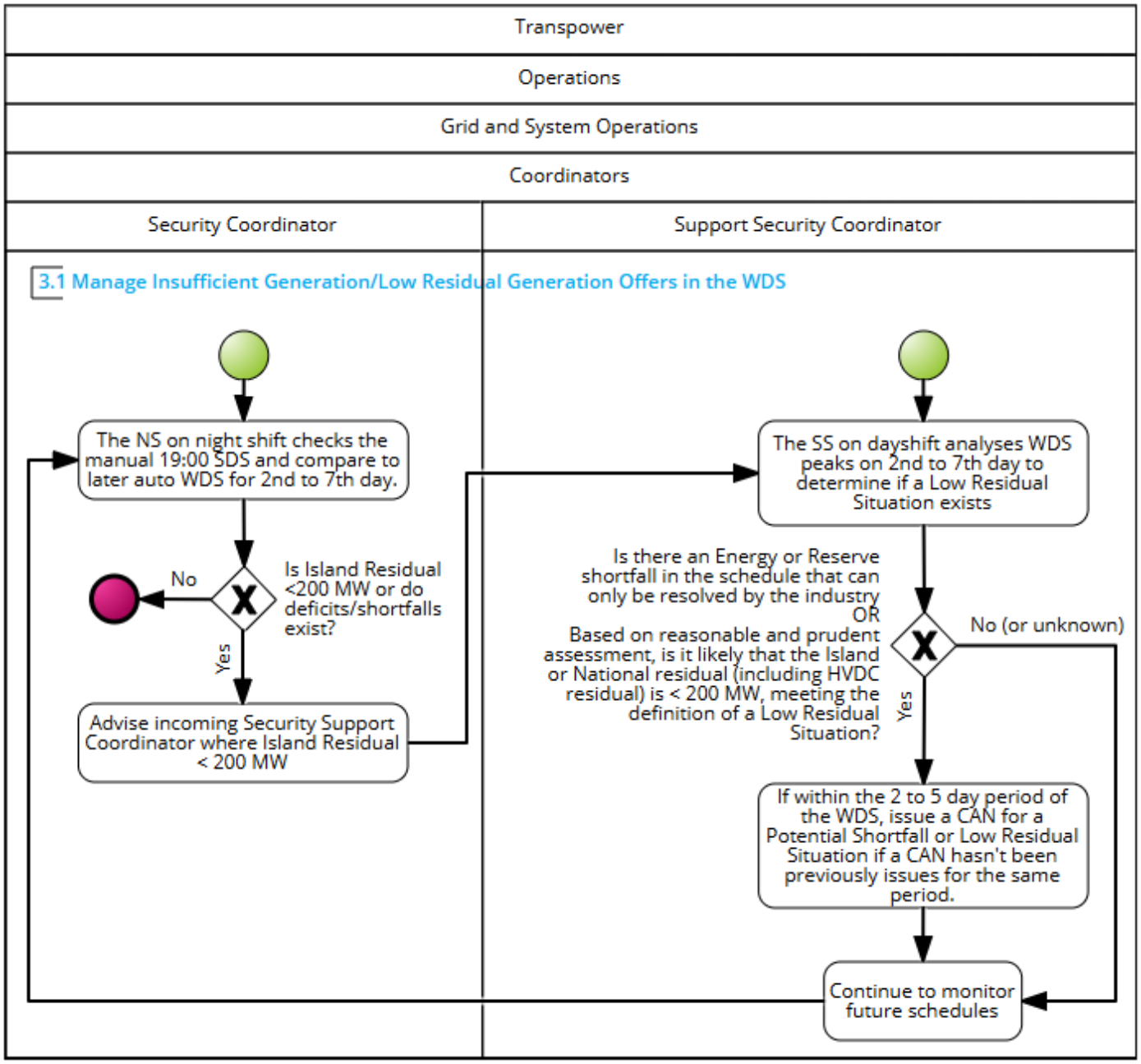

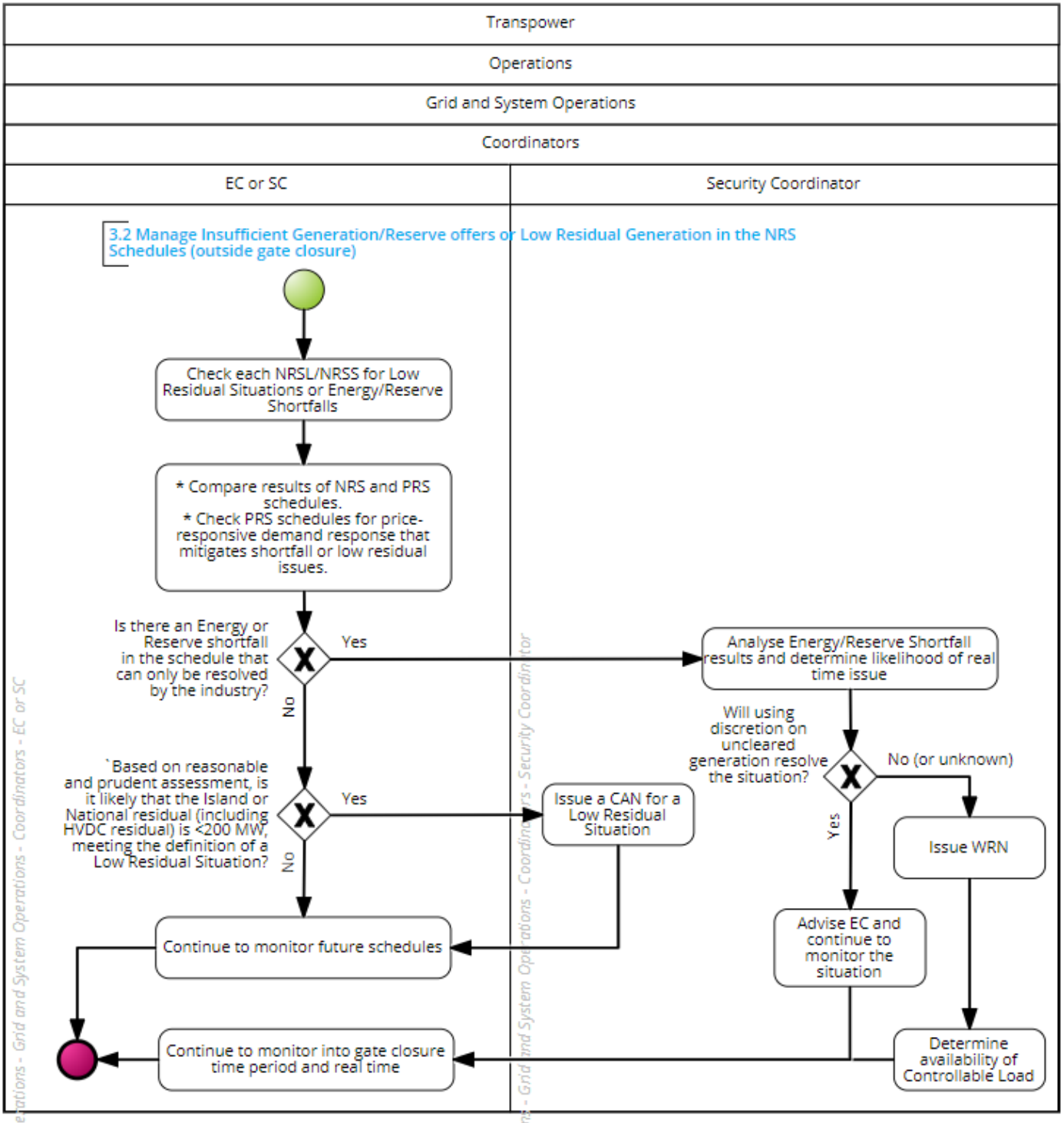

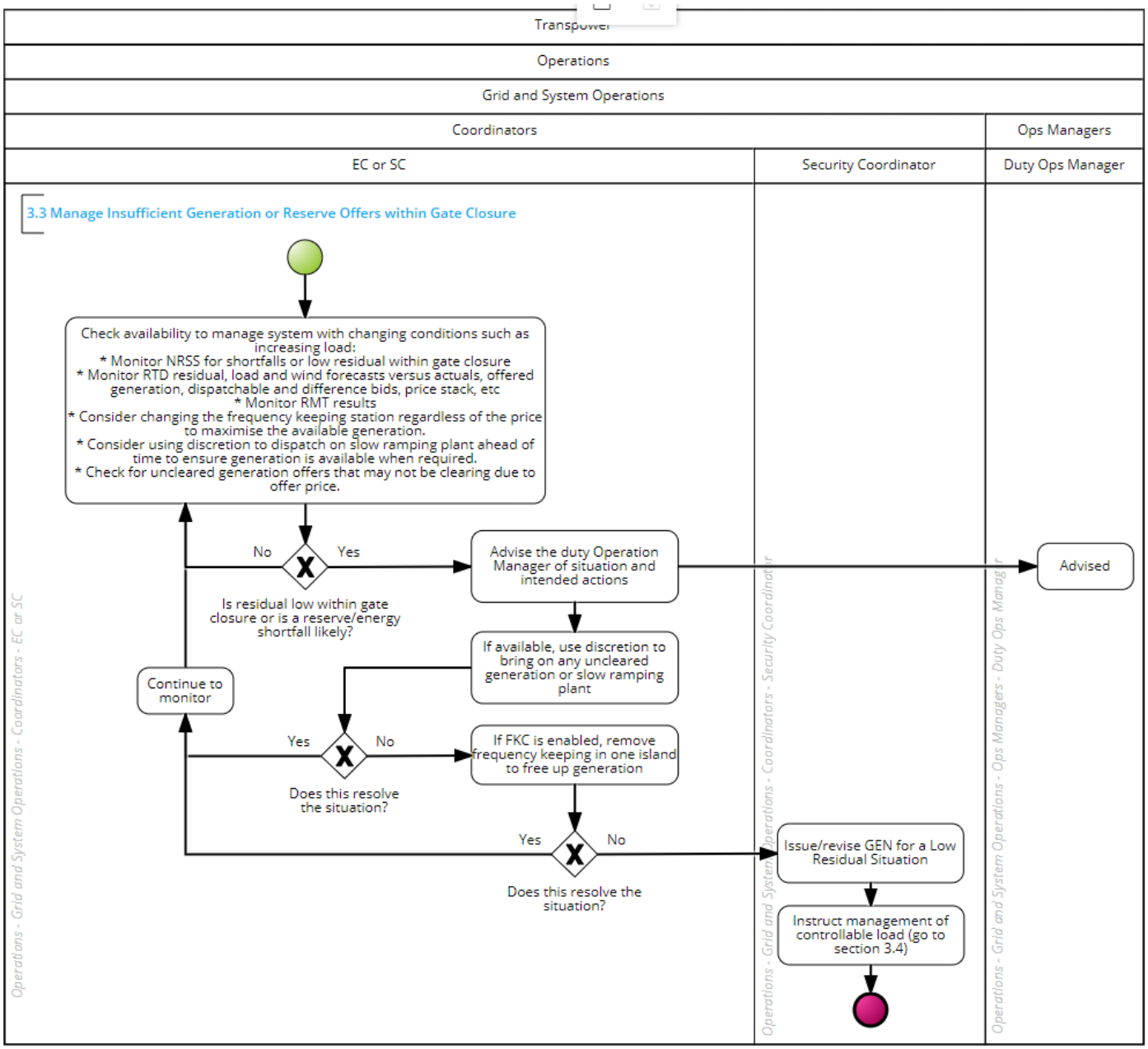

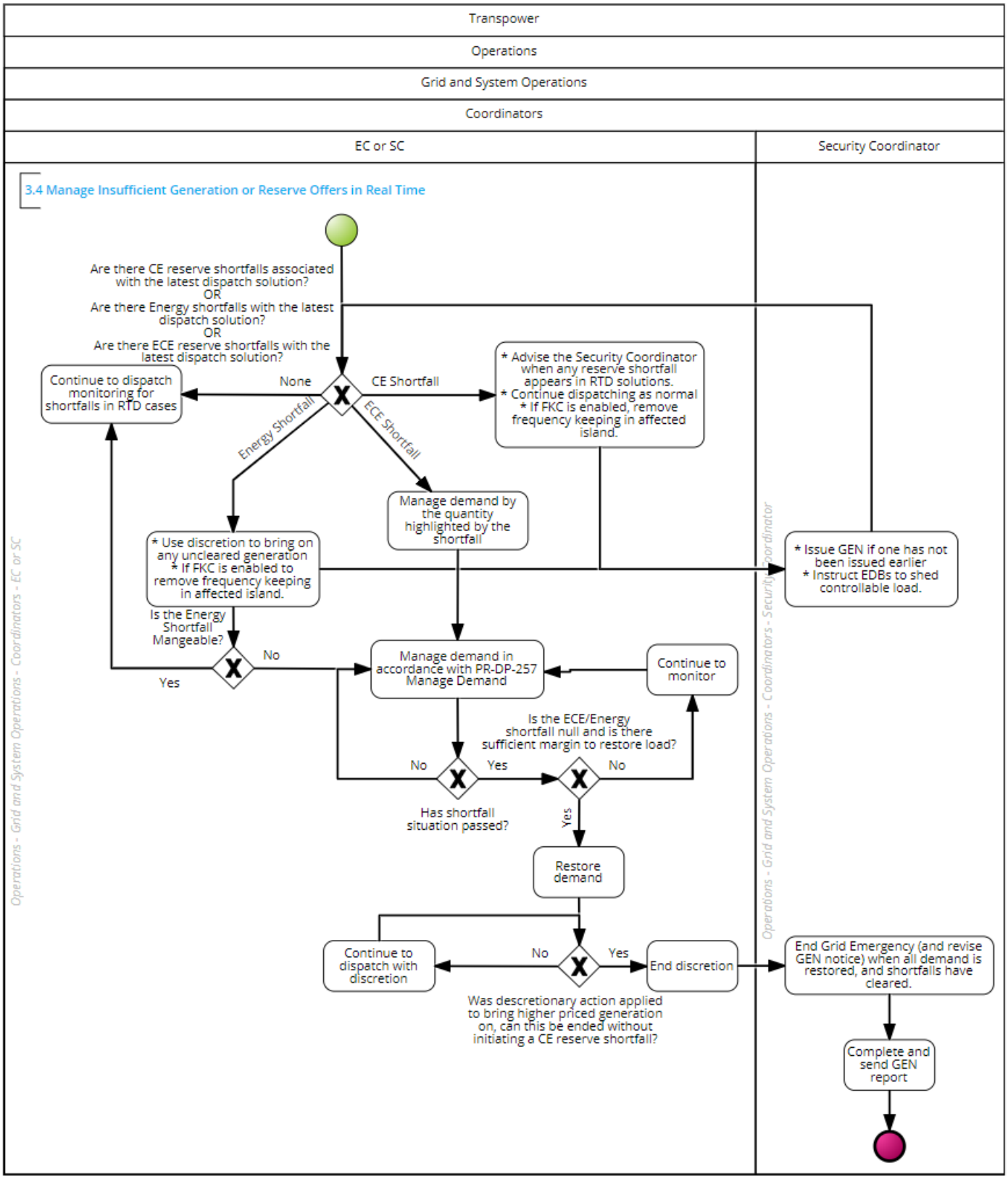

2 Purpose

Purpose and Objectives

This document describes the corrective actions to be taken to manage a situation where there is or may be insufficient generation offers to supply the load at n-1 security.

External Policy/ Rules & Regulations

The 'Code' Schedule 8.3, Technical Code B:

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Related Internal Policies, Processes and Procedures

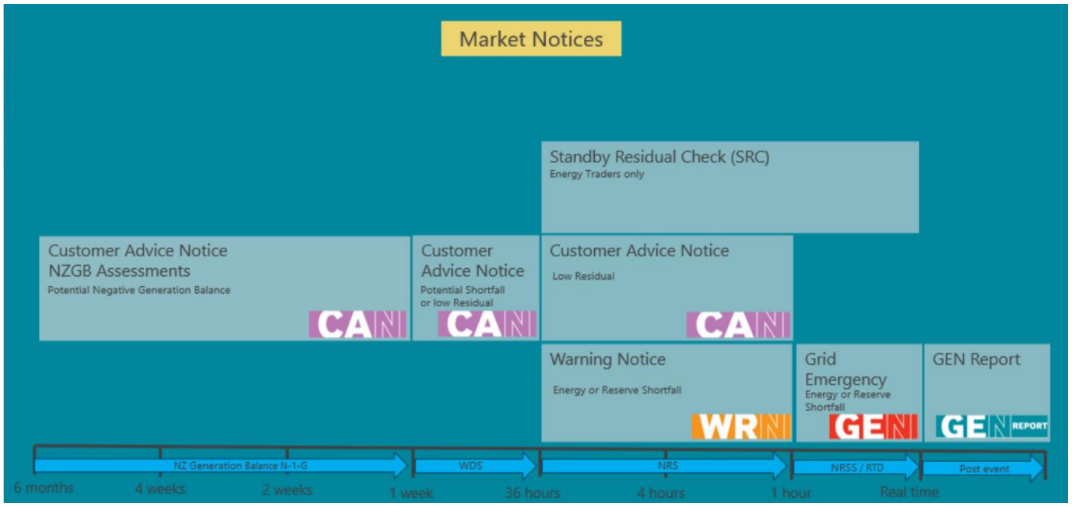
The Operations Division's operational procedures are located in the Volt DM.

Operational Documentation (Published)

- PR-DP-209 Frequency Keeper Selection
- PR-DP-224 Manage Dispatch
- PR-DP-231 Manage a System Event (including a Grid Emergency)
- PR-DP-257 Manage Demand
- PR-DP-954 Managing SPD Outage Load Correction

Summary of notices applicable to schedules

TIMEFRAME	Notice	Deficit/ Shortfall	Low Residual	Deficit/shortfall that can be resolved by discretion
Inside Gate Closure (RTD or NRSS)	GEN	✓		Not required
Outside Gate Closure (NRS)	WRN	✓		Not required
Outside Gate Closure (NRS)	CAN		✓	N/A
36hrs to 1week (WDS)	Potential CAN	✓	✓	N/A



3 Procedures

3.1 Manage Insufficient Generation/Low Residual Generation Offers in the WDS

Inputs	WDS indicators based on accurate offer/load inputs: ▪ Insufficient generation and/or reserve offers result in energy or reserve shortfall ▪ Low Residual Situation (<200 MW **Residual Gen** including HVDC residual) **Note:** Based on results it may be prudent to wait for (or initiate) a second solve for "at risk" trading periods to capture latest RMT results and allow the market to respond, prior to issuing a notice. As a general principle, a notice won't be issued based on the last two days of the WDS to allow conditions to firm up in subsequent iterations and the market to respond. Discuss with the duty operations manager, especially if deemed appropriate to issue one. **Note:** If based on manual 19:00 SDS (WDS) then wait until issues are replicated in auto WDS before considering whether a notice is required. **Note:** A CAN is ***not*** required if there is sufficient uncleared generation in the schedule that, if dispatched on with discretion in real-time, will resolve the situation. Continue to monitor into NRSL timeframe.
Outputs	Analyse WDS 2nd to 7th day peaks and if appropriate, a CAN notice for "**Potential Shortfall or Low Residual Situation" is issued (see Appendix).** **Note:** If either of these situations still exist in NRS timeframes after a Potential Shortfall or Low Residual Situation CAN has been issued, an appropriate notice is still required to be sent. This triggers EDB's requirement to submit difference bids.
Potential Shortfall or Low Residual Situation CAN	A "**Potential Shortfall or Low Residual Situation**" CAN is used to advise the industry of low residuals or shortfalls in the WDS. Such issues are often left for one or two iterations of the schedule to allow RMT to optimise results and for the market to respond. **Note:** If it is deemed prudent to advise the industry of an issue in the WDS timeframe, this CAN covers both low residuals and energy or reserve shortfalls. **Note 2:** If the issue still exists in NRS timeframes, then the relevant notice (CAN or WRN) is still to be issued.
Responsibilities	Security Coordinator, Security Support Coordinator

Instructions

Step	Action
1	**NS on night shift** Check the manual 19:00 SDS and compare to later auto WDS for 2nd to 7th day. Advise incoming security support coordinator where Island Residual < 200 MW or shortfalls exist. **SS on day shift** Analyse peaks on 2nd to 7th day of WDS to determine if a Low Residual Situation or shortfall exists.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Is there an Energy or Reserve shortfall in the schedule that can only be resolved by the industry, i.e. through increased offers, reduction of demand or return of assets?
<u>Note:</u> Check for uncleared generation offers. In real time, discretioning on such generation may resolve the situation.
Or,
Based on reasonable and prudent assessment, is it likely that the Island or National Residual Gen (including HVDC residual) is < 200 MW, meeting the definition of a Low Residual Situation?
▪ Carry out analysis as described in the appendix to determine if a Low Residual Situation exists.
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Continue to Step 3</td></tr>
<tr><td>No or unknown</td><td>Continue to monitor future schedules (step 4)</td></tr>
</table>
</td></tr>
<tr><td>3</td><td>If within the 2 to 5 day period of the WDS, issue a CAN for a “Potential Shortfall or Low Residual Situation” if a CAN hasn’t been previously issued for the same period.

<u>Note:</u> If unsure or within the last 2 days of the WDS (day 6 and 7), discuss with the duty Ops Manager first to determine if it is appropriate to issue a CAN in WDS timeframe. Due to the nature of generation/reserve offering timeframes and load forecast uncertainty, it may be prudent to wait for a second or third solve, or until NRSL timeframe before issuing a CAN.
<u>Note 2:</u> If shortfalls are caused by inaccuracies in the load forecast due to load agreements not being modelled, or generation agreements not being offered yet, then this should be discussed with the System Security Engineers prior to issuing a CAN to the industry.

See appendix for an example of a Potential Shortfall or Low Residual Situation CAN.</td></tr>
<tr><td>4</td><td>Continue to monitor future schedules.
<u>Note:</u> If a “Potential Shortfall or Low Residual Situation” CAN was issued in WDS timeframes and the conditions still exist in NRS cases, a “Low Residual Situation” CAN or WRN is required to be issued.
See appendix for an example of a Low Residual Situation CAN and WRN notices for Low Residuals or Insufficient Generation/Reserve offers.</td></tr>
</table>

3.2 Manage Insufficient Generation/ Reserve offers or Low Residual Generation in the NRS Schedules (outside gate closure)

Inputs	NRSS/NRSL indicators: ▪ Insufficient generation and/or reserve offers resulting in energy or reserve shortfall. ▪ **Low Residual Situation** (<200 MW **of Residual Gen** including HVDC residual) up to gate closure (see appendix for low residual situation definition and calculation). If there is a risk of energy or reserve shortfall due to unplanned events or uncertain system conditions, and this risk is not captured in the NRSS/NRSL prior to presenting in real time, it may be judged prudent to advise the industry as soon as possible and issue a WRN. See appendix 4.1 for more details. **Note:** A WRN is **not** required if there is sufficient uncleared generation in the schedule that, if dispatched on with discretion in real-time, will resolve the situation.
Outputs	▪ Appropriate Notices issued (CAN or WRN) **Note:** it may be prudent to add a buffer to the start/end times when issues appear in schedules to cater for uncertainties when scheduled quantities are only slightly above notice thresholds, i.e. 209 MW of residual either side of <200MW quantities. ▪ Network companies advised of situation and available controllable load established. ▪ A trigger for EDB's to submit difference bids has been initiated
Responsibilities	Energy Co-ordinator (NRSS), Security Co-ordinator (NRSL and NRSS)

Instructions

Step	Action
1	Check each NRSL/NRSS for **Low Residual Situations** or **Energy/Reserve Shortfalls** ▪ Check the Schedule Results: Schedule Outputs: Scarcity & Infeasibilities ▪ Check Schedule Results: Schedule Totals for Residual Gen (<200 MW)
2	Compare results of NRS and PRS schedules. Check PRS schedules for price-responsive demand response that mitigates shortfall or low residual issues. **Note:** CAN and WRN notices are still required if price responsive demand clears an energy/reserve shortfall or low residual situation. Industry notifications are to be based on the more conservative NRS schedules.
3	Is there an **Energy or Reserve shortfall** in the schedule that can only be resolved by increased generation/reserve offers, reduction of demand or return of assets? **Note:** Check for uncleared generation offers. In real time, discretioning on such generation may resolve the situation.

If	Then
Yes	Go to step 6
No	Continue to step 4

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Based on reasonable and prudent assessment, is it likely that the Island or National Residual Gen (including HVDC residual) is < 200 MW, meeting the definition of a Low Residual Situation?
▪ Outside of gate closure (1hr), carry out analysis to determine if a Low Residual Situation exists as described in the appendix.
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Continue to step 5</td></tr>
<tr><td>No</td><td>Continue to monitor future schedules (end of process)</td></tr>
</table></td></tr>
<tr><td>5</td><td>SC
Issue a CAN for a Low Residual Situation.
<u>Note:</u> a CAN for a Low Residual Situation is required to be issued even if a “Potential Shortfall or Low Residual Situation” CAN has already been issued off the WDS (see Appendix).
<u>A “Low Residual Situation” CAN is a formal trigger for EDB’s to submit difference bids via WITS or phone NCC directly with Controllable load values for the timeframe requested.</u>
<u>(A CAN may be issued up to gate closure).</u>
<u>Note 2:</u> A “Low Residual Situation” CAN should be issued nationally unless the situation is only applicable to one island. For example, if the HVDC is on outage and there is less than 200 MW of residual NI generation, but ample SI generation, then it is a North Island low residual situation only.
<u>Note 3:</u> A previously issued CAN should be escalated to a WRN if the situation deteriorates to where energy or reserve shortfall now exist.
See appendix for an example of a Low Residual Situation CAN
Continue to monitor future schedules</td></tr>
<tr><td>6</td><td>SC
Analyse Energy/Reserve Shortfall results and determine likelihood of a real time issue transpiring:
▪ What sort of Reserve Shortfall is it?
▪ Check the offered generation and LF trend. Is the forecast accurate? Are there any changes to generation offers causing the Reserve shortfalls?
▪ Are there imminent generation/reserve offer changes that will alleviate the shortfall?
▪ Check RMT results (Risk, NFRs and Pole Ramp-up etc).
▪ Check for uncleared generation and be prepared to discretion it on if it solves the shortfall.</td></tr>
<tr><td>7</td><td>Will using discretion on uncleared generation resolve the situation?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>No or unknown</td><td>Continue to step 8</td></tr>
<tr><td>Yes</td><td>Advise EC and continue to monitor the situation</td></tr>
</table></td></tr>
<tr><td>8</td><td>SC – Issue Warning Notice.
Issue a Warning Notice (WRN)
See appendix for examples of WRN notices for Insufficient Generation/Reserve offers.
Continue to step 9</td></tr>
</table>

Step	Action
9	**SC - Determine availability of Controllable Load** Check for Difference Bids for any Controllable Load value submitted via WITS and expect calls from any other EDB's. You will need to proactively follow up with EDB's if they have not submitted Controllable Load values by these two methods. Capture controllable load data in the Demand Management Spreadsheet (See Appendix 4.1) Advise network companies of situation and potential need for reduced demand and to be prepared for a possible load shed instruction. Information gathering should also include IL portion of controllable load. Advise the duty Operations Manager of situation and controllable load options
10	Continue to monitor into gate closure time period and real time

3.3 Manage Insufficient Generation or Reserve Offers Within Gate Closure

Inputs

- Reserve or Energy scarcity in NRSS schedules
  - **CE, ECE or Energy shortfall (SF)** values within gate closure timeframe in the NRSS.
  - MOI alarms indicating reserve or energy scarcity quantities.
- **Risk of having, or expecting, no residual generation in real time:**
  For example, low residual within gate closure, which may be exacerbated by:
  - loss of generation (tripping or bona-fide changes).
  - transmission constraint (including HVDC).
  - loads higher than forecast, and/or still not at the peak
  - changes in intermittent generation

Note: A Grid Emergency declaration (GEN) is **not** required if there is sufficient uncleared generation available that, if dispatched on with discretion, will resolve the situation.

Note: Advise duty Operations Manager prior to issuing any formal notice if time permits.

Outputs

- System security maintained.
- Grid emergency is declared (if appropriate).
- Generation, reserve and transmission offers are increased (where possible).
- Uncleared generation discretioned on if offered.
- Controllable load managed (if appropriate).

Note: An instruction to manage controllable load can be given within gate closure in expectation of, or potential for, a CE deficit (or worse) regardless of a deficit being in the NRSS or not. This is a judgement decision made by the security coordinator based on prudent assessment of risk and uncertainty of impending system conditions.

- Demand management instructions issued as required.

Note: There are two GEN templates for insufficient offers. One is for requesting demand reduction, and the other is when load reduction is instructed.
An instruction could have been verbally given, and the notice is a follow up, revision, or could be the initial instruction to reduce demand.

Responsibilities

Energy Coordinator, Security Coordinator

Instructions

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Check ability to manage system with changing conditions such as increasing load:
Monitor NRSS for shortfalls or low residual within gate closure, e.g. <=100 MW residual leading up to a peak may be a good indicator of potential issues.
Monitor RTD residual, load and wind forecasts versus actuals, offered generation, dispatchable and difference bids, price stack etc.
Monitor RMT results (Risk, NFRs and Pole Ramp-up etc).
Consider changing the frequency keeping station regardless of the price to maximise the available generation (if the offered station FK control maximum is lower than stations energy offer, this will limit the energy dispatch for a frequency keeper)
Consider using discretion to dispatch on slow ramping plant ahead of time to ensure generation is available when required (or determining when this should happen).
Check for uncleared generation offers that may not be clearing due to offer price (this can be discretioned on if required).</td></tr>
<tr><td>2</td><td>Is residual low within gate closure or is a reserve/energy shortfall likely?
Indicators include:
NRSS schedule indicates an energy or reserve shortfall for the current or next trading period.
Load is anticipated to be above forecast which could cause energy or reserve shortfall.
Intermittent generation is trending below levels forecast in the schedule and the difference is expected to cause energy or reserve shortfall.
Generation has decreased or tripped, and the change in availability is expected to cause energy or reserve shortfall.
Note: If only low residual in schedules the security coordinator can continue with the process, or not, based on their assessment of shortfall risk. Managing controllable load or not (and riding through a very low residual situation), are acceptable outcomes from this assessment.<table><tr><th>If</th><th>Then</th></tr><tr><td>No</td><td>Go back to step 1</td></tr><tr><td>Yes</td><td>Continue to step 3</td></tr></table></td></tr>
<tr><td>3</td><td>Advise the duty Operation Manager of situation and intended actions</td></tr>
<tr><td>4</td><td>If available, use discretion to bring on any uncleared generation or slow ramping plant
Note: offer price is not a factor in using discretion. All offered but uncleared generation can be discretioned on if feasible.
Does this resolve the situation?<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Return to step 1. Continue to monitor</td></tr><tr><td>No or unknown</td><td>Continue to step 5</td></tr></table></td></tr>
</table>

Step	Action
5	If FKC is enabled, remove frequency keeping in one island to free up generation. (Refer to PR-DP-209 Frequency Keeper Selection, Section 3.6). Does this resolve the situation? **If** / **Then** Yes / Return to step 1. Continue to monitor No or unknown / Continue to step 6
6	**SC** - **Issue/revise GEN.** ▪ Refer PR-DP-231 Manage a System Event (including a Grid Emergency) ▪ Refer PR-DP-257 Manage Demand ▪ Advise the Operations Manager **Note:** In addition to requests for generation and/or transmission capacity, a GEN may include a **request** for load reduction ***or*** an **instruction** for immediate load reduction. There are now GEN templates for either requesting or instructing load. Use the appropriate notice. Ensure any manually typed entry in a written GEN accurately captures the action required (E.g., if *only* controllable load is required to be shed, this should be clearly stated). **Note:** There is no need to declare a GEN in situations where plant is still ramping (e.g. WHI) and any shortfall will be mitigated once they're on their setpoint.
7	**Instruct management of controllable load** ▪ This may or may not include controllable load dispatched as IL. SC is to determine the quantity available and instruct off required amount. ▪ Refer to PR-DP-257 Manage Demand Go to section 3.4

3.4 Manage Insufficient Generation or Reserve Offers in Real Time

Inputs

- Reserve or Energy scarcity in RTD schedules
  - CE, ECE or Energy shortfall (SF) values on dispatch tooltray
  - MOI alarms indicating reserve or energy scarcity quantities.
  - Scarcity or infeasibility values for RTD schedules on Scarcity & Infeasibilities MOI display.
- Non-forecasted scarcity/shortfalls may occur, caused by:
  - Loss of generation (tripping or bona-fide changes).
  - Loads higher than forecast.
  - Changes in intermittent generation
- Frequency may be declining as demand increases with insufficient generation to meet demand.

Note: A Grid Emergency declaration (GEN) is **not** required if there is sufficient uncleared generation available that, if dispatched on with discretion, will resolve the situation.

Outputs

- System security maintained.
- Uncleared generation discretioned on if offered.
- Grid emergency declared (if appropriate).
- Controllable load managed and/or demand management instructions issued as required.

Responsibilities

Energy Coordinator, Security Coordinator

Instructions

Step	Action	
1	**Are there?**	**Then**
	CE reserve shortfalls associated with the latest dispatch solution? ▪ Energy Reserve Dispatch Tooltray > CE SF field ▪ **Note:** The quantity of either FIR or SIR shortfall (whichever is worst) is displayed. ▪ MOI alarms will alert to CE reserve shortfalls in RTD cases.	Go to step 2
	Energy shortfalls with the latest dispatch solution? ▪ Energy Reserve Dispatch Tooltray > Energy SF field. ▪ MOI alarms will alert to Energy shortfalls in RTD cases.	Go to step 3
	ECE reserve shortfalls with the latest dispatch solution? ▪ Energy Reserve Dispatch Tooltray > ECE SF field ▪ **Note:** The quantity of either FIR or SIR shortfall (whichever is worst) is displayed. ▪ MOI alarms will alert to ECE reserve shortfalls in RTD cases.	Go to step 4
	None of the above	Continue monitoring RTD

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>
CE Reserve Shortfall
EC
▪ Advise the Security Coordinator when any reserve shortfall appears in RTD solutions.
▪ Continue dispatching as normal. The RTD solution will be feasible for energy as long as there's sufficient generation offered to meet demand. SPD will reduce the reserves being dispatched to free up generation (subject to the reserve scarcity price, number of risk setters and whether the shortfall is combined FIR + SIR).
▪ Use discretion to bring on any uncleared generation. It is possible to have FIR or SIR shortfall and generation priced above the reserve scarcity price not clearing.
▪ If FKC is enabled, remove frequency keeping in an island to free up generation
SC
▪ Issue GEN if one has not been issued earlier.
▪ Instruct EDBs to shed controllable load (if not already advised to do so)
<u>Note:</u> at the discretion of the SC, controllable load management doesn't have to be instructed if the shortfall is minimal, i.e. a few MW and fleeting (at or over the peak and expected to be for less than 5 or 10 minutes).
Return to step 1 and continue to monitor
</td></tr>
<tr><td>3</td><td>
Energy shortfall
SC (if not already done)
▪ Issue GEN
▪ Instruct EDBs to shed controllable load
EC (if not already done)
▪ Use discretion to bring on any uncleared generation
▪ If FKC is enabled remove frequency keeping in affected island to free up generation.
Is the Energy Shortfall manageable? i.e:
▪ Can the shortfall be managed within the frequency band?
▪ Is system frequency stable?
▪ Is there ramping plant that will resolve the situation?
▪ Has demand peaked and is about to decline?
<u>Note:</u> Energy shortfalls can be dispatched, but the system frequency must be monitored closely as the shortfall is indicative that there is insufficient generation to meet demand.
<u>Note:</u> At the discretion of the SC, load management doesn't have to be instructed if the shortfall is minimal, i.e. a few MW and fleeting (at or over the peak and expected to be for less than 5 minutes), and system conditions are manageable.
<u>Note</u>: It's possible a scheduled energy shortfall will increase as increased reserves are scheduled and generation is reduced to provide those reserves. Consider using a negative PSD to clear or reduce the energy shortfall quantity in the solution and not dispatching generation down if possible, or via the use of discretion to maintain generation output (noting load management may still be required).
A reduction in load will be reflected in RTD so it's likely there won't be any energy shortfalls if load has been shed. The use of the PSD can also achieve this if appropriate.
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Energy shortfall is manageable</td><td>Continue to monitor closely</td></tr>
<tr><td>Energy shortfall is not manageable</td><td>Go to step 5</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>ECE Reserve Shortfall
Manage demand by the quantity highlighted by the shortfall.
e.g., if the ECE shortfall is 26 MW then 26 MW would need to be managed as applicable.
<u>Note:</u> While an ECE shortfall can be dispatched, an ECE scarcity price in a schedule is indicative that there is likely a modelling error. Price publication from affected schedules will automatically be disabled. Investigation of the cause should be undertaken.
<u>Note:</u> Coordinators will need to be aware of system and generator status. If the load has dropped off slightly since the solution, then small amounts of shortfall might mean the ECE risk is being covered as required. Check TSAT.
Go to step 5 to manage demand.</td></tr>
<tr><td>5</td><td>Instruct Demand Management
Manage demand in accordance with PR-DP-257 Manage Demand
Where time permits, all controllable load should be shed prior to reducing real load (including that which is dispatched as IL, except during an ECE reserve shortfall where reserve must maintained).</td></tr>
<tr><td colspan="2">Proceed with steps below once shortfall situation has passed</td></tr>
<tr><td>6</td><td>Is the CE/ECE Reserve or Energy shortfall null and is there sufficient margin/residual to restore load?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Go to step 7</td></tr>
<tr><td>No</td><td>Continue to monitor. Shed more demand if required.</td></tr>
</table></td></tr>
<tr><td>7</td><td>Restore Demand
See PR-DP-257 Manage Demand</td></tr>
<tr><td>8</td><td>If discretionary action has been applied to bring higher priced generation on, can this be ended without initiating a CE reserve shortfall (allow some margin)?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>End the discretion. Continue to step 9</td></tr>
<tr><td>No</td><td>Continue to dispatch with discretion</td></tr>
</table></td></tr>
<tr><td>9</td><td>End Grid Emergency (and revise GEN notice) when all demand is restored, and shortfalls have cleared.</td></tr>
<tr><td>10</td><td>Complete and send GEN Report.</td></tr>
</table>

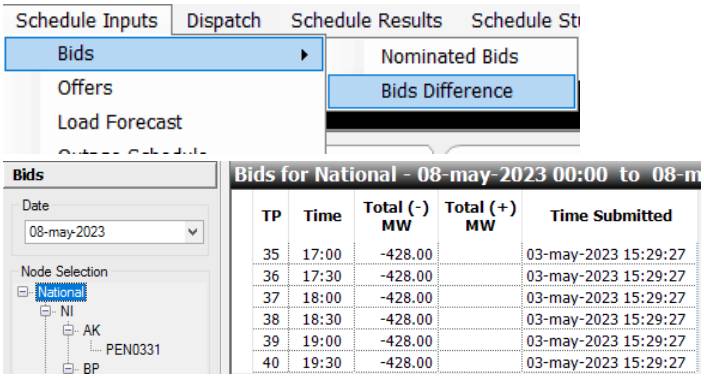
4 Appendix

Further Information Controllable load and Difference Bids

In accordance with the EA Code, an EDB must (If requested as part of issuing a CAN or WRN) submit the amount of their controllable load to the System Operator (excludes any controllable load offered as IL). This can be done by:

- phone to NCC (typically smaller EDB's)
- Electronically via WITS as Difference Bids

The information can be accessed from Schedule Inputs > Bids Difference



Company (EDB) Controllable load to PNODE list:

North Island	Node	Notes
Top Energy	KOE1101	Phone only
Northpower	MPE1101	Via WITS
Vector	PEN0331	Via WITS
Counties Energy	BOB1101	Via WITS
WEL Networks	HAM0331	Via WITS
Waipa Networks (Operated by WEL)	CBG0111	Via WITS included in WEL bid
The Lines Company	HTI0331	Phone only
Horizon Networks	KAW0111	Phone only
Eastland Networks	TUI1101	Phone only
Unison Networks	WTU0331	Via WITS
Centralines (Operated by Unison)	WPW0331	Via WITS included in Unison bid
Scanpower	DVK0111	Phone only
Powerco	BPE0331	Via WITS
Electra	PRM0331	Via WITS
Wellington Electricity	WIL0331	Via WITS
South Island	Node	Notes
Orion Group (USI load manager)	ISL0661	Via WITS
Alpine Energy	TIM0111	Via WITS included in Orion bid
Buller Electricity	ORO1101	Via WITS included in Orion bid
EA Networks	ASB0661	Via WITS included in Orion bid
Westpower	HKK0661	Via WITS included in Orion bid
MainPower	SBK0661	Via WITS included in Orion bid
Network Tasman (includes Nelson Electricity) NGOC has delegated authority	STK0331	Via WITS included in Orion bid
Marlborough Lines	BLN0331	Phone only
Aurora Energy	SDN0331	Via WITS
Network Waitaki	OAM0331	Phone only
PowerNet	INV0331	Via WITS

Demand Management Spread Sheet

Operational Forms Link:

OP: Realtime Team Administration - Operational Forms - All Documents (sharepoint.com)

Demand Management Spreadsheet direct link:

Controllable Load Tally Sheet Template .xlsx

- Open Template and "Save As" a new document for the time frame required.
- All coordinators can transfer bid values into the spread sheet. This reduces the necessity for a call about EDB's controllable load value in scheduling time. However, once a GEN has been issued, if time allows the coordinators should verbally confirm controllable load values to more accurately reflect the amount of controllable load available.

SPD Calculations

For CE risks, SPD will mostly clear a reserve shortfall before it clears an energy shortfall (subject to the reserve scarcity price, number of risk setters and whether the shortfall is combined FIR + SIR). SPD clears most available reserves and makes up any shortage with a reserve shortfall (**this does not include IL**). This solution can be dispatched.

Scarcity prices provide appropriate signals to the market, reflecting the shortfall/scarcity situation.

The key elements of scarcity pricing are:

- Energy and reserve scarcity prices will be produced in real time and are used for settlement.
- Energy and reserve scarcity prices will be included in the Real-Time Dispatch (RTD) schedule as well as in the forward schedules.
- Energy scarcity prices will reflect both generation and transmission constraints and apply at a nodal level.
- Reserve scarcity prices will apply at an island level and represent the value of reserve when there is a reserve shortfall affecting FIR and/or SIR.
- The ECE scarcity price is set at $800,000MWh. This is to ensure energy shortfall is always scheduled before an ECE shortfall. An ECE scarcity price in a schedule is indicative that there is likely a modelling error. Dispatches can still be sent but price publication from affected schedules will automatically be disabled. Investigation of the cause should be undertaken.

SPD incorporates the following functions:

- SPD reserve scarcity pricing is split into CE FIR & SIR.

Reserve scarcity	Price ($/MWh)
CE SIR	6,500
CE FIR	7,000

- Energy scarcity prices represent the value of the shortfall

Energy scarcity	Price ($/MWh)
First 5% of demand	21,000
Next 15% of demand	31,000
Remaining 80% of demand	50,000

- SPD will clear available CE reserve before flagging an energy shortfall.
- SPD could also start to restore reserves once into an energy shortfall. This could result in generation being reduced to provide reserves.

Low Residual Situations

A **Low Residual Situation** is defined as being when Island **Residual Gen** is less than **200** MW, including HVDC residual.

The purpose of declaring a Low Residual Situation is to advise that we are close to energy or reserve shortfalls and allow for market participants to make informed decisions based on potential impacts.

Residuals figures for all schedules can be found in the Market System Schedule Totals display (MOI>Schedule Results>Schedule Outputs>Schedule Totals Display).

The following formula may be used to determine how much Island Residual is available for each island. This is only to be used as a guide, and there are other factors to consider (see below).

With minimal participation in DD/DNL/DNG (currently just Solar Zero 24MW NI and 6MW SI) and until these products are proven to be reliable, the formula is:

Island Residual value = Residual Gen + HVDC Residual

Island	Total	TP 13
		06:00
NI	Total Load	1905.7
NI	Total Residual (Gen + DD + DNG + DNL)	1588.0
NI	HVDC Residual	507.9
NI	Gen Available	4080.2
NI	Gen Scheduled	2492.2
NI	Residual Gen	1588.0
NI	DD Available	0.0

Other factors to consider:

- Is the generation wind forecast likely to be accurate given recent experience, that day's conditions and weather forecast?
- Is there a lot of wind scheduled, which could increase the impact of inaccurate forecasting?
- Will AC transmission limitations or constraints exist that could constrain generation off that makes up part of the remaining island residual?
- Are both island Load Forecasts tracking accurately in all load areas?
- What is the makeup of remaining residual generation? (e.g. is it slow-ramping, or potentially unavailable due to transmission constraints)
- Is Hz keeping Ctrl Max constraining off potential generation?
- Are there any outages that could be recalled that are contributing to generation being constrained or unavailable?
- Is the instantaneous peak likely to be higher than the forecast ½ hour average?
- Could HVDC transfer be increased if more SI generation weas offered?

Reasonable and prudent judgement must be used in order to determine if a **Low Residual Situation** exists.

Note: Once a Low Residual Situation CAN has been issued, it is not a requirement to repeat for subsequent schedules for the same period(s), if the Low Residual Situation still exists. Further notification is only required if the situation escalated to a WRN or GEN.

4.1 Grid Emergency Notice "Request" Template

This formal notice is issued in accordance with the 'Code' - Part 8, Schedule 8.3, Technical Code B - Emergencies.

TRANSPOWER

Grid Emergency Notice

To:	GEN NZ Participants	**From:**	The System Operator
Sent:		**Telephone:**	0800 488 500
Ref:	6268574574	**Email:**	NMData@transpower.co.nz

Revision of:

Cause: Insufficient Generation offers National

Region or GXP affected: North Island, South Island

Starting:

Ending:

This is a New Zealand-wide emergency. The System Operator advises there is insufficient generation and reserve offers to meet demand and provide N-1 security for a contingent event.

Consequences on the power system:

Reduced reserves for the CE risk may be dispatched, and/or the system operator may need to manage demand.

For the period above participants are requested to:

Increase energy offers	National
Increase instantaneous reserve offers	National
Decrease demand by: using controllable load (that is not offered as instantaneous reserve) and increasing distributed generation	National
Increase transmission offers where generation may be constrained	National

Consequences if insufficient responses by participants:

If participant response across the country is insufficient, the system operator may manage demand to alleviate the Grid Emergency. The system operator may instruct connected parties to reduce demand or the grid owner to disconnect feeders without further notice to connected parties.

For more information contact the Security Coordinator on 0800 488 500

This notice is issued in accordance with Technical Code B - Emergencies, Schedule 8.3, Part 8

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

Transpower New Zealand Ltd The National Grid

4.2 Grid Emergency Notice "Instruct" Template

TRANSPOWER

Grid Emergency Notice

To:	GEN NZ Participants	**From:**	The System Operator
Sent:		**Telephone:**	0800 488 500
Ref:	6268574574	**Email:**	NMData@transpower.co.nz

Revision of:

Cause: Insufficient Generation offers National

Region or GXP affected: North Island, South Island

Starting:

Ending:

This is a New Zealand-wide emergency. The System Operator advises there is insufficient generation and reserve offers to meet demand and provide N-1 security for a contingent event.

Consequences on the power system:

Reduced reserves for the CE risk may be dispatched, and the system operator needs to manage demand.

For the period above connected parties are instructed to:

Decrease demand by: X% across all connections.

The system operator requires an immediate XX MW's load reduction across the country to avoid further consequences.

Consequences if insufficient responses by participants:

If participant response across the country is insufficient, the system operator may manage further demand to alleviate the Grid Emergency. The system operator may instruct connected parties to reduce greater demand quantities or the grid owner to disconnect feeders without further notice to connected parties.

For more information contact the Security Coordinator on 0800 488 500

This notice is issued in accordance with Technical Code B - Emergencies, Schedule 8.3, Part 8

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

Transpower New Zealand Ltd The National Grid

4.3 Warning Notice Template

Warning Notice

To:	WRN NZ Participants	**From:**	The System Operator
Sent:		**Telephone:**	0800 488 500
Ref:	6669429651	**Email:**	NMData@transpower.co.nz

Revision of:

Cause:	Insufficient Generation offers to meet demand National
Region or GXP affected:	National
Starting:	
Ending:	

The System Operator advises there is a risk of insufficient generation and reserve offers to meet demand and provide N-1 security for a contingent event.

Consequences on the power system:

Reduced reserves for the CE risk may be dispatched, and/or the system operator may need to manage demand.

For the period above you are requested to:	**At:**
Increase energy offers	National
Increase instantaneous reserve offers	National
Update non-conforming load bids	National
Decrease demand by: using controllable load (that is not offered as instantaneous reserve) and increasing distributed generation	National
Increase transmission offers where generation may be constrained	National

Consequences if insufficient responses by participants:

If participant response across the country is insufficient, the system operator will manage demand to alleviate the Grid Emergency. The system operator may instruct the grid owner to disconnect feeders without further notice to connected parties.

System Operator will issue a GEN which may require participants to shed load to avoid disconnection or further system consequences.

For more information contact the Security Coordinator on 0800 488 500

Up to date island residual information is available on the WITS website.

More information on the System Operator's procedures for low residuals or insufficient energy and reserves is here.

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

Transpower New Zealand Ltd The National Grid

4.4 Customer Advice Notice Template (Low Residual Situation)

Customer Advice Notice

To:	CAN NZ Participants	**From:**	The System Operator
Sent:		**Telephone:**	0800 488 500
Ref:	6669469483	**Email:**	NMData@transpower.co.nz

Revision of:

Low Residual Situation

Affected dates and times:

DD Mmm YYYY HH:MM - HH:MM

Based on the latest NRS, the System Operator advises that **[Region (National, North Island, South Island)]** residual generation is less than 200 MW for the above times.

For affected times, participants are requested to:

- Ensure energy, wind generation, reserve offers, and load bids are accurate.
- Increase energy and reserve offers.
- Submit difference bids for controllable load (for the identified time plus 1 hour either side).
- Increase transmission offers where generation may be constrained.

Process and further requests, if situation worsens:

This CAN gives you early notice that if the situation worsens we may have insufficient generation to meet demand and cover reserves for a contingent event. If insufficient generation and reserve offers appear in the schedules, we will send:

- A Warning notice (WRN) which will make further requests to participants to help resolve the situation. This could happen up to gate closure (1 hour ahead of real-time).
- A Grid Emergency Notice (GEN) within one hour of real-time which will make further requests to connected parties to take action to alleviate the situation.

For more information, or if you are aware of information that could impact system security, please advise the Security Coordinator on 0800 488 500.

Up to date island residual information is available on the WITS website

For further information on procedures for low residuals or subsequent insufficient energy and reserves see this link here.

Media enquiries, call 021 195 8613 (please do not text)

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

Transpower New Zealand Ltd The National Grid

4.5 Customer Advice Notice Template (Potential Shortfall or Low Residual Situation)

TRANSPOWER CAN

Customer Advice Notice

To:	CAN NZ Participants	**From:**	The System Operator
Sent:		**Telephone:**	0800 488 500
Ref:	6669429648	**Email:**	NMData@transpower.co.nz

Revision of:

Potential Short Fall or Low Residual Situation

Affected Dates and Times:

DD Mmm YYYY HH:MM - HH:MM

The System Operator advises that a **[Region (National ; North Island ; South Island)]** energy shortfall or low residual generation has been identified in the week ahead schedule (WDS) for the above times.

For affected times, participants are requested to:

- Ensure energy, wind generation, reserve offers, and load bids are accurate.
- Increase energy and reserve offers.
- Increase transmission offers where generation may be constrained.

Process and further requests, if the situation is not resolved or worsens:
This CAN gives you early notice of a pending situation. If insufficient generation and reserve offers appear in the NRS schedules (36 hours ahead of real-time), we will send:

- A Low Residual Customer Advice Notice (CAN) if national residual generation is less than 200 MW. The CAN will make further requests to participants to help resolve the situation. This could happen up to gate closure (36 hours to 1 hour ahead of real-time).
- A Warning notice (WRN) if an energy or reserve shortfall is identified or likely. The WRN will make further requests to participants to help resolve the situation. This could happen up to gate closure (36 hours to 1 hour ahead of real-time).
- A Grid Emergency Notice (GEN) if an energy or reserve shortfall is identified or likely within one hour of real-time. This will make further requests to connected parties to take action to alleviate the situation.

For more information, or if you are aware of information that could impact system security, please advise the Security Coordinator on 0800 488 500.

Up to date island residual information is available on the WITS website.

For further information on procedures for low residuals or subsequent insufficient energy and reserves, see this link here.

Media enquiries, call 021 195 8613 (please do not text).

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

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5 Document Information

5.1 Copyright Information

5.2 Document Feedback

If you find an error in this document or wish to provide feedback about any improvements please submit feedback here or use the QR code.

5.3 Revision History

Link to document review survey https://forms.office.com/r/sYbiNMKMwY

SharePoint Revision	Date	Change	Section
14.0	20/06/2023	Significant rewrite of most sections for clarification. NRSS and NRSL sections combined into one. Steps added for managing controllable load in 3.1. No longer issue WRN of WDS, New WDS CAN Potential shortfall. Can discretion on all generation to avoid shortfalls. [CT]	
15.0	28/07/2023	Updated to capture energy shortfall situations where reserves could be scheduled, and generation reduced. Clarified Residual Gen as quantity to use for low residual assessments [TC, CT]	
16.0	8/7/2024	**BAU Review:** Incorporate Winter 2023 Initiatives TI-DP-1051 [DM]	
17.0	14/11/2024	**BAU Review:** Updated WRN notice template to replace discretionary demand with controllable load (with reference to difference bids) Note: SC discretion for shedding controllable load for likely CE deficits or small/short deficits remain highlighted	
18.0	8/4/2025	**BAU Review:** Updated scarcity prices	
19.0	13/5/2025	**BAU Review:** Documented the ability to add a buffer to notice start/end times when appropriate, and a general principle to only issue Potential Shortfall and Low Residual notices based on the first 2-5 days of the WDS	
20.0	05/06/2025	**BAU Review:** Addition of two GENs. One for Instructing load reduction and one for requesting and update of CAN templates.	`
21.0	25/9/2025	**BAU Review:** Minor edit. Notice templates updated. [BW]	

5.4 Metadata

Document ID Information

Document ID number:	PR-DP-0264
Document Title:	PR-DP-264 Manage Insufficient Generation Offers and Reserve Shortfalls
Document Type:	Procedure
SharePoint Version:	V21
Document Status:	Issued
Severity of Consequences:	Moderate
Frequency of use	Daily
Level of Risk:	High

DMS Structure

Macro-Process:	Dispatch (DP)	
Process:		
Process Hierarchy:	*L1:* 03 Realtime	*L2:* 07 Manage Dispatch
	L3: 07-05 Manage Reserves	*L4:* [Business Model L4]
Document Complexity Rating (days)	21 days	

Document Control

Business Group Owner:	Realtime		
Prepared by (Writer/Reviewer):	Brett Whyte		
Peer Reviewer	[Peer Reviewer]		
Approved by (Owner 1):	Tim Connolly		
Approved by (Owner 2):	Click or tap here to enter text.		
Approved by (Owner 3):	Click or tap here to enter text.		
Published Date: *(only changed by Doc Administrator)*	25/09/2025		
Update Type:	BAU Review		
Next Review Date:	Click or tap to enter a date.		
Review Period:	18 Months		
Primary User Group(s):	NCC		
Secondary User Group(s):	Click or tap here to enter text.		
Hardcopy Kept in:	string;#RT Dispatch===Energy		
To be published on TP Web site	true	Web Area:	N/A