Operations Division

PR-DP-257 Manage Demand and Insufficient Generation Offers

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.

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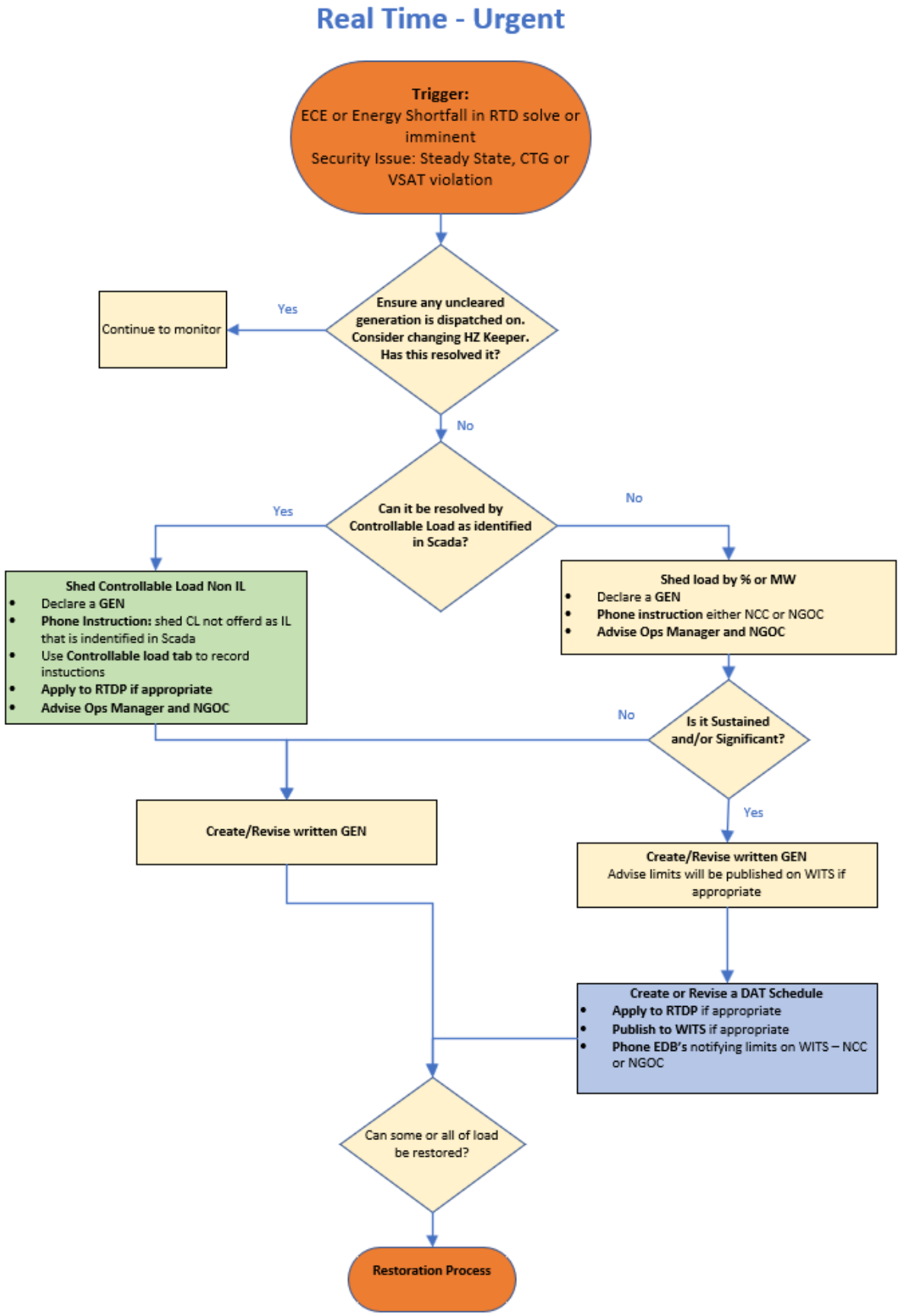
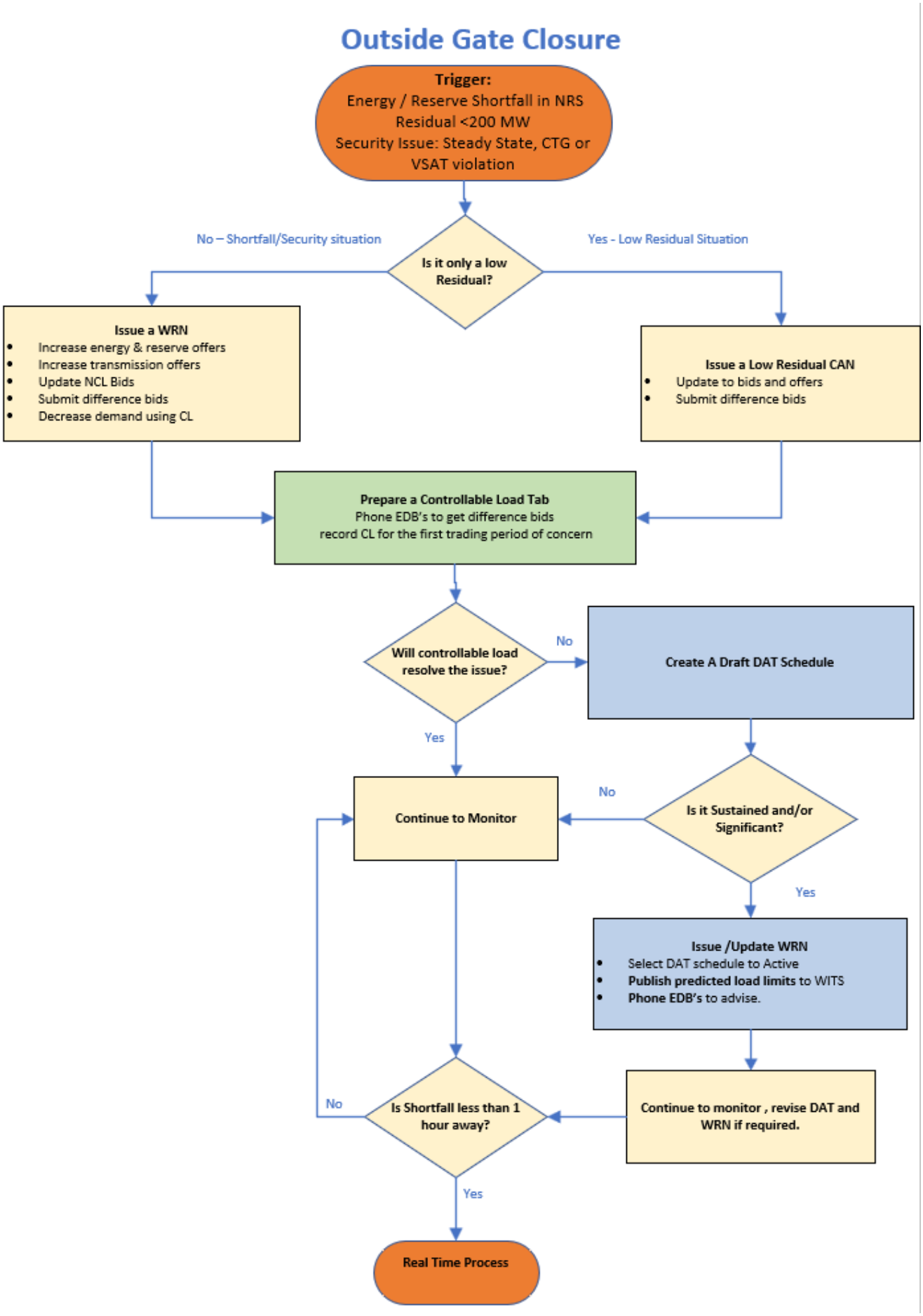
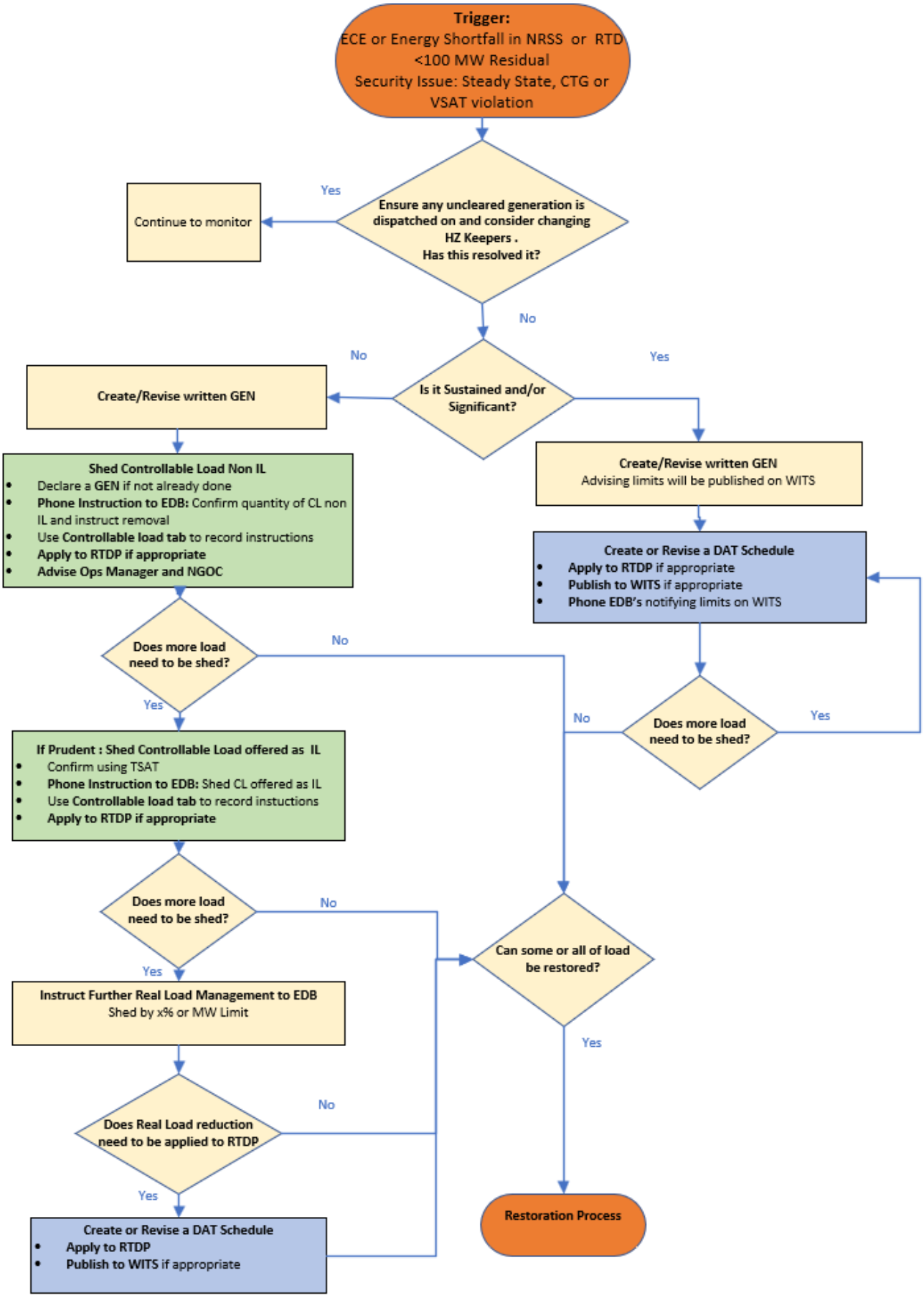
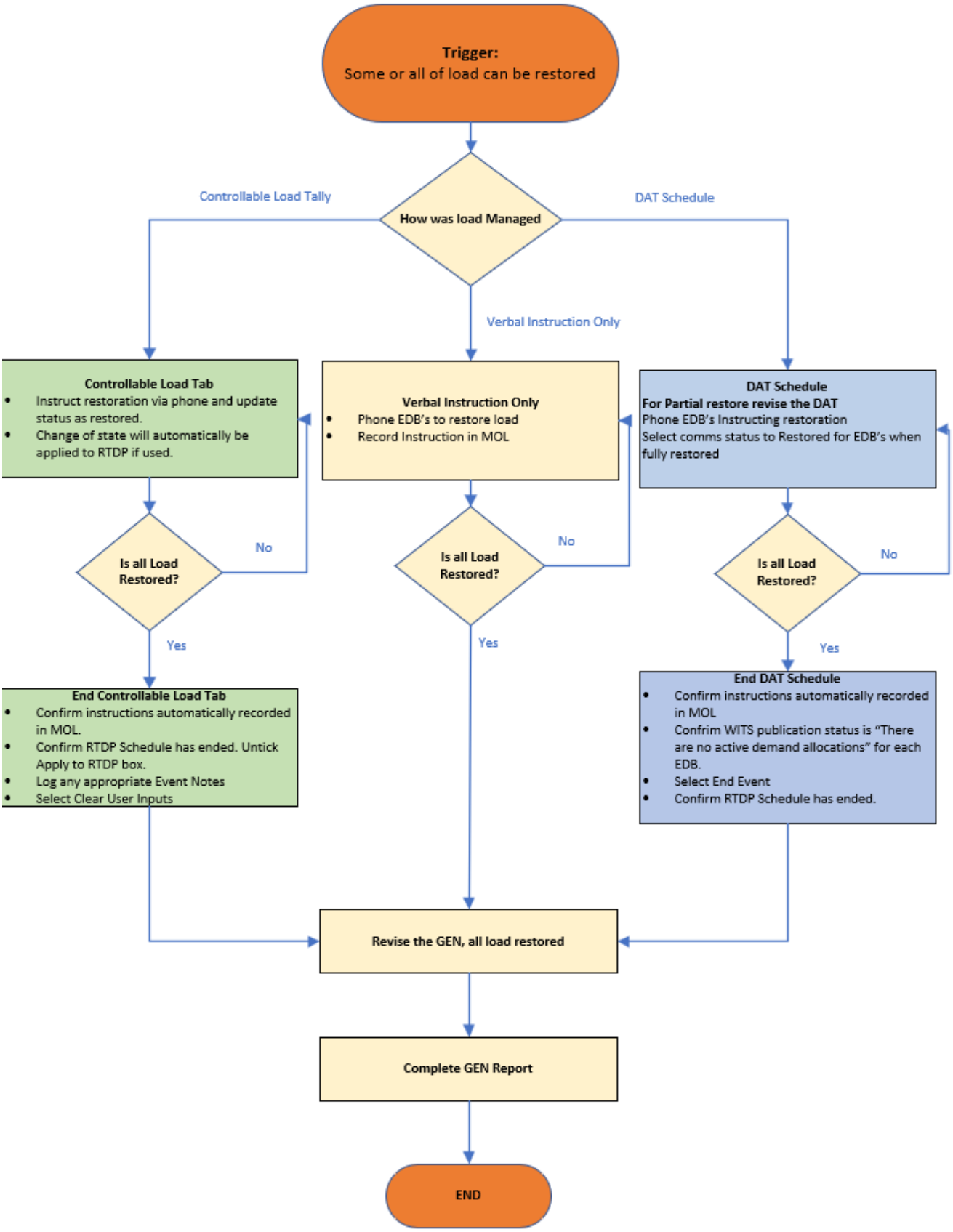




Real Time/Within Gate Closure



Restoration



2 Purpose

Purpose and Objectives

To describe the real time process for managing demand either nationally, regionally or locally where:

- There are insufficient offers of generation, instantaneous reserve, transmission and/or reactive support to supply the expected load (including transmission losses), provide frequency keeper regulating band and provide security for defined events.
- An unplanned event results in load loss or the need to take prompt action to correct steady state frequency, equipment loadings, voltage or voltage instability.
- frequency reserves are not able to be restored within 30 minutes after an event.
- n-1 security is not able to be restored after an event where there is a high probability of a second event.

External Policy/ Rules & Regulations

- Part 8, Schedule 8.3, Technical Code B of the Code
- Policy Statement

Note: Technical Code B sets out various actions the SO may take in a grid emergency in order of priority. Although not specifically set out in Technical Code B, the Authority agrees that reducing all available controllable load is the primary objective before reducing any real load.

Related Internal Policies, Processes and Procedures

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

Operational Documentation (Published)

- PR-DP-231 Manage a System Event (including a Grid Emergency)
- PR-DP-050 Demand Priority Lists and Customer Contact Details
- PR-DP-200 Manage IL Events
- MS MOI User Guide
- PR-DP-254 Manage AUFLS Event
- PR-DP-264 Manage Insufficient Generation Offers and Reserve Shortfalls
- PR-DP-209 Frequency Keeper Selection
- PR-SH-217 Issue Notices
- GL-DP-008 Guideline for Internal Communication During an Event or Incident
- GL-DP-1344 Guideline for using Demand Allocation Tool

Related External Policies, & Regulations

- Part 8, Schedule 8.3, Technical Code B of the 'Code'
- Policy Statement

Responsibilities

The Security Coordinator is responsible for managing the process. Demand management will be instructed by the Security Coordinator and will require a grid emergency being declared.

Connected Asset Owners must comply with any demand management instructions (and are expected, but not obligated, to comply with demand management requests).

Note: The National Grid Operating Centre (NGOC) can act on behalf of SO, for instructing connected asset owners to manage/restore load, if required by the Security Coordinator. The SC may also instruct the NGOC to electrically disconnect demand.

Definitions

Definition	Description
Connected Asset Owner	Means distributors and/or direct connects. Where the procedure refers to one or more distributors and/or direct connects for clarity the general term Connected Asset Owner is used.
Controllable load (CL)	Load that a Connected Asset Owner has control over **that is not offered as instantaneous reserve (IR).**
Dispatchable Demand (DD)	Dispatchable Demand is load that actively participates in the wholesale market. This means that a participant can signal their load quantities and price responsiveness through their bids, and their load is optimised and scheduled by SPD.
DNX	Dispatch notified generation (DNG) or load (DNL)
Demand management	Demand is also referred to as Load. Action taken by the SO to reduce demand offtake or to partially or fully restore demand offtake. Automatic demand management, e.g. through the action of a special protection scheme or AUFLS, may also occur. Any need for the SO to manage demand will be separate from automatic action. Restoration following such automatic action may require the application of this procedure.
DAT	Demand Allocation Tool used by the SO to assist in managing demand both controllable and real load. Encompasses the Demand Allocation Schedule and the Controllable Load Tab tools.
EDB	Electricity Distribution Business, aka distributors
Electrical Disconnection of Demand	Operating a device (i.e. a circuit breaker) so that electricity is unable to flow through a point of connection to the grid (grid exit point).
Interruptible load (IL)	A form of instantaneous reserve (IR), automatic demand management where ancillary service providers offer demand into the reserves market knowing that (if armed) it will be shed should frequency in the same island fall below 49.2Hz. Restoration will follow procedures set out in *PR-DP-200 Manage IL Events*.
RTDP	Real Time Dispatch Schedule. Created by inputs from the Demand Allocation Tool.

Communications

The Security Coordinator is responsible for managing the communication of any load management instructions. When time allows, the SC (or Security Support) may communicate directly with connected asset owners. This allows for a consistent delivery of requirements and provides connected parties opportunity to directly seek clarification of an instruction or request.

Where time pressure exists, the SC may request the NGOC to act on their behalf, by relaying requests for information or instructing connected parties to reduce/restore load.

The SC is the only role with the authority to declare a grid emergency and instruct/recind load shedding. If the connected asset operator has queries then they should be directed to the SC.

If using the Demand Allocation Schedule, load limits can be published via WITS directly to the connected asset owner. Demand instructions must be followed up via phone.

Priorities and Load Shedding Principles

First objective: Reduce controllable load (excluding IL).

Exceptions to this objective are:

- Controllable load, cleared as IL, is to be left on
- Immediate action is required with no time to target available controllable load, i.e. to stabilise the system, mitigate equipment damage, or restore safety margins.
- An EDB has specified they prefer to shed real load and keep their controllable load on.

Note: for localised issues it might be acceptable to instruct controllable load, cleared as IL, to be shed, if the lost IL can be replaced elsewhere in the reserve market and if it wasn't reduced, real load would need to be reduced.

Second objective: Reduce all controllable load including IL.

Exceptions to this objective are:

- When ECE is the binding risk in RTD, or
- TSAT identifies AUFLS is inadequate to cover an CE or ECE event (TSAT red alarm)
- Immediate action is required with no time to target available controllable load.

Third objective: Reduce real load.

- If time allows, use reasonable endeavours to ensure equitable load shedding across connected parties.
- Targeting the larger EDB's is prudent and acceptable if equitable load shedding is not practicable.

Fourth objective: Electrical disconnection of demand.

Electrical disconnection of demand is a last resort, used if connected asset owners are uncontactable or unwilling/unable to comply with instructions to reduce demand. Achieved through instruction to NGOC, following the demand priority list in PR-DP-050

Guideline for IL offering during a Grid Emergency

- If a Connected Asset Owner responds to a WRN or GEN **requesting** participants reduce demand, by removing load that impacts their ability to meet their instantaneous reserve offer (IL), then the IL provider should update their IL offer to reflect the amount of IL available.
- If the SO **instructs** a Connected Asset Owner to remove controllable load offered as IL, the IL can remain offered as long as it remains available to be restored once instructed (this will allow the SO to prioritise the restoration of reserve as generation become available).

Sustained and/or Significant

The Sustained and/or Significant definition gives guidance for the whether to use a DAT Schedule or Controllable load tab or no tool.
An event classified as sustained and/or significant triggers the use of the Demand Allocation Schedule to provide indicative or instruct load limits. All other demand management events will use the Controllable load tab or no tool.
A sustained and/or significant event meets some or all the following criteria.

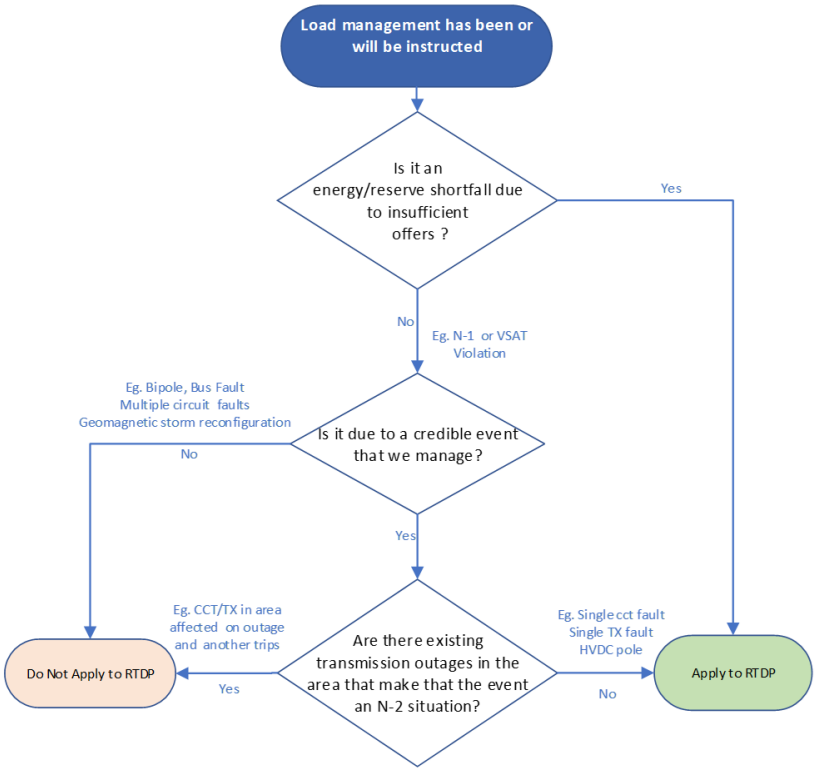
- It is real load management that requires application to RTDP (see Apply to RTDP process flowchart in the next section for guidance)
- It requires real load management that:
  - Is more than 1 hour, i.e. not just a peak?
  - Involves more than 3 EDB's?
  - Involves more than 100 MW of load?
  - Is politically sensitive, where visibility and equitability of load management is required.

SC's can use their discretion on whether to create a DAT schedule and publish limits. DAT Schedules can be created in draft in advance and activated only if required.

When to apply to RTDP

When created the RTDP Schedule becomes the pricing schedule and the load shed is added back in. This allows 5 min pricing to reflect what it would have been if load had not been managed.
Apart from ensuring generators are clearing a price that would occur if the load had not been controlled, an RTDP schedule can create scarcity pricing and is a signal to market participants that investment in either generation or transmission should occur.

General guideline is that scarcity pricing should not occur where there are planned transmission outages, as SO is not required to manage the grid to N-2.
RTDP is to be applied only where load has been instructed off (not requested)



EDB's uncontactable or unwilling/unable to Comply	If an EDB is uncontactable, or unwilling/unable to comply with instructions to shed load, ▪ Instruct the NGOC to electrically disconnect demand at relevant GXPs (if time allows as per the demand priority list – refer to PR-DP-050 Demand Priority Lists and Customer Contact Details) ▪ use reasonable endeavours to ensure demand reduction is equitable and avoid reduction of greater than 25% at a single point of connection, except where the total reduction required in the affected region exceeds 25%. Electrical disconnection of demand should be used when: ▪ there is insufficient time to instruct a Connected Asset Owner response, or ▪ a Connected Asset Owner has advised that in the given situation action is to be taken directly by Transpower, or ▪ there is insufficient response (unwilling, unable or cannot be contacted) from a Connected Asset Owner.
Independent action	Asset owners may take "independent action" which reduces demand. Unless that action was to restore the System Operator's PPOs, this is not a grid emergency. Any SO demand management/restoration action necessary following this independent action, and after any automatic (e.g. protection) action will be a grid emergency.

3 Procedures

3.1 Real Time/ Urgent

Inputs

- Energy and/or ECE shortfall in RTD or imminent. *Note in times of high demand an ECE shortfall may not occur due to large amount of AUFLS load.* SC can use discretion to move into Controllable Load management with residuals <100MW on an increasing load with predicted shortfalls.
- Security for defined events unable to be managed giving VSAT, steady state or N-1 violations.
- Insufficient offers of generation, instantaneous reserve, transmission and/or reactive support to supply demand, provide frequency keeper regulating band and provide security for defined events.
- An unplanned event resulting directly or indirectly in load loss or the need to take prompt action to correct steady state frequency, equipment loadings, voltage or voltage instability.
- DD and DNX products have been dispatched but a shortfall situation persists.

Note: At the discretion of the SC, controllable load management doesn't have to be initiated if a "real time" shortfall quantity occurs and is minimal i.e. a few MW, and fleeting i.e. expected to disappear in next one or two RTD solves.
If a minimal ECE deficit, ensure TSAT is not violating and there are sufficient AUFLS plus reserves to arrest potential frequency collapse

Outputs

- Grid Emergency declared (and notice sent if time allows)
- Verbal or written instructions to Connected Asset Owners to shed controllable load or real load.

Instructions

Step	Action
1	**Ensure any uncleared generation is dispatched on and consider changing HZ keepers.** ▪ Discretion uncleared generation and/or ▪ Changing HZ keepers? Is HZ keeping ctrl max constraining off generation? Changing HZ keeper in the SI can help with NI by increasing DC? Possibility of going to a single Hz keeper in 'other' island with wider band if necessary? **Has this resolved the situation?**

If	Then
Yes	Continue to Monitor
No	Go to step 2

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Can it be resolved by Controllable Load as identified in Scada? – See MOI<Demand Allocation Tool< Controllable Load tab or in SCADA USI Load Manager and/or Controllable Load NI popups from Dispatch overview.
The USI load manager (operated by Orion) has live SCADA data and the largest collective amount of controllable load. It may be appropriate to use the USI load manager first. If there is HVDC capacity available, this could free up SI generation to transfer north. Note Marlborough Lines need to be contacted separately.
<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>Go to step 3</td></tr>
</table></td></tr>
<tr><td>3</td><td>Shed Load by % or MW
▪ Declare a GEN if not already done, verbal to participants followed by written if widespread.
▪ Phone EDB directly, either Support Co-ordinators or delegated to NGOC.
▪ Advise NGOC and duty Operations Manager of any load shedding instructed.
If an urgent situation necessitates targeting a fewer number of EDBs for a more immediate response, then target the largest EDB’s that will quickly resolve the situation. On a reasonable endeavour’s basis, issuing of equitable load allocations can be implemented later via DAT, as time allows.
There are several methods for managing demand (% reduction, MW quantity reduction or MW Load Limit).
<table>
<tr><th>Method</th><th>Description</th><th>Example for verbal communication</th></tr>
<tr><td>% Reduction</td><td>Instruct Connected Asset Owners to reduce load by a percentage</td><td>“Vector is instructed to reduce load by 3% and hold load at that quantity”</td></tr>
<tr><td>MW Reduction</td><td>Instruct Connected Asset Owners to reduce load by x MW</td><td>“Powerco is instructed to reduce load by 30 MW and hold load at that quantity”</td></tr>
<tr><td>MW Load Limit</td><td>Instruct Connected Asset Owners to reduce load to a limit of x MW</td><td>“WEL Networks is instructed to reduce load to 200 MW and hold load at that quantity”</td></tr>
</table>
For each methodology, the new level of loading is to become the maximum load for each Connected Asset Owner or GXP.
Instructions may be issued either verbally or via a written GEN (though a GEN likely requires a follow up call). Instructions must specify the time(s) for which the load reduction is required.
Go to Step 4</td></tr>
<tr><td>4</td><td>Is it sustained and/or significant?
▪ Is it real load management that requires application to RTDP and/or equitable allocation of loadshed (see Apply to RTDP process flowchart in the previous section for guidance)
▪ Does it require real load management that:
  ▪ Is more than 1 hour, i.e. not just a peak?
  ▪ Involves more than 3 EDB’s?
  ▪ Involves more than 100MW of load?
  ▪ Is politically sensitive, where visibility and equitability of load management is required.
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Go to step 5</td></tr>
<tr><td>No</td><td>Go to step 9</td></tr>
</table></td></tr>
</table>

Step	Action
5	**Create/Revise a written GEN to advise limits will be published on WITS**
6	**Create or revise a DAT Schedule** ▪ Set schedule to "Apply to RTDP": if applicable. ▪ Save as Active. ▪ Publish to WITS as Instructed. (EDB's can set up alerts for Demand Allocation Notifications) ▪ Call EDB if not already done. Set Comms statuses to Instructed. Go to Step 9
7	**Instruct shedding of Controllable load not offered as IL** ▪ Declare GEN if not already done. ▪ Use Controllable Load tab in DAT to record instructions ▪ **Tick Apply to RTDP if appropriate**. (see process flow chart) ▪ Advise NGOC and duty Operations Manager of any load shedding instructed. SC/SS to communicate directly with distributors if possible. Go to step 8
8	**Create or revise a written GEN** if not already done Go to Step 9
9	**Can some or all of load be restored?** Go to Restoration process

3.2 Outside Gate Closure

Inputs	NRS Schedule shows: ▪ Low residual <200, ▪ Energy and/or Reserve shortfall ▪ Security for defined events unable to be managed at predicted load levels giving VSAT, steady state or N-1 violations.
Outputs	▪ Appropriate Notices issued (CAN or WRN) ▪ A trigger for EDB's to submit difference bids has been initiated ▪ Network companies advised of situation and available controllable load established. **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.
WDS Timeframe	Night Support Co-ordinator is to assess WDS and advise Security Support of any low residual or shortfall situations. After analysis detailed in the next section (trigger analysis), and discussion with Ops Manager, if it is deemed prudent a "**Potential Shortfall or Low Residual Situation CAN**" is used to advise the industry of low residuals or shortfalls in the WDS for days 2-5 only. 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 either of these situations still exist in NRS timeframes after a **Potential Shortfall or Low Residual Situation** CAN has been issued, an appropriate notice (Low Residual CAN or WRN) is still required to be sent. This triggers EDB's requirement to submit difference bids.

Trigger Analysis	**Low Residual** – Island residual (Residual Generation + HVDC Residual) is less than 200MW as identified in Schedule Totals.
	▪ Check load forecast is accurate, and load agreements modelled correctly
	▪ Consider accuracy and quantity of wind forecast.
	▪ What is the make- up of remaining residual generation?
	  ▪ are generation agreements offered yet?
	  ▪ is it generation constrained off by outages that may be recalled?
	  ▪ is it slow ramping plant unavailable in the short term e.g. HLY?
	  ▪ Is there additional SI generation available for increased HVDC transfer?
	▪ Is there instantaneous peak likely to be higher than forecast?
	▪ Would changing HZ keeper free up generation, i.e. Ctrl Max is lower than MW max?
	Energy and/or Reserve Shortfall - Identified in the Scarcity & Infeasibility and Schedule Summary Displays
	▪ In addition to the above checks for Low Residual situation, check for uncleared generation offers which could be discretionned on in real time to alleviate the situation. There may be generation available due to scarcity pricing rules.
	Security Situations – Identified in Schedules in SFTCheck violations and VSAT results. Confirm by powerflow of either RTNET peak savecase or snapshot with increased loads, or manipulation of StudySFT case to ensure realistic profiles.
	▪ Consider if recalling an outage or implementation of a system split may alleviate the situation.
	Once a credible potential demand management trigger is identified advise Ops Manager and proceed with the process below.

Instructions

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Potential Demand Management trigger is identified
Low residual <200,
Energy and/or Reserve shortfall
Security for defined events unable to be managed at predicted load levels giving VSAT, steady state or N-1 violations.</td></tr>
<tr><td>2</td><td>Is this a Low Residual situation only?<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 3</td></tr><tr><td>No</td><td>Go to step 4</td></tr></table></td></tr>
<tr><td>3</td><td>Issue a CAN for a Low Residual Situation either National or Island basis as appropriate.
This is a formal trigger for EDB’s to submit difference bids via WITS or a phone call to NCC .
To be issued even if one has been previously issued in WDS timeframe.
Go to Step 5</td></tr>
<tr><td>4</td><td>Issue a WRN for the Shortfall or Security situation, identifying the appropriate actions requested.
Increase energy & reserve offers
Increase transmission offers
Update NCL bids
Submit difference bids
Decrease demand using controllable load.
See appendix for examples.</td></tr>
<tr><td>5</td><td>Prepare a Controllable Load Tab
Support Co-ordinators to monitor Difference Bid offers and call EDB’s not able to submit electronic bids. (Identified in appendix 4.1).
Use this information to record in the Controllable Load Tab of the Demand Allocation Tool, for the first trading period of concern.
See Demand Allocation Tool guideline GL-DP-1344</td></tr>
<tr><td>6</td><td>Will controllable load resolve the issue?
After difference bids and phone calls have been made determine if this will resolve situation.
If it is a regional area, controllable load offered as IL can be shed if it can be re-distributed elsewhere in the system.<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Continue to monitor the situation, go to step 11</td></tr><tr><td>No</td><td>Go to step 7</td></tr></table></td></tr>
</table>

Step	Action
7	**Create a Demand Allocation Tool Schedule for the relevant trading periods.** Security or Support Co-ordinator to prepare a DAT Schedule using the last NRSS and NRSL schedules Identify amount of load management likely to be required for each trading period. Validate the results of the schedule. See Demand Allocation Tool guideline GL-DP-1344

8	**Is the event sustained and significant?**
	▪ Is it real load management that requires application to RTDP (see Apply to RTDP process flowchart in the next section for guidance)
	▪ Does it require real load management that:
	  ▪ Is more than 1 hour, i.e. not just a peak?
	  ▪ Involves more than 3 EDB's?
	  ▪ Involves more than 100MW of load?
	  ▪ Is politically sensitive, where visibility and equitability of load management is required.
	If / **Then**
	Yes / Go to step 9
	No / Continue to Monitor

9	**Issue a WRN and Publish Indicative Load Limits** ▪ Advise Ops Manager ▪ Issue a WRN notifying indicative load limits are published on WITS ▪ Save DAT Schedule as Active and Publish Indicative load limits to WITS ▪ Support Co-ordinators to phone participants to advise. ▪ "Due to xxx a WRN has been issued, if the situation remains, your predicted grid offtake load limits for the xxx-xxx TP's are now published on WITS"
10	**Continue to monitor.** Revise DAT and issue revised WRN if needed.
11	**Is the Potential Demand Management Situation less than 1 hour away?** **If** / **Then** Yes / Go to Manage Demand Real Time/Inside Gate Closure, 3.3 No / Continue to Monitor

3.3 Real Time /Within Gate Closure

Input (Trigger)

- Energy and/or CE/ECE shortfall in RTD/NRSS or imminent. *SC can use discretion to move into Controllable Load management with residuals <100MW on an increasing load with predicted shortfalls.* Check
- Security for defined events unable to be managed giving VSAT, steady state or N-1 violations.
- Insufficient offers of generation, instantaneous reserve, transmission and/or reactive support to supply demand, provide frequency keeper regulating band and provide security for defined events.
- An unplanned event (typically greater than a contingent event) resulting directly or indirectly in load loss or the need to take prompt action to correct steady state frequency, equipment loadings, voltage or voltage instability.
- An inability to restore frequency reserves within 30 minutes post an event.
- An inability to restore n-1 security post an event where there is a high probability of a second event.
- DD and DNX products have been dispatched but a shortfall situation persists.

Note: 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.

Outputs

- Grid Emergency declared (and notice sent if time allows)
- Verbal or written instructions to Connected Asset Owners to shed controllable load or real load.

Instructions

Step	Action
1	**Ensure any uncleared generation is dispatched on and consider changing HZ keepers.** ▪ Discretion uncleared generation and/or ▪ Changing HZ keepers? Is HZ keeping ctrl max constraining off generation? Changing HZ keeper in the SI can help with NI by increasing DC? Possibility of going to a single Hz keeper in 'other' island with wider band if necessary? **Has this resolved the situation?**

If	Then
Yes	Continue to monitor
No	Go to step 2

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Is it sustained and/or significant?
Is it real load management that requires application to RTDP and/or equitable loadshed (see Apply to RTDP process flowchart in the next section for guidance)
Does it require real load management that:
Is more than 1 hour, i.e. not just a peak?
Involves more than 3 EDB's?
Involves more than 100 MW of load?
Is politically sensitive, where visibility and equitability of load management is required.
<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 3</td></tr><tr><td>No</td><td>Go to step 6</td></tr></table></td></tr>
<tr><td>3</td><td>Create/Revise a written GEN to advise limits will be published on WITS</td></tr>
<tr><td>4</td><td>Create or revise a DAT Schedule
Set Schedule to Apply to RTDP if appropriate – see process flow chart
Save DAT Schedule as Active.
Publish to WITS as Instructed
Phone EDB if not already done. Set Comms statuses to Instructed.
Go to Step 5</td></tr>
<tr><td>5</td><td>Does more load need to be shed?
ECE Shortfall - note in times of high demand an ECE shortfall may not occur due to large amount of AUFLS load.
Eroding HZ keeping bands
Security violations still exist
<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 4</td></tr><tr><td>No</td><td>Go to step 14</td></tr></table></td></tr>
<tr><td>6</td><td>Create or revise a written GEN if not already done</td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>7</td><td>Instruct shedding of Controllable load not offered as IL
▪ Declare GEN if not already done.
▪ Phone EDB to confirm CL Non-IL quantity available and instruct removal. Note Diff Bids may not reflect real time availability, therefore it is best to confirm quantity.
▪ Use Controllable Load Tab in DAT to record instructions – See DAT user guideline GL-DP-1344
▪ Tick Apply to RTDP if appropriate. (See flow chart for guidance)
▪ Advise NGOC and duty Operations Manager of any load shedding instructed.
If the emergency is an area specific issue, controllable load offered as IL can be shed if it can be re-distributed elsewhere in the system.
The USI load manager (operated by Orion) and Powerco have live SCADA data and the largest collective amounts of controllable load. It may be appropriate to use these first.
If there is HVDC capacity available, the CL from USI load manager could free up SI generation to transfer north. Note Marlborough Lines need to be contacted separately.
SC/SS to communicate directly with distributors if possible.</td></tr>
<tr><td>8</td><td>Does more load need to be shed?<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 9</td></tr><tr><td>No</td><td>Go to step 14</td></tr></table></td></tr>
<tr><td>9</td><td>If Prudent Shed Controllable Load offered as IL
Determine in TSAT that AUFLS is adequate to cover an CE or ECE event, by overriding TSAT IL on the DSA Manager display to Zero and solving TSAT. See Appendix 4.2
▪ Phone instructions to EDB’s
▪ Use Controllable Load tab in DAT to record instructions
▪ Tick Apply to RTDP if appropriate.
Advise EDBs not to withdraw offers of IL as it may be required to restore this load to provide reserve at any point.
Continue to monitor ECE risk and TSAT results. If ECE risk is binding or TSAT results are at 100%, reserve must be restored to prevent the risk of cascade failure.
Go to Step 10</td></tr>
<tr><td>10</td><td>Does more load need to be shed? ECE Shortfall/ security violations still exist.<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 11</td></tr><tr><td>No</td><td>Go to step 14</td></tr></table></td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>11</td><td>
Instruct Real Load Management to EDB's
If an urgent situation necessitates targeting a fewer number of EDBs for a more immediate response, then target the largest EDB's that will quickly resolve the situation. On a reasonable endeavour's basis, issuing of equitable load allocations can be implemented later via DAT, as time allows.
There are several methods for managing demand (% reduction, MW quantity reduction or MW Load Limit).
<table>
<tr><th>Method</th><th>Description</th><th>Example for verbal communication</th></tr>
<tr><td>% Reduction</td><td>Instruct Connected Asset Owners to reduce load by a percentage</td><td>"Vector is instructed to reduce load by 3% and hold load at that quantity"</td></tr>
<tr><td>MW Reduction</td><td>Instruct Connected Asset Owners to reduce load by x MW</td><td>"Powerco is instructed to reduce load by 30 MW and hold load at that quantity"</td></tr>
<tr><td>MW Load Limit</td><td>Instruct Connected Asset Owners to reduce load to a limit of x MW</td><td>"WEL Networks is instructed to reduce load to 200 MW and hold load at that quantity"</td></tr>
</table>
For each methodology, the new level of loading is to become the maximum load for each Connected Asset Owner or GXP.
Instructions may be issued either verbally or via a written GEN (though a GEN likely requires a follow up call). Instructions must specify the time(s) for which the load reduction is required.
</td></tr>
<tr><td>12</td><td>
Does Load Reduction need to be applied to RTDP? See process flow chart for guidance.
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Go to step 13</td></tr>
<tr><td>No</td><td>Go to step 14</td></tr>
</table>
</td></tr>
<tr><td>13</td><td>
Create or Revise a DAT Schedule

Tick Apply to RTDP
Set to Active
Publish to WITS if appropriate
Call EDB's and set comms status to instructed
When time permits select End Event in Controllable Load Tab. A DAT schedule will supersede a Controllable Load schedule

</td></tr>
<tr><td>14</td><td>
Can some or all of load be restored?
Go To Restoration Process
</td></tr>
</table>

3.4 Restoration

Inputs

- Sufficient generation residual is available to restore load.
- Load trending down
- Stable system frequency
- Load shed value on Energy Reserve display is blank, indicating predicted load is now lower than a load limit applied in RTDP – see appendix 4.3

Outputs

- Instructions issued to Connected Asset Owner(s) to restore load.
- Grid Emergency ended.
- Grid Emergency Report completed and sent

General Principles

Initiate restoration in priority order below as generation becomes available:

1. Real load
2. Controllable load (offered as IL)
3. Controllable load (not offered as IL)

When restoring load, consideration should be given to the following:

- Public safety (requests from civil defence or emergency services, advice from EDB's regarding medical dependents or supply to hospitals etc)
- Direct connects or EBD's ability to sustain loss of supply without damage to equipment or environment (freezing of TWI potline or local authority sewage or storm water pumps etc)
- Restoration of security and reserve
- Cold load pickup (expect more load to be restored than was shed)
- Duration of loss of supply (as far as is practicable, prioritise restoration of load that has been off the longest)
- Political impact of lost load (major urban centre vs suburban or rural load)

There is no obligation to equitably restore load. Coordinators are to use their judgement to determine the appropriate approach, which may include targeted restoration to some parties prior to others.

If a DAT Schedule was used, revision of the load limits can create an equitable restoration, with revised limits able to be published to WITS. Targeted restoration can also be carried out with DAT.

There are several methods for partially restoring load:

Method	Description	Example for verbal communication
% Restoration	Instruct EDB to restore load by a percentage	"Vector may restore 50% of their shed load and hold load at that quantity"
MW Restoration	Instruct EDB restore x MW	"Powerco may restore 30 MW of load and hold load at that quantity"
MW Load Limit	Instruct EDB to restore load to a limit of x MW	"WEL Networks may restore load up to a maximum of 250 MW"

Note: If issuing an instruction to restore a % of load, the restoration percentage is based on the quantity of shed load, not total load. E.g. if you are restoring half of the shed load after shedding 4%, the instruction would be to restore 50% (not 2%).

Responsibilities

Security Coordinator is responsible for managing load restoration.

Instructions

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Monitor system conditions to determine when load can be restored (either full or partial restoration)
If load is being managed, it is important that the residual generation is minimised.</td></tr>
<tr><td>2</td><td>How Was Load Managed?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Controllable Load Tab?</td><td>Go to step 3</td></tr>
<tr><td>DAT Schedule</td><td>Go to step 6</td></tr>
<tr><td>Verbal Instruction Only</td><td>Go to step 9</td></tr>
</table></td></tr>
<tr><td>3</td><td>Controllable Load Tab:
▪ Issue verbal instructions to impacted parties that controllable load offered as IL, or all Controllable Load may be restored.
▪ Update status to “restored” – this will automatically log restoration and adjust RTDP if it was created.</td></tr>
<tr><td>4</td><td>Is All Load Restored?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Go to step 5</td></tr>
<tr><td>No</td><td>Go to step 3</td></tr>
</table></td></tr>
<tr><td>5</td><td>End Controllable Load Tab
▪ Confirm instructions have been automatically recorded in MOL
▪ Confirm RTDP Schedule ended, if instructions were applied to RTDP
▪ Untick Apply to RTDP box.
▪ Log any appropriate events notes.
▪ Select Clear User Inputs.
Go to Step 11</td></tr>
<tr><td>6</td><td>DAT Schedule
See General Principles for guidelines on restoring and DAT Guideline document.
▪ Phone instructions to EDB of new increased load limit or all load restored.
▪ When all of an EDB’s load is restored, select EDB Comms Status to Restored, this will automatically adjust RTDP if applied and publish to WITS as “There are no active demand allocations” if previous instruction was published.
▪ If any demand was electrically disconnected, instruct NGOC to restore this demand.</td></tr>
<tr><td>7</td><td>Is All Load Restored?
<table>
<tr><th>If</th><th>Then</th></tr>
<tr><td>Yes</td><td>Go to step 8</td></tr>
<tr><td>No</td><td>Go to step 6</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>8</td><td>End DAT Schedule
▪ Confirm Instructions have been automatically recorded in MOL
▪ Confirm WITS publication status in DAT Publish Preview “There are no active demand allocations” for all EDB’s, if limits previously published
▪ Select End Event
▪ Confirm RTDP Schedule has ended.
Go to Step 11</td></tr>
<tr><td>9</td><td>Instruct EDB’s to restore partial or all load via phone
▪ Record instructions in MOL
▪ If any demand was electrically disconnected, instruct NGOC to restore this demand.
Go to Step 11</td></tr>
<tr><td>10</td><td>Is All Load Restored?<table><tr><th>If</th><th>Then</th></tr><tr><td>Yes</td><td>Go to step 11</td></tr><tr><td>No</td><td>Go to step 9</td></tr></table></td></tr>
<tr><td>11</td><td>Revise Grid Emergency Notice to notify that all load has been or can be restored.
End Grid Emergency if appropriate.
Go to Step 12</td></tr>
<tr><td>12</td><td>Complete Grid Emergency Report within 12 hours of the end of the Grid Emergency (see PR-DP-231).</td></tr>
</table>

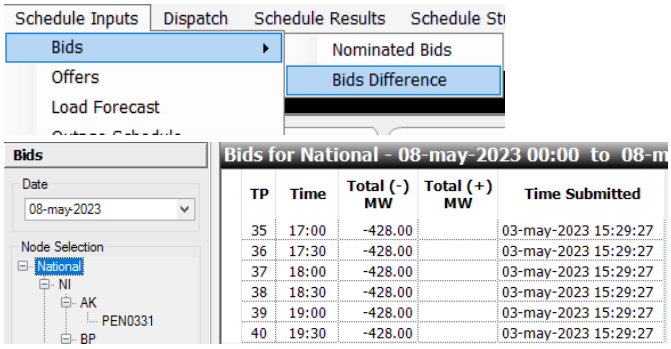
4 Appendix

4.1 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

EDB Controllable Load Summary

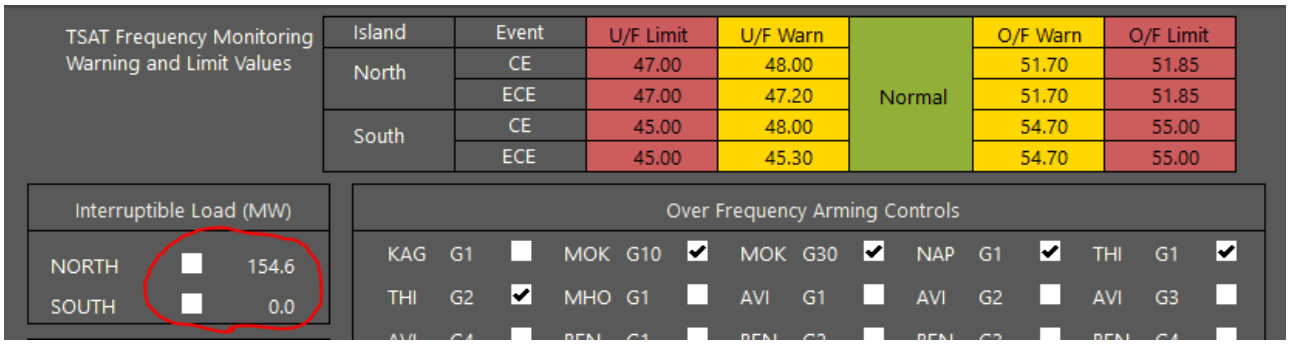
This table shows the average quantity of controllable load available for each EDB. This is for illustrative purposes only – actual quantities will vary.

North Island EDBs	IL Trader	Average quantity (MW) Note: This can vary from 0 to greater than specified
Powerco	AG1 & CE1	70
Vector	VLD	60
Wellington Electricity	UNW	23 - 40
Northpower	AG1	33
Electra	AG1	25
WEL Networks	WEN	15 – 20
Top Energy	AG1	18
Waipa Networks	AG1	11 (can be managed by WEL)
Unison Networks	AG1	8 - 9
Eastland Networks	AG1	8 (can be managed by Unison)
Horizon Networks		4
The Lines Company		4
Scanpower	AG1	2.5
Centralines	AG1	1.28
Counties Energy	CNP	Not known

South Island EDBs	IL Trader	Average quantity (MW) Note: This can vary from 0 to greater than specified
USI Load Manager (operated by Orion) *		119 *
Aurora Energy		33
PowerNet		11
Network Waitaki		1.2
***EDBs managed by the USI load manager**		
Orion Group *	AG4	52 *
Alpine Energy *		20 *
MainPower *		17.7 *
Marlborough Lines*		10 *
Nelson Electricity*		10 *
Network Tasman*		10 *
EA Networks *		6 *
Westpower *		3.25 *
Buller Electricity *		0.7 *

4.2 Disabling IL for TSAT solves

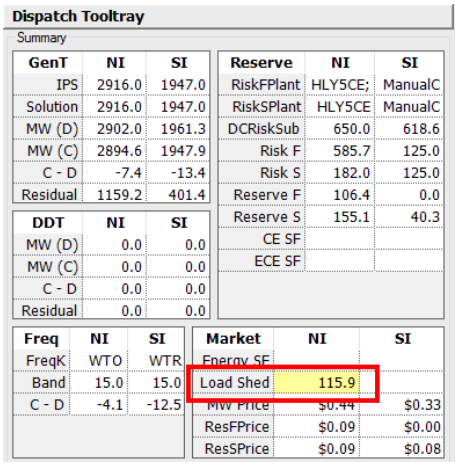
Prior to the removal of controllable load offered as IL, an assessment needs to be undertaken to ensure AUFLS will be adequate to cover the CE and ECE risk. This assessment can be done by overriding TSAT interruptible load on the DSA Manager display to Zero and solving TSAT.



If any TSAT results change to RED, IL must be maintained.

When IL load has been shed, if at any later point the ECE risk binds or TSAT results report 100% (RED) IL must be restored to prevent the risk of cascade failure

4.3 Load Shed Quantity on Energy Reserve Display



When "Apply to RTDP" is selected, this sets a load limit based on the load shedding applied at the time. The Load Shed quantity on the Energy Reserve display represents the difference between this load limit and the predicted load. The value will therefore change as the short-term load forecast changes.

As the predicted load approaches the load limit, the load shed value will diminish. If the predicted load drops to below the load limit, the load shed value goes blank, and this is an indication that load can be restored.

4.4 SPD Calculations

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 (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

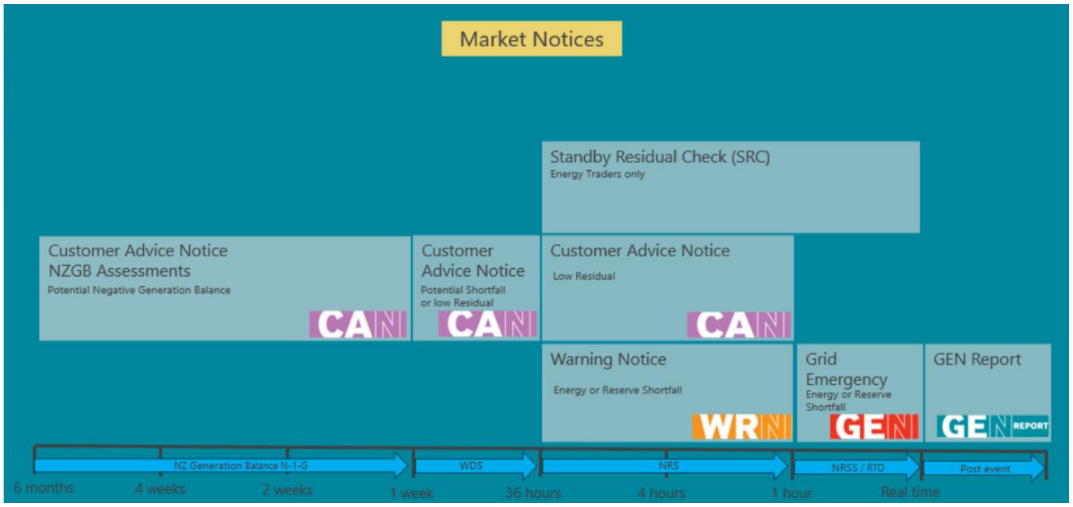
- Energy scarcity prices represent the value of the shortfall

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

4.5 Summary of Notices Applicable to Schedules

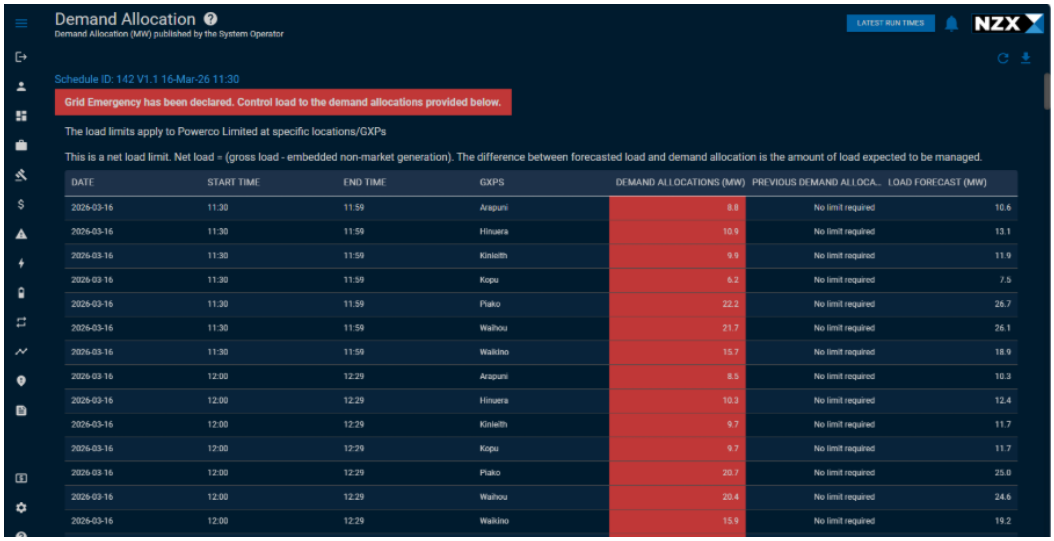
Timeframe	Notice	Deficit/ Shortfall	Low Residual	Deficit/shortfall that can be resolved by discretion
Inside Gate Closure (RTD or NRSS)	GEN	✓		Not required
Outside Gate Closure (NRS)	WRN	✓		Not required
Outside Gate Closure (NRS)	CAN		✓	N/A
36 hrs to 1week (WDS)	Potential CAN	✓	✓	N/A



4.6 Examples of Publication of Limits to WITS

Schedule with GXP specific limits published as Indicative.

The same Schedule has been published as Instructed



Example of an updated schedule where TMU is removed from 12:00 onwards.

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
13.0	20/10/2022	Updated TSAT SCADA 3.2 screen shot Considerations for load restoration Demand management spread sheet added [MH] **RTP3 Project Updates:** ▪ Purpose and objectives. Note added about IL ▪ Inputs note added re DD	9a 16 Appendix 4.2 2 3.1
14.0	Not issued	**RTP4 Project Updates:** ▪ Note added to the purpose statement ▪ Definition for dispatch demand (DD) added ▪ Note on DD added to Inputs and Outputs.	 2.0 2.0 3.1
15		**Major BAU revision.** Load restoration steps now separated from load reduction. Appendix 4.1 added for RTLS. Some other information moved from procedure section to appendices. [CT]	All
16	26/7/2023	Added practicable and reasonable endeavours	
17	24/12/2024	**Cyclic review:** Reissued no change. [PM]	
18.0	7/5/2026	**Project Update:** Major update incorporating PR-DP-264, Manage Insufficient Generation Offers and Reserve Shortfalls. Updated process flow charts and inclusion of Demand Allocation Tool [DT] DAT goes live on 15 May 2026.	All

5.4 Metadata

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	L3: 09-01 Manage System Events	*L4:* [Business Model L4]
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