Standby Residual Check
Training Workshop
Market Services
Participant Guide
May 2007
Contents

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• What you receive now
• What the Standby Residual Check (SRC) is about
• What we are changing in SRC
• What will be published
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Purpose of the Training

• Learn what SRC is
• Understand the inputs into the SRC calculations
• Use the SRC model to determine what actions can change the results
What you receive now

To: CAN Energy Traders
From: System Operator
Date: 20 Jun 2006, 01:43

Standby Reserve (CAN) for Insufficient dispatch proposals on 20-Jun-2006

The System Operator advises participants that there are insufficient standby reserves available for the following trading periods:

Following a contingent event:
- There may be insufficient generation reserve available for the System Operator to re-dispatch the system to a secure state (i.e. manage a subsequent contingent event).
- Demand management may be required

<table>
<thead>
<tr>
<th>Market Day</th>
<th>Time</th>
<th>Period</th>
<th>North Island</th>
<th>South Island</th>
<th>New Zealand</th>
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</thead>
<tbody>
<tr>
<td>20-Jun-2006</td>
<td>17:30</td>
<td>36</td>
<td>153.672</td>
<td></td>
<td>237.426</td>
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<tr>
<td>20-Jun-2006</td>
<td>18:00</td>
<td>37</td>
<td>174.635</td>
<td></td>
<td>232.119</td>
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<td>18:30</td>
<td>38</td>
<td>155.366</td>
<td></td>
<td>177.755</td>
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<td>20-Jun-2006</td>
<td>19:00</td>
<td>39</td>
<td>29.24</td>
<td></td>
<td>15.53</td>
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</tbody>
</table>

This situation can be alleviated by participants revising their demand and generation offers for those trading periods. A revision of this notice will be issued if there is any change to the situation advised above.
What you receive now: issues

The notice:

• does not indicate how margin is calculated
• does not indicate what can be done to remedy issue in any detail

Therefore it is difficult to maintain industry (& our) understanding of SRC function
What the SRC is about

• two checks:
  – do we have the ability to:
    1. replace energy without considering reserves (energy check)?
    2. replace energy and schedule reserves to cover next risk (capacity check)?
1. Replace energy

- do we have the ability to replace largest energy risk?
- reserve is not considered for the next risk
- worst case scenario - cannot replace energy lost after a contingent event
1. Replace energy

- calculation involves:
  - energy offers from generators
  - total energy offer quantity of the risk generator
  - required frequency keeping band
  - energy requirement (demand + Losses)
  - HVDC received (limited by SI offers)
2. Replace energy & schedule reserves (Capacity Check)

- ability to replace the largest risk energy with other energy?
- ability to schedule reserves to cover the next largest risk after 30 minutes?
- this is most common scenario:
  - cannot get back to N-1 for reserve
2. Replace energy & schedule reserves (Capacity check)

- calculation involves:
  + available total generator capability offered (includes manual subtractor)
  + offered Interruptible Load
  - risk station capability offered
  - required frequency keeping band
  - energy requirement (demand + losses)
  - next largest risk capability offered
  + HVDC received (limited by SI offers)
What we are changing in SRC

• manual subtractor
  – subtractor to allow spur line constraints and commissioning units to be deducted from the available generation capability offered

• manual risk
  – Largest single risk unit (normally only the South Island)

• peak island power system demand multiplier
  – Peak demand versus energy requirement value
What will be published – Graph

Standby Residual Check Charts

North Island Standby Residual
PDS: 09th May 2007 15:05:18

South Island Standby Residual
PDS: 09th May 2007 15:05:18

Search Criteria
Rolling View
• On
• Off
Date
09/05/2007

Price Type
• s0s/sdpq
• PDS

Submit

Email Notification
Email
David.bullen@transpower.co.nz

Changes successfully made

Submit
What will be published

- total island energy offer quantity
- total island risk unit energy offer quantity
- island frequency keeping band
- island energy requirement (demand & losses)
- HVDC received
- total island offered capacity
- total island offered Interruptible Load
- total island risk unit capability
- island next largest risk offered capability

Calculated off the SDS, PDS & SDPQ
The Checks

• To break down the detail in the model

• Energy and Reserves check for the North Island
Selecting the calculation components

date: 01-05-2007
period: 29
starting: 14:00
run time: 01-May-07 14:11
schedule type: SDPQ

Island
- NI
- SI

Risk Setting
- AC Risk
- DC Risk (loss of Pole 2)

DCMax (ignore sending island spare energy)
Components Cont’d
Available MWMAX + Offered IL

- NI Available MWMAX
  4220.467

- NI Offered MWMAX
  4220.467

- NI Manual subtractor
  0.000
Components cont’d
– Risk MW – Hz Band – Peak IPS

- NI 1st Risk MWMax 378.2
- NI Hz Req’d Band 50
- NI Peak IPS for Period 3180.213

MAX

- NI Risk Setter MWMax 378.2
- NI Manual Risk 0

For the DC Riskcalc, this value moves to the 2nd Risk position and 1st Risk MWMax = 0
Components cont’d
– New Capacity Risk

- NI
New Capacity Risk 446.4865

- NI
Manual Risk 0

If not 1st risk

- NI
Default 2nd Risk 60

- NI
2nd Risk MWM 370

- NI
New DC Risk 446.487
Components cont’d
+ HVDC Received

NI
New DC Risk
143.246

- DC Single Pole RampUp Capacity
538

+ NI
DC Energy
681.246
Components cont’d
The Checks

Energy and Reserves Check for New Zealand

- Need to check the SI capability to supply to the North Island
- As opposed to HVDC capability to transfer SI capability
Components cont’d
What is available in SI for NI?

- SI
  Offered Mv(Max
  3087.000

- SI
  Manual subtractor
  0.000

- SI
  Offered IL
  0.000

- SI
  Manual Risk
  120

- SI
  Risk Setter Mv(Max
  #N/A

SI
Mv/Max Energy
2367.000

MAX
Components
What is available in SI for NI?
Components cont’d
What is available in SI for NI?

+ SI
  Available Energy
  2967

- SI
  Hz Req'd Band
  50

- SI
  Peak IPS for Period
  2191.112

SI Spare Energy
725.888
Components

What is available in SI for NI?

NI DC Energy 681,246

HVDC is DCN

DCN Loss Factor 0.062

SI DC Energy 725,000

MIN

SI Spare Energy 725,000

SI DC Max Flow 1049,000
Components cont’d
dput together with the SI capability

• + NI Available MWMAX 4220
• + NI Offered IL 156
• - NI Risk MWMAX 395
• - Hz Required Band 50
• - NI Energy Requirement 4881
• - NI Next largest risk 370
• + HVDC received (limited by SI Offers) 681
• = -237 < 0 so National problem
• Implies cannot cover another contingency for reserves post 1st event
How much required from the NI?

• How much of the shortfall must be made up from the NI?
DC contingency shortfall requirement

NI Residual Capacity
-153.672

NI Available MwMax 4220.467

- NI Offered IL 458.885

- NI Risk MwMax 0

- NI Hz Req'd Band 50

- NI Peak IPC for Period 4420.905

- NI New Capacity Risk 495.595

- NI DC Energy 485.595

Receiving Island
The Checks

Energy Check for the North Island
– Can we replace energy after the loss of the largest risk generator
The components of Energy Shortfall

- NI Risk Setter En Offers 390
- NI Manual Risk 0

MAX

+ NI Energy Offers 4204.067
- NI Risk En Offers 390
Components cont’d

+ NI
Energy Offers
4204.067

- NI
Risk En Offers
390

- NI
Hz Reqd Band
50

+ NI
Peak IPS for Period
4480.805

+ NI
DC Energy
681.246

NI Residual Energy
-35.492

Receiving Island
Components cont’d
put together with SI capability

- + NI Energy Offers 4204
- - NI Risk energy offers 390
- - Hz required Band 50
- - NI Energy Requirement 4481
- + HVDC received (limited by SI Offers) 681
- = -35 < 0 so National problem
- Implies if lose the largest risk cannot meet demand post event – the most serious scenario.
Exercises

• Using the model for each of the data sets to answer and discuss
  – What are the issues?
    • Is it a NI or NZ problem?
    • How did you identify it in the model?
    • Can you help in the SI – doing what?
    • Can you help in the NI – doing what?