

# **RULE CHANGE PROPOSAL**

**May 2008**

## **Dispatch of Instantaneous Reserve**

### **Executive Summary**

This paper proposes a rule change to enable the partial dispatch of reserves when there is a shortage of energy and reserve offers.

## Introduction

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### Purpose

The System Operator, jointly with the National Winter Group (NWG) 2008, has identified the implementation of the ability to partially dispatch the reserve requirement at peak times as a possible mitigation to assist meet winter peak demand. The options considered by the NWG included both the full proposal that the Electricity Commission consulted on in 2006 (including the Commission's updated proposal in December 2007) and two alternative interim proposals. The timing and impact of each proposal were considered, and the System Operator was asked to develop a proposal based on what could be achieved for winter 2008.

The System Operator now proposes a change to the rules (**"NWG IR dispatch proposal"**).

The purpose of the rule change is to enable the partial dispatch of reserves when there are insufficient offers to simultaneously meet the:

- energy requirements; and
- reserve requirements for the largest contingent event ("CE").

We note the proposed rule change does not alter the System Operator's policy where there are insufficient offers to simultaneously meet the energy, frequency keeping and reserve requirements for an extended contingent event ("ECE"). The existing policy, which is to:

- ensure the ECE can be covered by the operation of AUFLS<sup>1</sup> together with the reserves scheduled and/or dispatched; and
- initiate pre-event demand shedding to avoid cascade failure

will continue to apply.

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### Focus on dispatch of IR in steady state

In February 2006, the Electricity Commission consulted on another proposal to amend the rules with respect to the dispatch and pricing of instantaneous reserve ("full proposal"). This is a comprehensive proposal that seeks to deal with the scheduling, dispatch and pricing of instantaneous reserve ("IR") both when there is a shortage of offers and immediately following the occurrence of a contingent event. That proposal was updated in December 2007.

The **NWG IR dispatch proposal** focuses on changes that are achievable in a shorter timeframe than the full proposal. Its scope is limited to the dispatch of instantaneous reserve when there is a shortage of offers in steady state or at the point where the System Operator would otherwise restore reserves after the occurrence of a contingent event<sup>2</sup>.

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<sup>1</sup> Automatic under-frequency load shedding.

<sup>2</sup> Following the occurrence of a contingent event, the System Operator immediately zeros the reserve requirement with the aim of restoring reserves within thirty minutes after the event. The System Operator does not propose to change this policy.

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**Manual determination of reserve requirements**

A key difference between the **NWG IR dispatch proposal** and the full proposal is the **NWG IR dispatch proposal** involves a manual (non-optimal) process for determining the reserve requirement in a shortage situation.

In contrast, the full proposal involves an automated and optimised process using the Scheduling, Pricing and Dispatch (SPD) software. This would be an inherently more accurate process but substantially more complex to implement. The complex proposal is not implementable for the winter 2008 timeframe.

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**Continuation under the new market systems**

With the aim of meeting the NWG 2008 timeframe, the System Operator has prepared this rule change proposal under some urgency. As such, the System Operator is not yet in a position to confirm whether continued delivery of the **NWG IR dispatch proposal** will be possible from the time its new market systems come into effect.

Accordingly, if this proposed rule change is implemented, there will probably be a reversion to the current rules, to take effect from the time that the new market systems are implemented. For simplicity and clarity, the System Operator has not drafted such necessary reversion into the proposed rule changes. Effectively, the proposed **NWG IR dispatch proposal** will apply from the date it comes into force until the **changeover date** (as defined in the Policy Statement – clause 161 of schedule C4 of the rules).

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**Current policy**

The System Operator's current policy where there are insufficient offers to meet the reserve requirement for the largest CE in the current trading period is set out in clause 33.1 of the Policy Statement (schedule C4 of the rules):

*33. To maintain a dispatchable **SPD** solution where there is insufficient offers and/or reserve offers in the current trading period, the system operator will:*

*33.1 For a **contingent event**, zero the reserve requirements until the system operator reasonably identifies it is possible to reschedule both generation and **frequency keeping**.*

In practice, the System Operator zeroes the reserve requirement by adjusting the relevant reserve adjustment factor<sup>3</sup> (RAF) in SPD to zero.

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<sup>3</sup> Four different RAFs exist for each island, for CE and ECE for FIR and SIR respectively. To achieve the required reserve, the RAF is multiplied by the risk after deducting the Net Free Reserve.

## Discussion

This discussion section describes the proposed changes.

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**Declaration of a grid emergency** In accordance with current policy, where the System Operator identifies there is, or is likely to be, a shortage of energy and reserve offers, the System Operator will issue a warning notice (outside 2 hours) or declare a grid emergency (within 2 hours).

Unless there is insufficient time, the System Operator will request responses from participants in order to alleviate the grid emergency before taking action by reducing the reserve requirements.

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**Proposed CE RAF reduction process** Where there are insufficient offers to maintain a dispatchable SPD solution for the current trading period, the System Operator proposes to reduce the CE reserve requirement for the relevant island in 20% increments. This action would be taken when the SPD solution for the current trading period has either become infeasible or is expected very shortly to become infeasible.

The reduction in the reserve requirement would be achieved by reducing the relevant CE RAFs from the usual value of 1 to one of the following values - 0.8, 0.6, 0.4, 0.2, or 0. These are the only values that would be available to system coordinators.

In real time operation it may not be possible or appropriate to reduce the reserve requirement sequentially to achieve a dispatchable SPD solution. The System Operator will use a manual process, using the information reasonably to hand and reflecting the time constraints, to determine the highest CE reserve setting that is likely to result in a dispatchable SPD solution.

Given the time constraints the System Operator will be under and the manual nature of the proposed process, it is not practicable for the System Operator to experiment with different RAF values in order to establish the maximum feasible RAF value. For this reason, the System Operator is proposing 20% increments to balance accuracy and practicability.

The System Operator proposes that it undertake the above RAF-reduction process instead of setting the CE RAFs to zero. In practice, it is expected the RAF value required for a dispatchable solution would, at a minimum, be at or below the point where all offered IL<sup>4</sup> is cleared.

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<sup>4</sup> Interruptible load.

**Proposed CE  
RAF reduction  
process  
(cont'd)**

However, reduction to zero is still a possible outcome under the proposed process when an immediate response is required to obtain a dispatchable solution and there is insufficient time to attempt to use a RAF value (from the available increments) that is greater than zero.

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**Restoration of  
the CE RAFs to  
one**

The System Operator proposes to use a similar approach to increasing the RAFs to the one it uses to reduce them. That is, the System Operator will use the information to hand to determine the highest CE RAF value setting (from the available increments) likely to result in a dispatchable SPD solution on the first attempt.

As an additional consideration, the System Operator will take into account the need to restore the reserve requirements with progressive increments back to a CE RAF of 1 and will seek to avoid a sequence of RAF increments and subsequent decrements. As such, the System Operator may wait until it has established there is a sustained change in power system conditions before incrementing the CE RAF.

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**RAF  
publication**

Currently, the System Operator would generally advise participants via a Grid Emergency Notice (GEN) where the RAFs have been zeroed or returned to one.

Currently GENs provide an indication to participants that the System Operator may have taken (or is about to take) action to reduce the RAFs. The NWG participants identified that if the Grid Owner offers HVDC Pole 1 only under a grid emergency, it will not be clear if the CE RAF values have also been reduced<sup>5</sup>.

The System Operator considers it important that participants are kept well informed of any changes to the CE RAF values. However, for practicability reasons<sup>6</sup>, and in the interests of reserving the issue of a GEN for participant requests and instructions, the System Operator considers it more appropriate to make information regarding CE RAF increments available to participants by means other than the GEN.

Consequently, the System Operator proposes to make the RAF value changes that have been applied available to participants via COMIT/WITS. Implementation details have not been finalised at the date of this paper. However, it is envisaged the RAF information would be made available with every Real Time Pricing (RTP) solution that is published. The RAF information would show the RAFs that applied at the start of each RTP (5 minute) period.

The issuing of a GEN would trigger participants to monitor COMIT/WITS for any RAF changes.

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<sup>5</sup> It is likely the System Operator would already have issued the GEN prior to making the decision that RAF reduction was required.

<sup>6</sup> There would be more RAF settings available to the System Operator than the current options of 1 or 0.

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**After a CE has occurred**

The System Operator does not propose to change its current policy of zeroing the reserve requirements immediately following the occurrence of a contingent event when IL has tripped. Where such an event occurs the System Operator aims (and will continue to aim) to restore reserves within thirty minutes after the event<sup>7</sup>. The System Operator restores the reserve requirement by returning the RAFs to 1.

The occurrence of a contingent event can itself result in an offer shortage situation due to the resultant withdrawal of energy and reserve offers following the event. This can lead to the System Operator being unable (after it has returned the RAFs to 1) to dispatch the reserve requirement within thirty minutes after the occurrence of the event.

If this situation occurs, the System Operator will declare a grid emergency as described in the above section **Declaration of a grid emergency**. Unless there is insufficient time, the System Operator will request responses from participants in order to alleviate the grid emergency before taking action by reducing the reserve requirements in accordance with the proposed CE RAF reduction process described above.

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<sup>7</sup> Refer to clause 17.1.6 of the Policy Statement (schedule C4).

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**Pricing matters** We emphasise that the scope of the proposed rule change does not include any change to the pricing rules. In our view, any such change should be led by the Electricity Commission, with proper industry consultation.

The System Operator recommends the Pricing Manager and Electricity Commission consider the impact of the proposed changes on the workability and appropriateness of the existing exemption.

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## Summary and Conclusions

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**Conclusion** To enable the partial dispatch of reserves in offer shortage situations, the System Operator is proposing changes to the rules.

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**Recommendation** The System Operator recommends that the Electricity Commission progress the proposed rule changes through the relevant regulatory process.

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## Proposed Rule Changes

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### Detailed Regulation changes

Transpower proposes that the Electricity Governance Rules 2003 (EGRs) be changed as follows:

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### Rule changes

Note: The changes below are "marked up" against the existing wording of the EGRs so the extent of the amendments is identifiable.

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## 1. Changes to Policy Statement (Schedule C4)

*Explanation:* The proposed changes to the Policy Statement would give effect to the core aspects of the **NWG IR dispatch proposal**, and outline how the System Operator will adjust the RAFs in an offer shortage situation.

- Amend clause 32 to read as follows:

32. In modelling reserve requirements, the **system operator** will:

32.1 Subject to clause 33 and 33A, Apply the **Reserves Management Tool**

[32.2 -32.4 remain unchanged]

*Explanation:* The adjustment of the RAFs occurs outside of RMT, and the above rule change is required to ensure there is no inconsistency between the different rules.

- Replace clause 33 of Schedule C4 with new clauses 33, 33A, 33B and 33C as follows:

33. To maintain a dispatchable **SPD** solution in any situation (other than following occurrence of a **contingent event** or an **extended contingent event**) where there is are, or the **system operator** considers there will be, insufficient **offers** and/or **reserve offers** in the current **trading period** (or, where such assessment is made in the last 5 minutes of a **trading period**, the following **trading period** ) to schedule **instantaneous reserves** to meet the reserve requirement identified by the **Reserves Management Tool** for a **contingent event**, the **system operator** will use reasonable endeavours to apply the following policy:

33.1 The **system operator** will reduce the reserve requirements so that it is possible to achieve a dispatchable **SPD** solution. The settings available for a reduction of the reserve requirements are 0.8, 0.6, 0.4, 0.2 or 0. When initially reducing the reserve requirements the **system operator** will use the information reasonably available to it at the time (and reflecting the time constraints for its decision) to determine what it considers to be the highest setting that is reasonably likely to result in a dispatchable **SPD** solution. If such setting does not result in a dispatchable **SPD** solution, the **system operator** will further reduce the reserve requirements (using the available settings) to achieve a dispatchable **SPD** solution.

33.2 Where the **system operator** has reduced the reserve requirement as provided for in this clause 33, the **system operator** will only subsequently increase the reserve requirements when the **system operator** considers there has been a sustained change in the state of the power system such that an increase is justified. When increasing the reserve requirements the **system operator** will apply the same principles it applied to reduce the reserve requirements initially (ie. it will adopt the highest setting it considers is reasonably likely to result in a dispatchable **SPD** solution). The **system operator** will continue to

apply this process until such time as it is reasonably satisfied that the reserve requirements can be returned to their normal setting (ie. one).

~~33.1 For a **contingent event**, zero the reserve requirements until the **system operator** reasonably identifies it is possible to reschedule both generation and **frequency keeping**.~~

33A To maintain a dispatchable **SPD** solution where there are insufficient **offers** and/or **reserve offers** in the current **trading period** to schedule **instantaneous reserves** to meet the reserve requirement identified by the **Reserve Management Tool** ~~For an **extended contingent event** that requires the **dispatch** of **instantaneous reserves** in addition to **automatic under-frequency load shedding**, the **system operator** will~~ reduce **demand** in accordance with the **demand management policies**.

33B Where the **system operator** adjusts the reserve requirements setting under clause 33 or following occurrence of a **contingent event**, it will use reasonable endeavours to make available to **participants** the setting applying at the commencement of each relevant **real time pricing period**.

33C For the avoidance of doubt:

33C.1 Nothing in clause 33 requires the **system operator** to ensure it has selected the highest possible setting for the reserve requirements that would result in a dispatchable **SPD** solution – the **system operator** is only required to determine what it considers to be the **highest setting that is reasonably likely to result in a dispatchable **SPD** solution, based on the information that it has available and considers at the time of its decision; and**

33C.2 The **system operator's** actions under this clause 33 or 33A are consistent with meeting the requirements of the **dispatch objective**.

*Explanation:* Clause 33 sets out the detail of how the System Operator will adjust the RAFs in an offer shortage situation. Clause 33C is included to emphasise that the proposal does not completely optimise the dispatch of reserves in a way that might be achieved with a complex software application. The clause is intended therefore to support the System Operator in making real-time, operational decisions without at the same time opening up each decision to claims, with the benefit of hindsight that a different setting of the RAFs was possible and better and that consequently the System Operator did not meet the dispatch objective.

## 2. Changes to Reserve Management Objective (Schedule C6)

Amend the first paragraph to read as follows

The objective of the Reserves Management process is to provide the Scheduling, Pricing and Dispatching Tool (SPD) with the information necessary to permit SPD to schedule a minimum quantity of instantaneous reserve. Simultaneously, but subject to the sufficiency of **offers** and/or **reserve offers** and to clause 33 and 33A of Schedule C4, the process must satisfy the requirement that sufficient instantaneous reserve is scheduled to maintain the power system frequency of each of the North and South Islands within the limits of the under-frequency standard specified below.

*Explanation:* The change is to ensure consistency, and to recognise that the reserves management process is dependent upon the sufficiency of offers.

## 4. Changes to Schedule G6 (Schedule of Prices and Quantities)

Amend rule 4.3.3 as marked below:

### 4.3.3 Adjustments to instantaneous reserve

Adjustments will only be made to **instantaneous reserve** modelling parameters where the **system operator** has a specific requirement for **instantaneous reserve** to meet the requirements of the **dispatch objective** (including where adjustments are provided for as part of the **policy statement**).

*Explanation:* The change is to make it clear that there is consistency between the adjustment of RAFs under the policy statement and an adjustment under schedule G6.