



**Independent Market Operator**

**Final Market Rule Change  
Report**

**Title: Calculation of Net STEM  
Shortfall**

**Ref: RC\_2010\_03**

**Date: 30 March 2010**

## Contents

1.	INTRODUCTION .....	3
2.	THE RULE CHANGE PROPOSAL .....	4
2.1	Submission Details .....	4
2.2	Details of the Proposal.....	4
2.3	The Proposal and the Wholesale Market Objectives .....	5
2.4	The Amending Rules Proposed by the IMO .....	5
2.5	The IMO's Initial Assessment of the Proposal.....	5
3.	CONSULTATION .....	6
3.1	Consultation with Verve Energy .....	6
3.2	Out of session submission from Landfill Gas & Power.....	6
3.3	Out of session submission from Perth Energy .....	7
3.4	Out of session submission from Synergy .....	8
3.5	Out of session submission from Alinta .....	8
3.6	The IMO's response to submissions received during the consultation period .....	8
4.	THE IMO'S ASSESSMENT.....	9
4.1	Wholesale Market Objectives .....	9
4.2	Practicality and cost of implementation .....	11
4.3	Views expressed in submissions.....	11
4.4	Views of the Market Advisory Committee.....	11
5.	THE IMO'S FINAL DECISION.....	13
5.1	Reasons for the decision .....	13
6.	AMENDING RULES .....	13
6.1	Commencement .....	13
6.2	Amending Rules .....	14
	APPENDIX 1: FULL DETAILS OF THE PROPOSAL.....	19

## DOCUMENT DETAILS

IMO Notice No.: RC\_2010\_03  
Report Title: Calculation of Net STEM Shortfall  
Release Status: Public  
Confidentiality Status: Public domain  
Published in accordance with Market Rule 2.6.4

### Independent Market Operator

Level 3, Governor Stirling Tower  
197 St George's Terrace, Perth WA 6000  
PO Box 7096, Cloisters Square, Perth WA 6850  
Tel. (08) 9254 4300  
Fax. (08) 9254 4399  
Email: imo@imowa.com.au  
Website: [www.imowa.com.au](http://www.imowa.com.au)

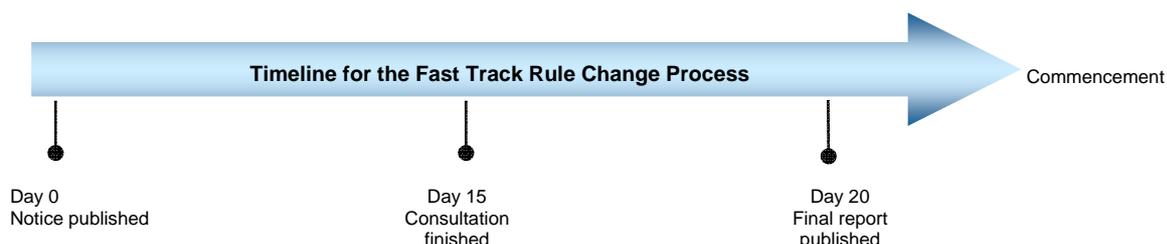


## 1. INTRODUCTION

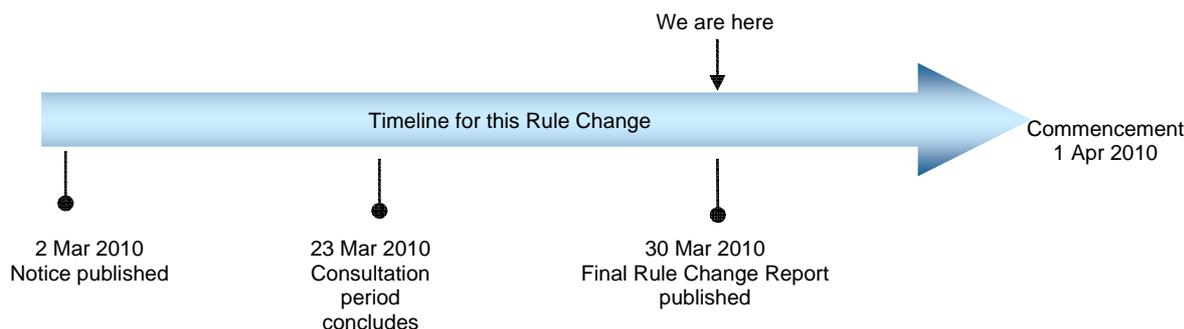
On 2 March 2010 the Independent Market Operator (IMO) initiated a Rule Change Proposal regarding amendments to clauses 4.26.2, 4.26.2E, 4.26.3 and new clause 4.26.2F of the Wholesale Electricity Market Rules (Market Rules).

This Proposal was processed using the Fast Track Rule Change Process, described in section 2.6 of the Wholesale Electricity Market (Wholesale Electricity Market) Rules (Market Rules).

The fast track process adheres to the following timelines:



The key dates in processing this Rule Change Proposal are:



The IMO's final decision is to implement the Rule Change Proposal in the form outlined in section 6.2 of this report. The decision is based on the IMO's assessment of the Rule Change Proposal against the:

- Wholesale Market Objectives;
- practicality and cost of implementing the proposal;
- Market Advisory Committee's (MAC) recommendations; and
- outcomes from the public consultation period.

The amendments to the Market Rules made as a result of this Rule Change Proposal will commence at 8.00am on 1 April 2010.

All documents related to this Rule Change Proposal can be found on the IMO website: [http://www.imowa.com.au/RC\\_2010\\_03](http://www.imowa.com.au/RC_2010_03)

## 2. THE RULE CHANGE PROPOSAL

### 2.1 Submission Details

<b>Name:</b>	Troy Forward
<b>Phone:</b>	(08) 92544304
<b>Fax:</b>	(08) 92544399
<b>Email:</b>	<a href="mailto:troy.forward@imowa.com.au">troy.forward@imowa.com.au</a>
<b>Organisation:</b>	Independent Market Operator
<b>Address:</b>	
<b>Date submitted:</b>	2 March 2010
<b>Urgency:</b>	High
<b>Change Proposal title:</b>	Calculation of Net STEM Shortfall
<b>Market Rule affected:</b>	4.26.2, 4.26.2E, 4.26.3 and new clause 4.26.2F

### 2.2 Details of the Proposal

A Net STEM Shortfall is the amount by which the Reserve Capacity actually supplied by a Market Participant falls short of that Market Participant's Reserve Capacity Obligation. It is used to calculate the Capacity Cost Refund payable by a Market Participant.

The IMO identified two key issues with the current formulation of the Net STEM Shortfall calculation:

- Issue 1: Where a Market Participant has multiple generators in its portfolio and one (or more) suffers a real-time Forced Outage then the expected energy supplied in real-time from the portfolio is reduced to reflect just the Forced Outage. This adjustment however is applied relative to the portfolio's total Reserve Capacity Obligation Quantity, including Scheduled Generators, Curtailable Loads and Interruptible Loads that were not dispatched. As a result the Market Participant is exposed to a Net STEM shortfall purely because some of its facilities were not asked to supply energy or loads requested to reduce consumption; and
- Issue 2: Portfolios which include generators with additional capacity available beyond their Reserve Capacity Obligations (such as Intermittent Generators) can use the output of these generators to potentially offset any Net STEM shortfall caused by under supply of other facilities in the same portfolio.

Currently Issue 1 is impacting directly on a Market Participant and as such the IMO proposed the following interim solution:

- Remove Curtailable Loads from the calculation in clause 4.26.2 (Net STEM Shortfall calculation) and treat separately under clause 4.26.2D (Capacity Shortfall calculation).

The IMO noted that in adopting this interim solution the further issues around portfolios with multiple generators and outputs greater than their Reserve Capacity Obligations would not be solved. A further long-term solution will still be required, and will be progressed by the IMO at a later stage.

The IMO also proposed:

- a typographical change to clarify that the Capacity Cost Refund determined in clause 4.26.2E relates to the Net STEM Shortfall calculated under clause 4.26.2 and the Capacity Shortfall calculated under clause 4.26.2D; and
- some further minor changes to improve the overall integrity of this section of the Market Rules.

Further details of the identified issues along with the IMO's proposal are presented in Appendix 1 of this report.

### **2.3 The Proposal and the Wholesale Market Objectives**

Details of the IMO's assessment of the proposal against the Wholesale Market Objectives were presented in the Rule Change Notice published on the IMO's webpage.

### **2.4 The Amending Rules Proposed by the IMO**

The amendments to the Market Rules originally proposed by the IMO are provided in section 6.2 of this final report.

### **2.5 The IMO's Initial Assessment of the Proposal**

The IMO decided to process the Rule Change Proposal using the Fast Track Rule Change Process, described in clause 2.6 of the Market Rules, on the basis that it satisfies the criteria in clauses 2.5.9(a) and 2.5.9 (b) of the Market Rules.

In particular, the IMO considered that the proposed amendments were required to correct a manifest error which maintains the reference to Curtailable Loads in the Net STEM Shortfall calculation despite the separate treatment of Curtailable Loads which was introduced under RC\_2008\_20. The IMO considered that this was an oversight which requires correcting to ensure consistency with the original intent of RC\_2008\_20 and remove a potential anomaly in determining the Net STEM Shortfall.

Additionally the IMO noted that the proposal also consists of a minor correction to amend a current inaccuracy in the drafting of clause 4.26.2E which refers to the shortfall determined under clause 4.26.2 (the Net STEM Shortfall) as a Capacity Shortfall. It does not seek to amend the operation of the Market Rules.

As such the IMO considered that the proposal fulfils the requirements of sub-clauses 2.5.9(a) and 2.5.9(b) and therefore maybe be fast-tracked.

Clause 2.5.9 states:

*The IMO may subject a Rule Change Proposal to the Fast Track Rule Change Process if, in its opinion, the Rule Change Proposal:*

*(a) is of a minor or procedural nature; or*

*(b) is required to correct a manifest error; or*

*(c) is urgently required and is essential for the safe, effective and reliable operation of the market or the SWIS.*

### **3. CONSULTATION**

An invitation for all Rule Participants to contact the IMO, should they wish to be consulted on this Rule Change, was published on the IMO website on 2 March 2010, together with the Rule Change Notice.

The consultation period for this Rule Change Proposal was between 3 March 2010 and 23 March 2010. Interested stakeholders were requested to inform the IMO if they wished to be consulted on this Rule Change Proposal by 9 March 2010.

The IMO received a request to be consulted on this Rule Change Proposal from Verve Energy. An overview of the consultation between the IMO and Verve Energy is presented below. The IMO also received out-of-session submissions from Landfill Gas & Power (LGP), Perth Energy, Synergy and Alinta. Further details of these out-of-session submissions are summarised below, with full text available on the IMO's website.

#### **3.1 Consultation with Verve Energy**

The IMO and Verve Energy met to consult on RC\_2010\_03 on Monday 15 March 2010. During the consultation Verve Energy noted that it did not oppose the proposed changes, but considered that all the identified issues should be attended to within the proposal and not just the issues associated with the inclusion of Curtailable Loads in the calculation.

Verve Energy stated that until the issues associated with portfolios that include generators with additional capacity available beyond their Reserve Capacity Obligations (e.g. Intermittent Generators) are further considered there will be a potential for Market Generators to game the market. In response, the IMO noted that it will further review the wider issues associated with the Net STEM shortfall calculation with the intent of proposing a further rule change to provide a solution to these wider issues.

#### **3.2 Out of session submission from Landfill Gas & Power (LGP)**

LGP supports the Rule Change Proposal on the grounds that it corrects a manifest error that requires urgent remedy.

LGP notes that the proposed changes are necessary to uphold the integrity of the Market Rules and as such is consistent with all the Market Objectives.

### **3.3 Out of session submission from Perth Energy**

Perth Energy agrees that the identified issue regarding the inclusion of Curtailable Loads in the calculation of the Net STEM Shortfall should be addressed as a matter of urgency for the following reasons:

- The Market Rules as currently written appear to inadvertently discriminate between single and multi-facility portfolios in that the outcome of the Net STEM Shortfall calculation is different depending on the construction of the Market Participant's portfolio in relation to the number of facilities and types of facilities included; and
- The current Market Rules clearly provides a significant disincentive to registering a Curtailable Load or an Interruptible Load as all Capacity Credits associated with these facilities will over a year be repaid in the form of Capacity Credit refunds as a result of the shortcoming of the current formulation of the Net STEM Shortfall calculation.

Perth Energy considers that the proposed changes clearly relate to a manifest error and therefore supports the IMO's decision to fast track the changes. Perth Energy also considers the effectiveness of the market may be impacted without the quick implementation of the proposed change as there will continue to be a strong disincentive to register Curtailable Loads until the current shortcomings of the Market Rules have been addressed.

Perth Energy notes that the beneficial impact of Intermittent Generators' output on a Market Participant's total Net STEM Shortfall calculation is not warranted. Perth Energy contends that Intermittent Generators are allocated Capacity Credits and have at the same time a zero value for their Reserve Capacity Obligation Quantity. As a result in effect no Capacity Credit refunds apply to Intermittent Generators. Perth Energy states that Intermittent Generators also, in general, incur no penalties for not following a predetermined resource plan. In Perth Energy's view, continuing to allow Intermittent Generators to offset Net STEM Shortfalls created by other facilities in a portfolio will continue to provide portfolios with Intermittent Generators with an undue competitive advantage.

Perth Energy notes that it would welcome a further change to the Market Rules to address the remaining issues with clause 4.26.2, including the issue of the treatment of Intermittent Generators.

Perth Energy considers that addressing the issue identified by removing the unintended consequences in the current calculation of the Net STEM Shortfall would further facilitate achievement of the Market Objectives, and in particular Market Objective (a). Perth Energy does not consider the change proposal impacts on the achievement of Market Objectives (b), (c), (d) and (e).



### **3.4 Out of session submission from Synergy**

Synergy supports the Rule Change Proposal but agrees with the IMO that this is an interim solution only. In particular, Synergy considers that the rules relevant to the calculation of the Net STEM Shortfall need a full assessment. Synergy notes that it would support the formation of a working group to specifically assess the ongoing requirement concerning Net STEM Shortfall calculations and to determine the nature of such formulation.

### **3.5 Out of session submission from Alinta**

Alinta supports the interim solution as the proposed changes are necessary to rectify a manifest error in the Market Rules. However, Alinta does not support the contention that the current Market Rules, which provide a benefit to Market Participants with a mixture of Scheduled Generators and Intermittent Loads, is a manifest error.

Alinta notes that Market Rule 4.26.2 is clearly intended to apply across all facilities operated by a Market Participant. While this may give some benefit to some Generators depending on their Facility portfolio, it is unclear that this is necessarily unintended or inappropriate.

Alinta stated that prior to future amendments to the Net STEM Shortfall Calculation, consideration will need to be given to whether the benefit that might be received by a Market Participant resulted in an actual cost to the market as a whole or vice versa. If the market is not adversely impacted by the operation of Market Rule 4.26.2 as amended in this proposal, then it should not be considered to be a manifest error.

Market Rule 4.26.2 potentially provides an incentive to invest in Intermittent Generation as part of a diversified Generation portfolio. Alinta note that it is not clear that the current Market Rule does not intend to provide such an incentive and therefore it is also not clear that the potential outcome of the proposed amendments is either unintended or inappropriate. What should be considered is whether the market is adversely impacted by the operation of the current Market Rule 4.26.2.

Alinta agrees that irrespective of the intent behind Market Rule 4.26.2 when the rules were developed, it would be appropriate that the outcomes associated with Market Rule 4.26.2 and the broader issues identified in the IMO's Concept Paper be assessed against the Market Objectives.

Alinta considers that this Rule Change Proposal is consistent with all the Wholesale Market Objectives in particular Market Objective (a) and (d).

### **3.6 The IMO's response to submissions received during the consultation period**

During the consultation period a number of points were raised, both formally and informally, regarding the IMO's proposed amendments to the Market Rules. In particular, Verve Energy, Perth Energy, Synergy and Alinta all noted the need to further consider the broader issues identified with the Net STEM Shortfall calculations. In particular, Synergy expressed support for the formation of a working group to specifically assess the Net STEM Shortfall calculations and to determine the nature of any revised formulation.



In response, the IMO agrees that there is a need to further consider the broader issues around the calculation of Net STEM Shortfalls. The IMO considers a Working Group, constituted under the auspices of the MAC, should be convened to consider the identified issues and potential solutions for implementation. The IMO however notes that given the work currently underway associated with the Oates Review Implementation process there is limited capacity within the Market to consider these issues in the immediate term. Given these restrictions and the importance of both thoroughly considering the identified issues and determining an appropriate solution, the IMO does not intend convening a Net STEM Shortfall Calculation Working Group until the end of 2010.

#### 4. THE IMO’S ASSESSMENT

In preparing this Final Rule Change Report, the IMO must assess the Rule Change Proposal in light of clauses 2.4.2 and 2.4.3 of the Market Rules.

Clause 2.4.2 outlines that the IMO “must not make Amending Rules unless it is satisfied that the Market Rules, as proposed to be amended or replaced, are consistent with the Wholesale Market Objectives”.

Additionally, clause 2.4.3 states, when deciding whether to make Amending Rules, the IMO must have regard to the following:

- Any applicable policy direction from the Minister regarding the development of the market;
- The practicality and cost of implementing the proposal;
- The views expressed in submissions and by the MAC; and
- Any technical studies that the IMO considers necessary to assist in assessing the Rule Change Proposal.

The IMO notes that there has not been any applicable policy direction from the Minister, nor have there been any technical studies commissioned in respect of this Rule Change Proposal.

This IMO’s assessment is outlined in the following sections.

##### 4.1 Wholesale Market Objectives

The IMO considers that the Market Rules as a whole, if amended, will be consistent with the Wholesale Market Objectives.

Wholesale Market Objective	Consistent with objective
(a) to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system	Yes



<b>Wholesale Market Objective</b>	<b>Consistent with objective</b>
(b) to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors	Yes
(c) to avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions	Yes
(d) to minimise the long-term cost of electricity supplied to customers from the South West interconnected system	Yes
(e) to encourage the taking of measures to manage the amount of electricity used and when it is used	Yes

Further, the IMO considers that the Market Rules, if amended, would not only be consistent with the Wholesale Market Objectives but also allow the Market Rules to better address Wholesale Market Objective (a):

<b>Impact</b>	<b>Wholesale Market Objectives</b>
Allow the Market Rules to better address objective	a,
Consistent with objective	b, c, d, e
Inconsistent with objective	-

(a) *to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West Interconnected System*

The IMO considers that the proposed amendments will better achieve market objective (a) through restoring market price signals to their correct levels for portfolios with Curtailable Loads. In particular, the purpose of Capacity Cost Refunds is to ensure that Market Participants who hold Capacity Credits face an appropriate incentive to ensure that they deliver the capacity that they have been contracted to deliver. Currently, Market Participants with portfolios containing Curtailable Loads are faced with inflated refunds despite having made the capacity of their Curtailable Load available to the market. This outcome may potentially impact on Market Participant's decisions to make available the capacity of Curtailable Loads, thereby potentially restricting the availability of capacity in the SWIS.

The IMO considers that the proposed changes are consistent with the other Market Objectives.



#### **4.2 Practicality and cost of implementation**

The proposed changes will require changes to the settlement systems operated by the IMO. These changes will cost approximately AUD \$3525.

#### **4.3 Views expressed in submissions**

The IMO received a formal request for consultation from Verve Energy who supported the Rule Change Proposal but noted the need for further review of the broader issues identified with the Net STEM Shortfall calculation. Additionally, the IMO received four out-of-session submissions before the end date for consultation. These submissions were also in favour of the Rule Change Proposal, but similarly Perth Energy, Synergy and Alinta noted the need to further review the broader identified issues. In particular, Synergy suggested that a Working Group be convened to consider the broader issues further.

In response to these points raised regarding the need to further consider the broader issues previously identified the IMO has determined to convene a Net STEM Shortfall Calculation Working Group through the auspices of the MAC. Further details of the IMO's response to submissions are contained in section 3.4 of this report.

#### **4.4 Views of the Market Advisory Committee**

The MAC met to discuss the proposal at various stages:

- 9 December 2009;
- 10 February 2010; and
- 10 March 2010.

An overview of the discussion from the various MAC meetings is presented below. Further details are available in the MAC meeting minutes available on the IMO website: <http://www.imowa.com.au/market-advisory-committee>

### **December 2009 MAC meeting**

Griffin Energy first outlined the problem with the formula for calculating the Net STEM Shortfall at the 9 December 2009 meeting. In particular Griffin Energy noted that a Market Participant with more than one Facility is currently overcharged Capacity Cost Refunds if one of its facilities experiences a Forced Outage while another has generating capacity that is not dispatched

Griffin Energy signalled its intention to submit a fact track Rule Change Proposal to address this problem, albeit with an agreed extension to the consultation period to take account of the Christmas Break.

### **February 2010 MAC meeting**

During the 10 February 2010 meeting, the IMO presented the issues identified by Griffin Energy with the formula for calculating the Net STEM Shortfall.

The IMO apologised to Griffin Energy for not working through this issue quicker. In particular, the IMO noted that after internally reviewing the issues, it had determined that although there appears to be an error in the calculation, no fast solution to fix the issue had been identified. The IMO noted that any changes will impact on most of the market and that it had contracted Future Effect to undertake a more detailed examination of the issues to identify any potential solution and likely impact.

The following points were raised by MAC members regarding Future Effects presentation on the identified issues and potential solutions:

- Griffin Energy noted that as a consequence of the current error in the calculation it is likely to cost it \$2.5m this year;
- Alinta noted that it was uncertain whether the treatment of Intermittent Generators under the current calculation was necessarily unintended; and
- The Chair noted a preference for fixing the whole issue and not just part of the issue.

The MAC was in agreement that the IMO should prepare a Rule Change Proposal, subject to any comments received from MAC members following the meeting, including the proposed solution before the next MAC meeting.

Following the February MAC meeting, the IMO circulated a concept paper providing further details of the issues and seeking comments from MAC members. Comments provided by MAC members generally supported the removal of Curtailable Loads from the calculation of the Net STEM Shortfall (as an interim solution).

### **March 2010 MAC Meeting**

The IMO noted its decision to progress the interim proposed solution to Griffin Energy's issues associated with the inclusion of Curtailable Loads in its portfolio. The IMO noted that the



broader issues identified in the concept paper will be kept on the IMO Rules log as a medium priority issue to be reviewed at a later date.

The IMO noted the interactions between Intermittent Generation and its impact on the portfolio level Net STEM Shortfall calculations and that it will seek guidance from other stakeholders who are directly impacted on by this interaction, prior to progressing with any Rule Change Proposal.

The following points were raised by MAC members during the meeting:

- Alinta noted that it has reviewed the wider issue with the inclusion of Intermittent Generation in its portfolios and has not identified a significant impact having previously occurred;
- Alinta noted that it was uncertain that all the issues had been examined as thoroughly as required with regards to the broader issues with the calculation identified by the IMO; and
- The IMO noted the concerns raised by Alinta and stated that it had taken these into account when determining to proceed with the interim solution of removing Curtailable Loads from the Net STEM Shortfall calculation.

## 5. THE IMO'S FINAL DECISION

The IMO's final decision is to implement the amendments to clauses 4.26.2, 4.26.2E, 4.26.3 and to insert new clause 4.26.2F.

### 5.1 *Reasons for the decision*

The IMO has made its decision on the basis that the Amending Rules:

- Will allow the Market Rules to better address Wholesale Market Objective (a);
- Are consistent with the remaining Wholesale Market Objectives;
- Have the support of those Market Participants formally consulted during the consultation period; and
- Are consistent with the advice received from the MAC.

Additional detail outlining the analysis behind the IMO's reasons is outlined in section 4 of this Final Rule Change Report.

## 6. AMENDING RULES

### 6.1 *Commencement*

The amendments to the Market Rules resulting from this Rule Change Proposal will commence at **8:00am** on **1 April 2010**.

## 6.2 Amending Rules

The following clauses are amended (~~deleted wording~~, new wording):

The proposed amendment to clause 4.26.2 will remove Curtailable Loads from the RCOQ and CAPA components for the calculation of each Market Participant's Net STEM Shortfall. Any shortfall associated with Curtailable Loads will be calculated in clause 4.26.2D.

For unregistered facilities this means excluding Loads that can be interrupted on request (the term Curtailable Load cannot be used as the definition implies that they are registered) and may potentially be registered in the future as a Curtailable Load in accordance with clause 2.29.5(b). For Registered Facilities this means excluding Curtailable Loads from the calculation.

4.26.2. The IMO must determine the net STEM shortfall ("**Net STEM Shortfall**") in Reserve Capacity supplied by each Market Participant  $p$  holding Capacity Credits associated with a generation system in each Trading Interval  $t$  of Trading Day  $d$  and Trading Month  $m$  as:

$$SF(p,m,d,t) = \text{Max}(RTFO(p,d,t), RCOQ(p,d,t) - A(p,d,t)) + \text{Max}(0, B(p,d,t) - C(p,d,t)) - RTFO(p,d,t)$$

Where

$$A(p,d,t) = \text{Min}(RCOQ(p,d,t), \text{CAPA}(p,d,t));$$

$$B(p,d,t) = \text{Min}(RCOQ(p,d,t) - RTFO(p,d,t), \text{DSQ}(p,d,t));$$

$$C(p,d,t) = \text{Min}(\text{DSQ}(p,d,t), \text{MSQ}(p,d,t));$$

$RCOQ(p,d,t)$  ~~is for Market Participant  $p$  and Trading Interval  $t$  of Trading Day  $d$~~  is equal to:

(a) ~~the total Reserve Capacity Obligation Quantity of Market Participant  $p$ 's unregistered facilities that have Reserve Capacity Obligations,~~ excluding Loads that can be interrupted on request, plus

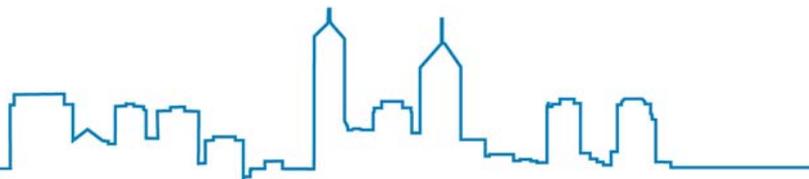
(b) ~~the sum over all of the Registered Facilities registered to Market Participant  $p$~~  of the product of:

i. ~~the factor described in clause 4.26.2B as it applies to Market Participant  $p$ 's the Registered Facilities;~~ and

ii. ~~the Facility's Reserve Capacity Obligation Quantity~~ for each Facility

for all Market Participant  $p$ 's Registered Facilities, excluding Curtailable Loads; in Trading Interval  $t$  of Trading Day  $d$ ;

$CAPA(p,d,t)$  ~~is for Market Participant  $p$  and Trading Interval  $t$  of Trading Day  $d$ :~~



- (ac) equal to  $RCOQ(p,d,t)$  for a Trading Interval where the STEM auction has been suspended by the IMO in accordance with clause 6.10;
- (bd) subject to paragraph (ac), for the case where Market Participant p is not the Electricity Generation Corporation, the sum of:
- i. the sum of the Reserve Capacity Obligation Quantities in Trading Interval t of that Market Participant's Interruptible Loads ~~and Curtailable Loads~~; plus
  - ii. the MW quantity calculated by doubling the net MWh quantity of energy sent out by Facilities registered by that Market Participant during that Trading Interval calculated as the Net Contract Position less the shortfall as indicated by the applicable Resource Plan; plus
  - iiA if a STEM submission does not exist for that Trading Interval, the MW quantity calculated by doubling the total MWh quantity of energy to be consumed by that Market Participant including demand associated with any Curtailable Load or ~~Interruptible Load~~ Interruptible Load, but excluding demand associated with any Dispatchable Load during that Trading Interval as indicated by the applicable Resource Plan; plus
  - iii. the MW quantity calculated by doubling the total MWh quantity covered by the STEM Offers which were not scheduled and the STEM Bids which were scheduled in the relevant STEM Auction, determined by the IMO for that Market Participant under clause 6.9 for Trading Interval t, corrected for Loss Factor adjustments so as to be a sent out quantity in accordance with clause 4.26.2A; plus
  - iv. double the total MWh quantity to be provided as Ancillary Services as specified by the IMO in accordance with clause 6.3A.2(e)(i) for that Market Participant corrected for Loss Factor adjustments so as to be a sent out quantity in accordance with clause 4.26.2A; plus
  - v. the greater of zero and  $(BSFO(p,d,t) - RTFO(p,d,t))$ ; and
- (ee) subject to paragraph (ac), for the case where Market Participant p is the Electricity Generation Corporation, the sum of:
- i. the sum of the Reserve Capacity Obligation Quantities in Trading Interval t of that Market Participant's Interruptible Loads ~~and Curtailable Loads~~; plus



- ii the MW quantity calculated by doubling the total MWh quantity of the Net Contract Position quantity of that Market Participant for Trading Interval t, corrected for Loss Factor adjustments so as to be a sent out quantity in accordance with clause 4.26.2A; plus
- iii the MW quantity calculated by doubling the total MWh quantity of the STEM Offers which were not scheduled and the STEM Bids which were scheduled in the relevant STEM Auction, determined by the IMO for that Market Participant under clause 6.9 for Trading Interval t, corrected for Loss Factor adjustments so as to be a sent out quantity in accordance with clause 4.26.2A; plus
- iv. double the total MWh quantity to be provided as Ancillary Services as specified by the IMO in accordance with clause 6.3A.2(e)(i) for the Electricity Generation Corporation corrected for Loss Factor adjustments so as to be a sent out quantity in accordance with clause 4.26.2A; plus
- v. the greater of zero and  $(BSFO(p,d,t) - RTFO(p,d,t))$ .

$BSFO(p,d,t)$  is the total MW quantity of Forced Outage associated with Market Participant p before the STEM Auction for Trading Interval t of Trading Day d, where this is the sum over all the Market Participant's Registered Facilities of the lesser of the Reserve Capacity Obligation Quantity of the Facility for Trading Interval t and the MW Forced Outage of the Facility for Trading Interval t as provided to the IMO by System Management in accordance with clause 7.3;

$RTFO(p,d,t)$  is the total MW quantity of Forced Outage associated with Market Participant p in real-time for Trading Interval t of Trading Day d, where this is the sum over all the Market Participant's Registered Facilities of the lesser of the Reserve Capacity Obligation Quantity of the Facility for Trading Interval t and the MW Forced Outage of the Facility for Trading Interval t as provided to the IMO by System Management in accordance with clause 7.13.1A (b);

$DSQ(p,d,t)$  is a MW quantity calculated by doubling the MWh value of the sum over all of the Facilities registered by Market Participant p of each Facility's Dispatch Schedule for Trading Interval t of Trading Day d;

$MSQ(p,d,t)$  is a MW quantity calculated by doubling the MWh value of the sum over all of the Facilities registered by Market Participant p of the greater of zero and each Facility's Metered Schedule for Trading Interval t of Trading



Day d corrected for Loss Factor adjustments applicable to that Facility so as to be a sent out quantity.

The proposed amendment to clause 4.26.2E is a typographical change to clarify that the Capacity Cost Refund is made up of the **Net STEM Shortfall** calculated under clause 4.26.2 (the original drafting mistakenly referred to Capacity Shortfall calculated under 4.26.2) and the Capacity Shortfall calculated under clause 4.26.2D. The changes also clarify that the overall Capacity Cost Refund is the summation of these two variables as opposed to either the Net STEM Shortfall or the Capacity Shortfall. This ensures that Market Participants with both generating facilities and Curtailable Loads will have the correct Capacity Cost Refund calculated for its portfolio.

4.26.2E. For each Market Participant holding Capacity Credits, the IMO must determine the amount of the refund (“Capacity Cost Refund”) to be applied for Trading Month m in respect of a Net STEM Shortfall as determined under clause 4.26.2 and a Capacity Shortfall as determined under clauses ~~4.26.2~~ or 4.26.2D during that Trading Month.

The proposed addition of clause 4.26.2F and amendment to 4.26.3 is a minor change to improve the integrity of the Market Rules. This change standardises the drafting for 4.26.3 and 4.26.3A. The new clause 4.26.2F defines that a Capacity Cost Refund must be determined for each Market Participant (this was previously defined in clause 4.26.3 and did not link to the Capacity Cost refund calculated for Curtailable Loads (4.26.3A)).

4.26.2F For each Market Participant holding Capacity Credits, the IMO must determine the amount of the refund (“Capacity Cost Refund”) to be applied for Trading Month m.

4.26.3 For each ~~Market Participant holding Capacity Credits, the IMO must determine the amount of the refund (“Capacity Cost Refund”) associated with a generation system to be applied for Trading Month m.~~ The Capacity Cost Refund associated with a generation system is the lesser of:

- (a) the Maximum Participant Refund determined in accordance with the Refund Table, less all Capacity Cost Refunds applicable to the Market Participant in previous Trading Months falling in the same Capacity Year as Trading Month m; and
- (b) the Participant Forced Outage Refund plus the sum over all Trading Intervals t in Trading Month m of the Net STEM Refund,

where the Net STEM Refund is the product of:

- i. the Off-Peak Trading Interval Rate or Peak Trading Interval Rate determined in accordance with the Refund Table applicable to Trading Interval t; and



- ii. the Net STEM Shortfall in Trading Interval t.

Note that the IMO has not proposed any amendments to clause 4.26.3A (this clause has been reproduced here to provide context when reviewing the proposed Amending Rules); the IMO has however proposed the new clause 4.26.2F which will define that a Capacity Cost Refund must be determined for each Market Participant (this was previously defined in clause 4.26.3). The proposed Amending Rules will provide the calculations for the Capacity Cost Refund for both a generating system (clause 4.26.3) and a Curtailable Load (4.23.3A).

4.26.3A. The Capacity Cost Refund associated with a Curtailable Load is equal to the lesser of:

- (a) twelve times the Monthly Reserve Capacity Price multiplied by the number of Capacity Credits associated with the Facility, less all Capacity Cost Refunds applicable to the Market Participant in previous Trading Months falling in the same Capacity Year as Trading Month m; and
- (b) the sum over all Trading Intervals t in Trading Month m of:

$$12 * \text{Monthly Reserve Capacity Price} * S / (2 * H)$$

Where:

S is the Capacity Shortfall in MW determined in accordance with clause 4.26.2D in any Trading Interval; and

H is the maximum number of hours that the Facility was certified to be available in accordance with clause 4.10.1(f)(ii).



## APPENDIX 1: FULL DETAILS OF THE PROPOSAL

### Background

A Net STEM Shortfall is the amount by which the Reserve Capacity actually supplied by a Market Participant falls short of that Market Participant's Reserve Capacity Obligation. It is used to calculate the Capacity Cost Refund payable by a Market Participant. There have been a number of amendments to the shortfall calculation since market start as presented in Appendix 1 of this Rule Change Proposal.

The formula for the Net STEM Shortfall, as calculated under clause 4.26.2 of the Wholesale Electricity Market Rules (Market Rules), is summarised as follows:

$$SF = \text{Max} (RTFO, RCOQ-A) + \text{Max} (0, B-C) - RTFO$$

Where A = Min (RCOQ, CAPA)

$$B = \text{Min} (RCOQ - RTFO, DSQ)$$

$$C = \text{Min} (DSQ, MSQ)$$

CAPA is the capacity that was made available before the Trading Day.

RTFO is the MW quantity of Forced Outage in real-time.

RCOQ is the total Reserve Capacity Obligation Quantity.

DSQ is the sum of the Dispatch Schedule Quantities.

MSQ is the sum of the Metered Schedule Quantities.

In particular, the calculation has the following two components:

- Pre-STEM [Max (RTFO, RCOQ-A)]: this compares the capacity made available in the day-ahead STEM processes to the Market Participant's obligations. That is it quantifies the amount of capacity that should have been made available but was not. This first check is looking at whether the Market Participant made the capacity available (CAPA) and taking the minimum of this and RCOQ so that more capacity than is available in the Market Participant's RCOQ is not made available. The calculation RCOQ-A then determines if there is a shortfall pre-STEM. It then compares this with RTFO to see if the Market Participant submits a RTFO after the Trading Day, if the RTFO is greater than RCOQ-A then this number will bind as the RTFO attracts Facility Forced Outage Refunds; and
- Post-STEM (real-time) [Max (0, B-C)]: this compares the amount of capacity the Market Participant was supposed to supply to what was actually supplied in real time. That is, it

quantifies the amount by which the metered schedules fall short of the dispatch schedules<sup>1</sup>.

Note that the Net STEM Shortfall calculation is net of the effects of real-time forced outages. That is if a Facility suffers a Forced Outage, the Market Participant will incur a Facility Forced Outage Refund in accordance with clause 4.26.1A. To avoid a Market Participant being impacted on twice for the same Forced Outage, the real-time component of the Net STEM Shortfall formula reduces the amount of energy the Market Participant is required to supply by the amount of the outage.

## Issue

There are two key issues with the current formulation of the Net STEM Shortfall calculation:

- Issue 1: Where a Market Participant has multiple generators in its portfolio and one (or more) suffers a real-time Forced Outage then the expected energy supplied in real-time from the portfolio is reduced to reflect just the Forced Outage. This adjustment however is applied relative to the portfolio's total Reserve Capacity Obligation Quantity, including Scheduled Generators, Curtailable Loads and Interruptible Loads that were not dispatched. As a result the Market Participant is exposed to a Net STEM shortfall purely because some of its facilities were not asked to supply energy or loads requested to reduce consumption; and
- Issue 2: Portfolios which include generators with additional capacity available beyond their Reserve Capacity Obligations (such as Intermittent Generators (IG's)) can use the output of these generators to potentially offset any Net STEM shortfall caused by under supply of other facilities in the same portfolio.

### **Issue 1: Portfolios with Multiple Generators**

The Net STEM Shortfall formulation specifies that all the variables that form part of the calculation are to be summed over all of a Market Participant's Facilities and Loads before being used in the calculation. The effect of this approach is that, if a Market Participant has one Scheduled Generator that is undergoing a partial Forced Outage, and another Scheduled Generator that has unused capacity, as it was not required to supply energy (RCOQ > DSQ) then its Net STEM Shortfall will be inflated by the amount of that unused capacity. This is because all Facilities are required to contribute to RCOQ and RTFO (as they are set at the portfolio level) but Facilities MSQ and DSQ are at a facility level. A portfolio which has a Curtailable Load and/or Interruptible Load with Reserve Capacity Obligations which it has not been requested to meet will also have an inflated Net STEM Shortfall as a consequence of this interaction.

---

<sup>1</sup> Part B represents what the Market Participant was dispatched to do but is capped by the capacity the Market Participant is obliged to make available, less any Forced Outages notified to System Management. Part C accounts for the difference between what a Market Participant was dispatched to do and what it actually did. It addresses the possibility that a Market Participant either does not follow instructions or is incapable of following them because it is on forced outage which it has not declared

For example, suppose that a Market Participant has a portfolio comprising of two Scheduled Generators (SG) as follows:

	<b>SG 1</b>	<b>SG 2</b>	<b>Portfolio</b>
RCOQ	100	20	120
RTFO	40	0	40
DSQ	100	0	100
MSQ	60	0	60
Real-time Shortfall	0	0	<b>20</b>

SG 1 has suffered a partial Forced Outage of 40MW. It was expected to deliver 100MW, but only delivered 60MW. Facility 2 was available but was not dispatched. SG 2 adds 20MW to the total RCOQ of the portfolio, making it 120MW. This is greater than the amount the two facilities can produce because of the 40 MW Forced Outage of SG 1.

As a result the effective capacity for the portfolio is lowered to 80MW (RCOQ-RTFO). The market anticipated that this portfolio will provide 80 MW when it is dispatched to 100MW, however the portfolio only delivered 60MW and so a 20MW shortfall results, even though the shortfall would be zero if calculated for each Facility separately. For further details please refer to Table 2 of Appendix 2 of this Rule Change Proposal. An example of a portfolio which includes Curtailable Loads and Interruptible Loads is also presented in Table 3 of Appendix 2.

The problem is that Facility 2 has contributed to the portfolio's RCOQ even though it was not asked to supply that energy. There has been an interaction between the Reserve Capacity of Facility 2 (which was available but not called) and the allowance for real-time Forced Outage for Facility 1 (which was effectively reduced because the portfolio had more capacity available through Facility 2). A Market Participant has recently raised this issue with the IMO, where the impact is currently manifesting itself through the inclusion of a Curtailable Load within its portfolio.

Related changes to the Market Rules:

The Rule Change Proposal: Demand Side Management Operational Issues (RC\_2008\_20) proposed amendments to the determination of a Demand Side Management (DSM) programme's Reserve Capacity Refunds. In particular, RC\_2008\_20 amended the Market Rules to include new clauses 4.26.2D and 4.26.2E, where:

- o New clause 4.26.2D determines the level of refund to apply in any Trading Interval based on the amount of shortfall, measured in terms of MWh, as a proportion of the total MWh reduction that the Curtailable Load should deliver if called to the maximum level for the maximum allowable time; and
- o New clause 4.26.2E determined the total refund applicable for each Market Participant by summing the shortfall determined for any Curtailable Loads (clause 4.26.2D) and other generation systems (clause 4.26.2).

RC\_2008\_20 did not however amend clause 4.26.2 to remove the reference to Curtailable Loads from the calculation of the Net STEM Shortfall for the generation system.



## **Issue 2: Facilities with outputs which exceed their Reserve Capacity Obligations**

The second identified issue with the current formulation of the Net STEM Shortfall relates to a participant with a portfolio containing facilities with outputs which exceed the portfolio's Reserve Capacity Obligations.

Consider the case where a Market Participant with a portfolio of generators does not offer enough capacity in the day-ahead market, CAPA would be less than the value of its RCOQ. Assuming no Forced Outages occur, the shortfall should reflect the difference between the portfolio's RCOQ and the amount of capacity offered into the market. However, in the case where the portfolio contains either:

- A Scheduled Generator with a maximum generation capacity greater than its Capacity Credits;
- Facilities that do not hold Capacity Credits; and/or
- Intermittent Generators (such as wind farms).

These can add to the CAPA value without also increasing the portfolio's RCOQ, thereby reducing the calculated Net STEM shortfall.

This issue can also manifest through the post-STEM aspect of the calculation by increasing the DSQ and MSQ quantities. In particular, if an Intermittent Generator with a metered output of X MW is added to the portfolio then this term will change by:

$$B = \text{Min} (\text{RCOQ} - \text{RTFO}, \text{DSQ} + X)$$

$$C = \text{Min} (\text{DSQ} + X, \text{MSQ} + X)$$

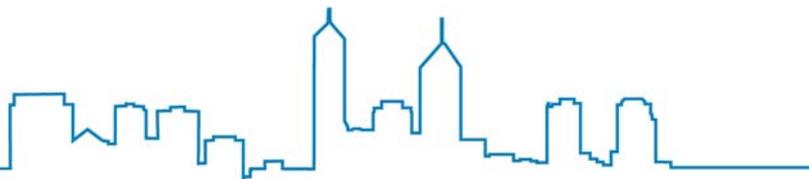
If X is large enough to raise the DSQ + X above RCOQ –RTFO then  $[\text{Max} (0, B-C)] = 0$ . Despite the Facility having a real-time Forced Outage, the portfolio has satisfied its post-STEM obligations by adding energy from the Intermittent Generator. This potentially gives an unanticipated advantage to Market Participants in these circumstances.

For further details of the calculation when the portfolio includes an Intermittent Generator please refer to Table 4 of Appendix 2.

The two issues show that clause 4.26.2 as currently drafted will, in certain circumstances, lead to different outcomes for Market Participants with:

- Multi-Facility portfolios (including Curtailable Loads and Interruptible Loads); and/or
- Facilities with outputs great than their Reserve Capacity Obligations (such as Intermittent Loads).

## **Proposal**



As the specific issue impacting on the Market Participant currently relates directly to issue 1, the following potential interim solution has been identified to correct this:

- Remove Curtailable Loads from the calculation in clause 4.26.2 (Net STEM Shortfall calculation) and treat separately under clause 4.26.2D (Capacity Shortfall calculation).

The IMO considers that this solution would ensure consistency with the changes which resulted from RC\_2008\_20. In adopting this interim solution the further issues around portfolios with multiple generators and outputs greater than their Reserve Capacity Obligations would not be solved. A further long term solution will still be required, and will be progressed by the IMO at a later stage.

The IMO also proposes a typographical change to clarify that the Capacity Cost Refund determined in clause 4.26.2E relates to the Net STEM Shortfall calculated under clause 4.26.2 and the Capacity Shortfall calculated under clause 4.26.2D.

The IMO also proposes some further minor changes to improve the overall integrity of this section of the Market Rules.

