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## Wholesale Electricity Market Rule Change Proposal

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**Change Proposal No:** RC\_2009\_35  
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### Change requested by

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<b>Date submitted:</b>	21 December 2009
<b>Urgency:</b>	Standard Rule Change Process
<b>Change Proposal title:</b>	Energy Price Limits Methodology and Consultation Process
<b>Market Rule(s) affected:</b>	6.20.7, 6.20.9, 6.20.10 and new clause 6.20.9A

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### Introduction

Clause 2.5.1 of the Wholesale Electricity Market Rules (Market Rules) provides that any person, including the Independent Market Operator (IMO), may make a Rule Change Proposal by submitting a completed Rule Change Proposal form to the IMO.

This Rule Change Proposal can be posted, faxed or emailed to:

**Independent Market Operator**

Attn: Manager Market Development and System Capacity  
PO Box 7096  
Cloisters Square, Perth, WA 6850

Fax: (08) 9254 4339

Email: [market.development@imowa.com.au](mailto:market.development@imowa.com.au)

The IMO will assess the proposal and, within five Business Days of receiving this Rule Change Proposal form, will notify you whether the Rule Change Proposal will be further progressed.

In order for the proposal to be progressed, all fields below must be completed and the proposal must explain how it will enable the Market Rules to better contribute to the achievement of the wholesale electricity market objectives. The objectives of the market are:

- (a) to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;
- (b) to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;
- (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;
- (d) to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and
- (e) to encourage the taking of measures to manage the amount of electricity used and when it is used.

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## Details of the proposed Market Rule Change

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### 1. Describe the concern with the existing Market Rules that is to be addressed by the proposed Market Rule change:

#### Background

The Energy Price Limits (price limits) constitute a set of limits comprising the Maximum Short Term Energy Market (STEM) Price, the Alternative Maximum STEM Price and the Minimum STEM Price. Clause 6.20.6 of the Market Rules requires the IMO to annually review the appropriateness of the price limits.

In undertaking an annual review the IMO may propose revised values for the Maximum STEM Price and the Alternative Maximum STEM Price. The Minimum STEM Price to apply at any time is the Maximum STEM Price multiplied by negative one.

The applicable formula for calculating the price limits is set out in clause 6.20.7 (b) and is as follows:

$$(1 + \text{Profit Margin}) \times (\text{Variable O\&M} + (\text{Heat Rate} \times \text{Fuel Cost}))/\text{Loss Factor}$$

Further details pertaining to the definition of the price limits are provided in the Market Rules.

McLennan Magasanik Associates (MMA), an independent consultant, was engaged by the IMO to undertake the 2009 Energy Price Limits review. MMA was also engaged in both 2007 and 2008 to undertake the review. One of the objectives of the 2009 review was to determine whether the cost assumptions, and previously used methodology for determining the price limits, are still suitable and if appropriate, recommend rule changes. The management of uncertainty in the calculations was also an important element of the review.

As an outcome of undertaking the 2009 review, MMA highlighted issues surrounding the use of Profit Margin when calculating the price limits and suggested that this should be replaced with Risk Margin. Further details pertaining to this issue are outlined below.

## Issue

As first identified by MMA during the 2007 price limits review, the purpose of and basis for the use of a Profit Margin in clause 6.20.7(b) is seen to be problematic. In particular, it was considered that the reference to Profit Margin when calculating the price limits is inconsistent with the principle of generators bidding according to their Short Run Marginal Costs (SRMC).

The economic rationale for incorporating a Profit Margin in the calculation of the price limits, as outlined by MMA in the 2009 final report, is as follows:

*In the presence of strong competition, a generator would be very near to its SRMC having regard to its operational decisions in order to maximise its profits. This works on the basis that bids above SRMC would be expected to miss out on profitable production as it could be displaced by lower priced bids. However, the last loaded generator having the highest costs has the opportunity to set the market prices without any competition from the supply side, since there are no lower cost generating resources available. While there may be some demand side competition this is often at much higher bid prices than incurred by the highest cost generator.*

*As a result the level of competition under these extreme conditions when the Maximum STEM Price is likely to be applied is quite limited and therefore the perfect competition model is no longer applicable. This may provide some rationale for allowing for a Profit Margin to provide some additional incentive for the generator to generate since it would be setting the market price and therefore earning no profit on its output.*

A Market Generator is required, under clause 2.16.9G of the Market Rules, to bid at its reasonable expectation of the SRMC of generating the relevant electricity. To apply a Profit Margin when determining the price limits would be inconsistent with the application of the SRMC bidding requirements. Instead, MMA suggest that the Profit Margin is actually a Risk Margin as it makes provision for uncertainty in the assessment rather than a profit on a known cost.

In particular, MMA recommend assessing the uncertainty to the IMO of the short run average cost of peaking power and striking a value that results in a price limit that exceeds the majority (for example 80 to 90 percent) of potential circumstances. MMA notes that this range is typical of Risk Margins observed in electricity markets where traders cannot accurately predict future market conditions and yet must strike a fixed price for trading purposes to manage uncertainty.

By adopting a Risk Margin when calculating the price limits rather than a Profit Margin, in the event that future market conditions prove that the Maximum STEM Price is constraining economic operation of peaking plant, the price settings will be able to be reviewed to reflect prevailing market conditions. Thus the risk that generators would be financially disadvantaged by the price cap is very low.

MMA outlined the following four potential methods for defining a Risk Margin:

1. The uncertainty could be ignored and expected costs and quantities could be used to determine the Maximum STEM Price. This approach creates the risk that the Maximum STEM Price is too low in many circumstances so as to discourage efficient operations and new entry in peaking services, potentially resulting in inefficient operations when system conditions are unfavourable for short-term running.
2. Addressing uncertainty by using the values of all parameters at the extreme end of their range, so that the Maximum STEM Price reflects the worst possible outcome. This approach would almost certainly result in a very high Maximum STEM Price that would have no practical use in mitigating market power.
3. The expected values could be applied in the cost assessment and the Profit Margin could be used to assess the impact of uncertainty from the viewpoint of the generator. This approach would be reflective of the uncertainty in the cost factors in a general manner. It does not rigorously represent the way the factors can work together to create uncertainty in the maximum cost as observed at the Market level.
4. The uncertainty of the input variables and how they work in combination could be assessed in the assessment of the Maximum STEM Price. The Profit Margin could be set to zero or interpreted as a Risk Margin so as to make the Maximum STEM Price realistic from a commercial perspective. The Risk Margin of the assessed price over the expected or most probable price would be confirmed to ensure that it is not excessive in relation to the objective of market power mitigation. This represents a more rigorous test of uncertainty than option 3.

For the purposes of undertaking the 2007, 2008 and 2009 price limits reviews the fourth method was the preferred approach proposed by MMA and endorsed by the IMO. This was on the basis that assigning a single value to a cost parameter as defined in the Market Rules assumes a known cost with no margin of uncertainty. However, in setting the price limits, a likely range of costs with an expected value and a margin of uncertainty are assessed. Consequently, the Risk Margin was applied by MMA to the expected cost to ensure that the imposition of a capped price does not impede participation of high cost generators in the market under high demand or low reserve supply conditions.

## Proposal

The IMO considers that MMA's interpretation is appropriate as perfect knowledge of all the possible conditions that determine the cost of generation at any particular time is unavailable to the IMO. The IMO notes the work of Mosquera, Reneses, Baraquin and Sanchez-Ubeda (2006) which identified that the main variables likely to be subject to uncertainty include system demand, hydro conditions<sup>1</sup> and fuel costs.<sup>2</sup> In the case of the determination of the price limits for the Wholesale Electricity Market, the IMO notes that fuel costs, and in particular gas costs, are likely to be the greatest cause of uncertainty.

Given this uncertainty in the input data, the IMO considers that a margin for uncertainty is needed when applying the expected costs to set the price limits. The IMO therefore proposes

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<sup>1</sup> Noting that this is not relevant in the case of Western Australia

<sup>2</sup> N. Mosquera, J. Reneses, J. Baraquin, E.F. Sanchez-Ubeda (2006): Risk Analysis in Electricity Markets by using decision trees, 9<sup>th</sup> International Conference on Probabilistic Methods Applied to Power Systems KTGH, Stockholm, Sweden.

that the Market Rules be amended to replace “Profit Margin” with “Risk Margin”, where Risk Margin refers to the margin between the price cap and the expected highest short run cost generating works in the South West interconnected system (SWIS).

The IMO contends that this will allow for the uncertainty faced by the IMO in setting the price limits to be accurately reflected when annually reviewing its appropriateness. The IMO also considers that by including a Risk Margin between the price cap and the expected highest short run cost generating works in the SWIS in the calculation of the price limits, a price limit suitable for mitigating market power without inhibiting efficient operations will be achieved.

The IMO notes that this amendment would be reflective of the approach adopted in undertaking the review in previous years.

The IMO also proposes to amend clause 6.20.9 to clarify that the IMO will publish draft reports and seek public consultation only when undertaking the annual review required under clause 6.20.6 of the Market Rules. The IMO contends that currently there is uncertainty in the application of clause 6.20.9 with regards to the monthly recalculation of the Alternative Maximum STEM Price under clause 6.20.3 of the Market Rules. The IMO considers that it would be inefficient to undertake a public consultation process every month when the Alternative Maximum STEM Price is revised, and that the annual review and consultation process provides sufficient scope for interested stakeholders to express any concerns they might have with the values calculated for the Alternative Maximum STEM Price.

The IMO also proposes the addition of new clause 6.20.9A to allow for a second consultation period, if required, after submissions have been received on the draft report. This will allow the IMO to gauge industry views on any outstanding issues identified either during or following the first consultation period.

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## **2. Explain the reason for the degree of urgency:**

The IMO considers that this Rule Change Proposal does not meet the requirements of clause 2.5.9, and therefore proposes that it be progressed through the Standard Rule Change Process.

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## **3. Provide any proposed specific changes to particular Rules: (for clarity, please use the current wording of the Rules and place a ~~strikethrough~~ where words are deleted and underline words added)**

6.20.7. In conducting the review required by clause 6.20.6 the IMO:

- (a) may propose revised values for the following:
  - i. the Maximum STEM Price, where this is to be based on the IMO’s estimate of the short run marginal cost of the highest cost generating works in the SWIS fuelled by natural gas and is to be

calculated using the ~~methodology described~~ formula in paragraph (b); and

- ii. the Alternative Maximum STEM, where this is to be based on the IMO's estimate of the short run marginal cost of the highest cost generating works in the SWIS fuelled by distillate and is to be calculated using the ~~methodology described~~ formula in paragraph (b);

- (b) must calculate the Maximum STEM Price or Alternative Maximum STEM Price using the following ~~methodology~~ formula:

$$(1 + \text{Profit Margin} \text{ Risk Margin}) \times (\text{Variable O\&M} + (\text{Heat Rate} \times \text{Fuel Cost})) / \text{Loss Factor}$$

Where

- i. ~~Profit Margin is the allowable profit margin expressed as a fraction~~ Risk Margin is a measure of uncertainty in the assessment of the mean short run average cost for a 40 MW open cycle gas turbine generating station calculated using a statistical distribution of its various cost related parameters in accordance with clause 6.20.7(b), where:
  - a. the Risk Margin is calculated for the Maximum STEM Price as the proportion by which the 80<sup>th</sup> percentile of the probability distribution for the short run average cost exceeds the mean short run average cost; and
  - b. the Risk Margin is calculated for the Alternative Maximum STEM Price as the proportion by which the 90<sup>th</sup> percentile of the probability distribution for the short run average cost exceeds the mean short run average cost;
- ii. Variable O&M is the mean variable operating and maintenance cost for a 40 MW open cycle gas turbine generating station, expressed in \$/MWh, and includes, but is not limited to, start-up related costs;
- iii. Heat Rate is ~~based on the mean heat rate at minimum capacity for~~ a 40 MW open cycle gas turbine generating station's, heat rate at minimum capacity, expressed in GJ/MWh;
- iv. Fuel Cost is the mean unit fixed and variable fuel cost for a 40 MW open cycle gas turbine generating station, expressed in \$/GJ; and

- v. Loss Factor is the marginal loss factor for the generator relative to the Reference Node.

Where the IMO must determine appropriate values for the factors described in paragraphs (i) to (v) as applicable to the Maximum STEM Price and Alternative Maximum STEM Price.

6.20.9. In conducting the review required by clause 6.20.6, the IMO must prepare a draft report describing how it has arrived at a proposed revised value of an Energy Price Limit. The IMO must publish the draft report on the Market Web Site and advertise the report in newspapers widely published in Western Australia and request submissions from all sectors of the Western Australia energy industry, including end-users, within six weeks of the date of publication.

6.20.9A. Prior to proposing a final revised value to an Energy Price Limit in accordance with clause 6.20.10, the IMO may publish a request for further submissions on the Market Web Site. Where the IMO publishes a request for further submission in accordance with this clause, it must request submissions from all sectors of the Western Australia energy industry, including end-users.

6.20.10 After considering the submissions on the draft report described in clause 6.20.9, and any submissions received under clause 6.20.9A, the IMO must propose a final revised value for any proposed change to an Energy Price Limit and submit those values and its final report, including any submissions received ~~on the draft report~~, to the Economic Regulation Authority for approval.

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#### **4. Describe how the proposed Market Rule change would allow the Market Rules to better address the Wholesale Market Objectives:**

- (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 submits that the proposed Amending Rules will better achieve market objective (a) by transparently reflecting the current approach to calculating the price limits in the Market Rules. The IMO considers that by embedding current accepted practices into the Market Rules a more transparent and efficient approach to undertaking the review will result. This is because interested parties will no longer need to refer to the draft and final reports to understand the approach adopted in undertaking the review.

The IMO considers that the proposed Amending Rules are consistent with the remaining Market Objectives.

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**5. Provide any identifiable costs and benefits of the change:**

**Costs:**

No costs associated with the proposed Amending Rules have been identified by the IMO.

**Benefits:**

- Removal of an inconsistency with the principle of a Market Generator bidding at its SRMC.
- Inclusion of a Risk Margin to reflect the uncertainty pertaining to the underlying parameters used in the Energy Price Limits review.
- Clarification that public consultation is required only for annual Energy Price Limit reviews and not for monthly updates to the Alternative Maximum STEM Price.
- Allow for a second consultation process to be undertaken on any outstanding issues, if required.