

---

## Wholesale Electricity Market Rule Change Proposal Form

---

**Change Proposal No:** RC\_2010\_37  
**Received date:** 30 November 2010

**Change requested by:**

<b>Name:</b>	Shane Cremin
<b>Phone:</b>	08 9261 2908
<b>Fax:</b>	08 9486 7330
<b>Email:</b>	<a href="mailto:shane.cremin@thegriffingroup.com.au">shane.cremin@thegriffingroup.com.au</a>
<b>Organisation:</b>	Griffin Energy
<b>Address:</b>	L15, 28 The Esplanade, Perth, 6000
<b>Date submitted:</b>	30/11/2010
<b>Urgency:</b>	3-high
<b>Change Proposal title:</b>	Calculation of the Capacity Value of Intermittent Generation
<b>Market Rule(s) affected:</b>	Clauses 4.11.3A, 7.7.5B, 7.7.5C, 7.7.5E, 7.13.1, 10.5.1 and the Glossary.

---

### Introduction

Market Rule 2.5.1 of the Wholesale Electricity Market Rules provides that any person (including the IMO) may make a Rule Change Proposal by completing a Rule Change Proposal Form that must be submitted to the Independent Market Operator.

This 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 Independent Market Operator will assess the proposal and, within 5 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 change 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.

---

---

## **Details of the proposed Market Rule Change**

---

---

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

A key outcome for the Wholesale Electricity Market (WEM) is to ensure that electricity and related services are provided reliably and economically.

The Long Term Projected Assessment of System Adequacy (PASA) is a process through which the Independent Market Operator (IMO) determines the amount of capacity required to meet future peak system demand and reliability requirements.

The Reserve Capacity Mechanism (RCM) provides incentives for investment in capacity in the WEM, and distinguishes broadly between Scheduled Generation and Intermittent Generation.

- Scheduled Generation – assigned Capacity Credits at a level equivalent to the level of electrical output produced on a sent-out basis at 41 degrees Celsius (in accordance with clause 4.11.1(a)); and
- Intermittent Generation – assigned Capacity Credits based on their average capacity factor over a three year period (in accordance with clause 4.11.2(b)1).<sup>1</sup> This has historically equated to valuing wind farms at 38 to 42 percent of their nameplate capacity.

---

<sup>1</sup> While there is no restriction on the ability of each type of technology to apply for certification in accordance with either of the Capacity Credit allocation methodologies, since market start Intermittent Generators have predominantly applied for certification in accordance with clause 4.11.2(b).

Modelling suggests that a solar generation plant would be valued between 20 percent and 30 percent of its nameplate capacity with this method.

The expanded Mandatory Renewable Energy Target (MRET) scheme has a national target for renewable generation to comprise 20 percent of all generation by 2020. As a result, it is expected that capacity (and energy) from renewable energy generation, particularly wind generation, will grow in the South West Interconnected System (SWIS).

### **Issues**

The Planning Criteria used by the IMO in undertaking the Long Term PASA is that there should be sufficient available capacity in each Capacity Year during the planning horizon to:

1. meet forecast peak demand, plus a reserve margin; and
2. limit expected energy shortfalls to 0.002 per cent of annual energy consumption.

The methodology for assigning Capacity Credits to Scheduled Generators focuses on meeting forecast peak demand by assessing the sent out capacity likely to be available at an ambient temperature of 41°C.

However, the current methodology for assigning Capacity Credits to Intermittent Generators, which is based on the three-year average output, does not necessarily relate to the output of Intermittent Generators in peak demand periods. Rather, it is orientated towards the contribution that Intermittent Generators make to limiting expected annual energy shortfalls.

Given the expected increase in Intermittent Generation on the SWIS, the following concerns have been raised about the current methodology used to assign Capacity Credits to Intermittent Generators.

- System Management has suggested that the current methodology overstates the energy that wind farms can be expected to make available during periods of peak demand, and that as a result the methodology has the potential to jeopardise the security of the power system.
- The current methodology is unsuitable for solar generation because it includes overnight and winter periods during which solar output would be expected to be low. As these periods are generally outside periods of peak demand, the current methodology may undervalue the energy that solar can be expected to make available during periods of peak demand.

### **Renewable Energy Generation Working Group**

The Renewable Energy Generation Working Group (REGWG) was convened by the Market Advisory Committee (MAC) at its meeting on 12 March 2008 to consider and assess system and market issues arising from increasing penetration of Intermittent Generation.

A work program which broadly comprised four Work Packages was established to address these issues. Work Package 2 sought to develop a methodology that would accurately value the contribution of intermittent generators during periods of peak demand. McLennan Magasanik Associates (MMA) was appointed to undertake Work Package 2.

A key concept that was considered and recommended was the use of Load for Scheduled Generation (LSG) when identifying the critical peak demand intervals. LSG is calculated using the load that remains after removing the level of intermittent generation in the market.

The use of LSG can change the timing of critical system reliability conditions towards those times where the demand on Scheduled Generators is highest. This technique accounts for increasing penetration of Intermittent Generation and promotes diversity of technology types and location. LSG has been incorporated into each of the valuation methodologies explained below.

MMA, through its analysis, recommended a methodology based upon the average output of each facility in 750 peak intervals for selected high demand years, which are scaled to future load forecasts. This methodology delivers valuations of between 35 percent and 40 percent of nameplate capacity for the existing wind farms, and between 50 percent and 60 percent for the modelled solar generation facilities. A more simple and transparent variant of this methodology, using 750 Trading intervals from the last three years, was also considered and was known as Proposal 2B. Proposal 2B is expected to deliver valuations of between 30 percent and 35 percent of nameplate capacity for the existing wind farms, and between 35 percent and 50 percent for the modelled solar generation facilities.

System Management expressed concern that this methodology relied on simulated data, and that, being based on an average performance level, did not represent the capacity that could reliably be delivered by Intermittent Generators.

Consequently, System Management proposed an alternative methodology that assessed the value of the fleet at the 90 percent probability of exceedance (PoE) level of the top 1 percent of Trading Intervals during the last three years (175 Trading Intervals per year). It then proportioned this fleet capacity value between the various Intermittent Generators according to their performance in the top 250 intervals during the last three years. The methodology proposed by System Management would deliver valuations of between 6 percent and 17 percent of nameplate capacity for the existing individual wind farms, and between 10 percent and 30 percent for the modelled solar generation facilities.

The Office of Energy proposed a further alternative methodology that would assess the average performance of the intermittent generation fleet over 12 peak Trading Intervals for each year, and then value the fleet at the 95 percent PoE level of these averages from the preceding eight years. The fleet capacity value would then be apportioned between the various Intermittent Generators according to their performance in the top 250 Trading Intervals during the last three years. The Office of Energy's methodology is estimated to deliver valuations of between 16 percent and 20 percent of nameplate capacity for existing wind farms and between 40 percent and 50 percent for the solar generation facilities modelled.

Throughout the REGWG process, System Management maintained that valuations higher than around 20 per cent<sup>2</sup> of nameplate capacity could compromise the reliability of the power system.

---

<sup>2</sup> It is unclear if this represented a blanket capacity credit cap for all intermittent generation, or would be applied to each intermittent facility (wind, wave or solar), irrespective of the underlying renewable resource.

System Management's views were countered by various REGWG members, including Market Participants with existing Intermittent Generation facilities (Alinta, Griffin Energy), proponents of new Intermittent Generation facilities (Pacific Hydro, Mid West Energy) and Synergy. These members supported Proposal 2A (or its variant 2B), suggesting that this proposal, developed and recommended by an expert consultant, has the strongest scientific basis and strongest link to system reliability. They also indicated that any reduction in the capacity valuation for Intermittent Generators would harm investment in the renewable energy sector in the SWIS and increase the perceived regulatory risk of investing in the WEM.

The IMO suggested Proposal 1 at the 2 September 2010 REGWG meeting, which was supported by LGP on the basis that it is a compromise between the other proposals. System Management indicated that it could accept Proposal 1 provided that the valuation did not exceed 20 percent of nameplate capacity. This was not supported by the other parties advocating Proposal 2A or 2B.

While failing to reach a consensus position on the matter of valuing Capacity Credits for Intermittent Generation, the REGWG supported the proposal that the IMO would recommend a way forward to the MAC<sup>3</sup>. The IMO has indicated to the MAC that it proposes to submit a rule change proposal based on Proposal 1 – the Office of Energy 'compromise' methodology.

Griffin, along with a number of other stakeholders with considerable interests in maintaining a viable investment environment in the SWIS, as well as ensuring long term system reliability, believes that the compromise methodology of Proposal 1 will create unnecessary distortions in the market. Importantly, we believe that:

1. The MMA Proposals 2A and 2B provide an explicit mechanism that will self regulate the contribution of intermittent generation to system peak periods in the SWIS. If an intermittent facility fails to produce energy during the periods when most required (i.e. when scheduled generation is at peak output under the LSG concept – likely during summer peak demand periods), then the quantity of capacity credits allocated to the facility will be reduced and other generation facilities (or DSM) will be required to meet the IMO demand forecast.
2. The issue of system reliability, in the face of an expected increase in intermittent generation in the SWIS, it better managed through re-setting the system reserve margin and/or the expected energy shortfall limits. This will have the same effect of decreasing the quantity of capacity credits to intermittent facilities in that a greater capital stock of generation (or DSM) will be required to meet the same IMO demand forecast, but without distorting the market for, or disincentivising investment in intermittent generation in the SWIS<sup>4</sup>.

---

<sup>3</sup> While minuted as such, it was not my recollection that the REGWG agreed that the IMO would develop a rule change proposal for submission to the MAC, rather that it would provide a recommendation on what to do next.

<sup>4</sup> It should be noted that there will be little likelihood of too much intermittent generation being built in the SWIS to meet a greater reserve margin. In our market, all intermittent generation technologies require offtake agreements for the energy they produce. As there will only ever be a finite requirement for new energy to meet load growth, there will also be a finite quantity of intermittent generation capable of being financed. The remainder of reserve capacity requirement will likely be met by scheduled peaking generation or DSM.

## Proposal

Griffin proposes to change the current methodology for allocating capacity credits for intermittent generators in the Market Rules to that based on Proposal 2B, developed by MMA for the REGWG. While not as technically proficient as Proposal 2A (MMA's preferred methodology), it delivers the following benefits:

- balances consideration of both the reliability and unserved energy impacts of the capacity valuation methodology with respect to the IMO Planning Criterion by only awarding capacity credits to intermittent generation facilities based on their output during periods of highest demand on scheduled generation (using the top 750 LSG intervals in a year);
- uses recent historical data averaged out over three years to smooth any annual variation;
- Is the simplest and most transparent methodology;
- Is the most consistent with the current methodology; and
- more fairly reflects the contribution of solar generation facilities to power system reliability at times of peak demand.

The methodology is as follows:

1. Identify the top 750 Trading intervals associated with the highest Load for Scheduled Generation output in each of the three previous years.
2. For each of the 2,250 intervals identified in Step 1, determine the metered output of the intermittent generation facility (or the estimated output if the facility is experiencing a Planned or Consequential Outage or where its output was curtailed following a request from System management).
3. Double the value determined in Step 2 and divide this number by 2,250. The result is the Relevant Level for that facility (or is the quantity of capacity credit allocated to that facility).

This proposal includes the proposed amendments presented in the Draft Rule Change Report: Adjustment of the Relevant Level for Intermittent Generation (RC\_2010\_24). Alinta's proposed amendments adjust for Trading Intervals where a Planned or Consequential Outage occurred or where output was curtailed following a request from System Management.

---

### 3. Explain the reason for the degree of urgency:

Griffin proposes that the Rule Change Proposal be progressed via the Standard Rule Change Process.

---

### 4. 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)

- 4.11.3A. The Relevant Level in respect of a Facility at a point in time is determined by the IMO following these steps:
- (a) take ~~all~~ the top 750 Facility-Assessment Load for Scheduled Generation Trading Intervals that fell within each of the last three years up to, and including, the last Hot Season, excluding any Trading Intervals where the Facility either:
    - i. was owned, controlled or operated by a Market Participant other than the Electricity Generation Corporation and:
      - 1. was affected by a Planned Outage or Consequential Outage as notified under clause 7.13.1A; or
      - 2. was issued a Dispatch Instruction from System Management as notified under clause 7.13.1(c); or
    - ii. was owned, controlled or operated by the Electricity Generation Corporation and:
      - 1. was affected by a Planned Outage or Consequential Outage as notified under clause 7.13.1A; or
      - 2. was issued an instruction from System Management to deviate from its Dispatch Plan or change its commitment or output as notified under clause 7.13.1(cC);
  - (b) determine the amount of electricity (in MWh) sent out by the Facility in accordance with ~~meter data submissions~~ Meter Data Submissions received by the IMO in accordance with clause 8.4 during these Trading Intervals;
  - (c) ~~if the Generator-Facility has not entered service, or if it entered service during the period referred to in step (a), estimate in accordance with the Reserve Capacity Procedure the amount of electricity (in MWh) that would have been sent out by the Facility, had it been in service, for all the top 750 Facility-Assessment Load for Scheduled Generation Trading Intervals occurring during the period referred to in step (a) which are prior to it entering service;~~
  - (cA) if, during the period described in step (a), the Facility's output was reduced in order to comply with a Dispatch Instruction from System Management, issued in accordance with clause 7.7, use:
    - i. the estimated decrease (in MWh) in the output of each Facility, by Trading Interval, as a result of System Management Dispatch Instructions, provided by System Management in accordance with clause 7.13.1(eB); and
    - ii. the amount of electricity (in MWh) sent out for the Facility in accordance with the Metered Data Submissions received by the IMO in accordance with clause 8.4 for all the Trading Intervals that were excluded under step (a)(ii.), to estimate the amount of electricity (in MWh) that would have been sent out by the Facility, had it not complied with the Dispatch Instruction for all the Trading Intervals that were excluded under step (a)(ii.).

- (cB) if, during the period described in step (a), the Facility's output was reduced in order to comply with an instruction from System Management under clause 7.6A.3(a) to deviate from its Dispatch Plan or change its commitment or output, use:
- i. the estimated decrease (in MWh) in the output of each Facility, by Trading Interval, as a result of an instruction from System Management in accordance with clause 7.6A.3(a), where this information has been either:
    - a. provided by System Management in accordance with clause 7.13.1(eD) for the relevant Trading Intervals that were excluded under step (a), where actual data for the site of the Facility has been provided to System Management under clause 7.7.5B; or
    - b. determined by the IMO in accordance with the Reserve Capacity Procedure for all the relevant Trading Intervals that were excluded under step (a), where actual data for the site of the Facility has not been made available to System Management under clause 7.7.5B; and
  - ii. the amount of electricity (in MWh) sent out for the Facility in accordance with the Meter Data Submissions received by the IMO in accordance with clause 8.4 for all the Trading Intervals that were excluded under step (a)(iii.), to estimate the amount of electricity (in MWh) that would have been sent out by the Facility had it not complied with System Management's instruction for all the relevant Trading Intervals that were excluded under step (a)(iii.); and
- (d) set the Relevant Level as double the sum of the quantities determined in steps (b), and (c), (cA) and (cB) divided by the sum of the Trading Intervals identified in steps (a), (cA) and (cB) 52,560.

7.7.5B. ~~A Market Participant~~ Non-Scheduled Generator ~~may~~ must provide System Management with the information specified in the Power System Operation Procedure to support System Management's ~~the~~ calculation of the quantity described in clause 7.7.5A(a) and 7.7.5E.

7.7.5C. The Power System Operation Procedure must specify the data required to be provided by a Non-Scheduled Generator to System Management for each Facility during each Trading Interval, where this information must be that actual wind data for the site of a wind farm and the number of turbines operating, if made available by a Market Participant to System Management, are sufficient to allow System Management to determine, in accordance with clause 7.7.5A, what the output of ~~the~~ each Facility ~~a wind farm~~ would have been had no Dispatch Instruction or request to deviate from its Dispatch Plan or change its commitment or output been issued.

7.7.5E. Where the Electricity Generation Corporation has made actual wind data available in accordance with clause 7.7.5B and the Power System Operation Procedure, System Management must estimate the decrease, in MWh, in the output of each Electricity Generation Corporation Facility as a result of a instruction from System Management to deviate from its Dispatch Plan or change its commitment or output in accordance with clause 7.6A.3(a).



7.13.1. System Management must provide the IMO with the following data for a Trading Day by noon on the first Business Day following the day on which the Trading Day ends:

...

(c) a schedule of all of the Dispatch Instructions other than instructions with respect to Registered Facilities to which clauses 3.21A.14 or 4.25.10 apply, that System Management issued for each Trading Interval in the Trading Day by Market Participant and Facility, including the information specified in clause 7.7.3, or as agreed between the IMO and System Management;

(cA) a schedule of the MWh output of each generating system monitored by System Management's SCADA system for each Trading Interval of the Trading Day;

(cB) the maximum daily ambient temperature at the site of each generating system monitored by System Management's SCADA system for the Trading Day;

(cC) a schedule of all instructions provided to the Electricity Generation Corporation's Non-Scheduled Generators to deviate from its Dispatch Plan or change its commitment of output in accordance with clause 7.6A.3 for each Trading Interval of the Trading Day;

...

(eB) the estimated decrease, in MWh, in the output of each Non-Scheduled Generator, by Trading Interval, as a result of System Management Dispatch Instructions, as determined in accordance with clause 7.7.5A, where this is to be used in settlement as the quantity described in clause 6.17.6(c)(i);

(eC) the required decrease, in MWh, in the consumption of each Curtailable Load, by Trading Interval, as a result of System Management Dispatch Instructions, where this is to be used in settlement as the quantity described in clause 6.17.6(d)(i);

(eD) the estimated decrease, in MWh, in the output of each Electricity Generation Corporation Non-Scheduled Generator as a result of a instruction from System Management to deviate from its Dispatch Plan or change its commitment or output in accordance with clause 7.6A.3(a), as determined in accordance with clause 7.7.5E, where this is to be used in the calculation of the Relevant Level described in clause 4.11.3A;

...

(g) details of the instructions provided to:

- i. Curtailable Loads that have Reserve Capacity Obligations; and
- ii. providers of Supplementary Capacity;

on the Trading Day; and

(h) the identity of the Facilities which were subject to either a Commissioning Test or a test of Reserve Capacity for each Trading Interval of the Trading Day.; and

- (i) the data provided by a Market Participant in accordance with clause 7.7.5B.

10.5.1. The IMO must set the class of confidentiality status for the following information under clause 10.2.1, as Public and the IMO must make each item of information available from the Market Web-Site after that item of information becomes available to the IMO:

- (a) the following Market Rule and Market Procedure information and documents:

...

- (f) the following Reserve Capacity information (if applicable):

- i. Requests for Expressions of Interest described in clause 4.2.3 for the previous five Reserve Capacity Cycles;

...

- ix. The following annually calculated and monthly adjusted ratios:

1. NTDL\_Ratio as calculated in accordance with Appendix 5, STEP 8;
2. TDL\_Ratio as calculated in accordance with Appendix 5, STEP 8; and
3. Total\_Ratio as calculated in accordance with Appendix 5, STEP 10.; and

- x. Facility-Assessment Load for Scheduled Generation.

## Glossary

**Facility-Assessment Load for Scheduled Generation:** The total sent out generation of all Facilities minus the sent out generation (measured or estimated) of Facilities which applied to be assigned Certified Reserve Capacity in accordance with clause 4.11.2(b) adjusted for the impact of Consequential Outages on those Facilities.

---

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

Griffin considers the proposed rule changes will have the following affect on the market objectives:

Objective    Impact

- a)            The rule change promotes greater reliability as the quantity of capacity credits received by an intermittent generator is closely aligned with the peak summer demand periods, when system reliability is most at risk. It also promotes economic efficiency by rewarding intermittent generation facilities a suitable quantity of capacity credits relative to other generation facilities, ensuring

- investment in generation technologies is optimised in the WEM.
- The rule change promotes competition among new entrant generators (including those with advanced intermittent projects under development) as it is relatively consistent with the current capacity credit allocation methodology and does not distort the market for new generation investment.
- b)
- The rule change lessens discrimination between scheduled generation and intermittent generation in that intermittent generation is now also awarded capacity credits based on output during higher (summer) demand periods. It also lessens discrimination between intermittent generation technologies by ensuring all technologies have their capacity allocation assessed by their contribution during peak (summer) demand periods.
- c)
- The rule change may have several impacts. Firstly, *prima facie* it will increase the long term cost of electricity in the WEM as any expected reduction in capacity credits from intermittent generation facilities (compared with the current allocation methodology) will mean that further generation facilities (or DSM) will need to be constructed (or contracted) to meet the same IMO forecast demand, hence raising the cost to end users. However, it may also assist in reducing the cost of electricity in that, assuming renewable energy facilities are to be constructed to meet federal MRET targets, intermittent facilities that are incentivised to produce energy during high demand periods will likely offset expensive peaking scheduled generation, bringing down wholesale energy prices in the STEM and balancing markets during the summer period.
- d)
- The rule change may lead to benefits in that energy storage options will be incentivised and implemented more quickly as storage technologies become economically viable.
- e)

---

## 6. Provide any identifiable costs and benefits of the change:

### Costs

It is likely the IMO will have IT costs associated with this rule change. The IMO will be expected to disclose these costs during the submission period.

It is expected the owners (or contracted offtakers) of some existing intermittent generation facilities will experience a drop in revenue due to a reduction in capacity credits.

### Benefits

The proposal maintains a simple and transparent methodology to better align the capacity credit allocation methodology to intermittent generation facilities (including solar generation facilities) to the value they bring to the market in providing energy during peak (summer) demand periods.

System reliability will be strengthened as those facilities which fail to produce energy during periods of peak (summer) demand will have their quantity of capacity credits reduced. This will impact valuations on potential intermittent investments sending clear signals to investors.

Owners of existing intermittent generation facilities should not face significant or immediate impacts on the valuation of assets – reducing the perception of regulatory risk in the WEM.

State government policy of incentivising new investment in renewable energy in the SWIS should not be greatly impacted.

Incentivising energy output from facilities with a low short run marginal cost during periods of peak demand in a system where peak demand is met by gas and liquid fired generation facilities will lower the wholesale price of energy in the STEM and balancing markets.

---