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# 2010 Annual Wholesale Electricity Market Report for the Minister for Energy

14 June 2011

Economic Regulation Authority



WESTERN AUSTRALIA

appropriate incentives to intermittent generation and DSM technologies. The Authority has examined these in the context of incentives provided by the RCM.

### Intermittent generation

Capacity Credits assigned under the RCM to wind generation in the SWIS have increased from 78 MW in the 2009/10 Capacity Year to 167 MW in the 2012/13 Capacity year. This represents an increase in wind generation's share of total capacity, from 1.5 per cent to 2.8 per cent of credited capacity.

Under the current Market Rules, there are concessions for intermittent generation that include:

- an exemption from funding Spinning Reserve Ancillary Service costs;
- a requirement to fund a share of the Load Following Ancillary Service costs, however, the share funded is disproportionately small;<sup>31</sup>
- an option to participate in the STEM and submit Resource Plans if owned by an independent power producer (**IPP**);
- no exposure to the upwards deviation administrative price (**UDAP**) and the downwards deviation administrative price (**DDAP**);<sup>32</sup> and
- Reserve Capacity Credits are allocated based on its output at all times (i.e. all Trading Intervals) and not just at times of peak demand (e.g. hot summer afternoons).<sup>33</sup>

Stakeholders have previously informed the Authority of their view that wind generation was disproportionately benefiting from the RCM. One identified issue was the potential over-allocation of Capacity Credits to intermittent generation, which seldom operates at full capacity during times of peak demand. The current calculation method in the Market Rules uses average power output over the last three years, which delivers an approximate 40 per cent of nameplate capacity.

A number of submissions received by the Authority supported introducing a Capacity Credits allocation method that better reflects the available capacity from intermittent generation at times of peak load.<sup>34</sup> The submissions indicated overall support for the principle that costs should be borne by those who cause them, and allocated in a

Programmes (RC\_2010\_29); and proposed adjustments to the Reserve Capacity Refunds mechanism (a work stream of the Market Evolution Program).

<sup>31</sup> ROAM Consulting estimated that the proportion of Load Following Service costs (total around \$6 million) funded by Intermittent Generators during 2008/09 was four per cent, with the remainder funded by other Loads. See IMO website, [MAC Meeting No. 33 Papers, 10 November 2010](#), p. 126.

<sup>32</sup> MCAP is used to settle deviations from Net Contract Position by Verve Energy, by non-scheduled generators, by non-dispatchable, interruptible and curtailable loads, and by non-Verve Energy scheduled generators subject to commissioning tests or tests of their reserve capacity requirements. UDAP and DDAP are used to settle deviations by non-Verve Energy scheduled generators (excluding those subject to a test) that deviate from their schedules without instruction from System Management. In general terms, the value of the MCAP for a trading interval is either equal to the STEM price for that trading interval or is based on STEM bids and STEM offers for that trading interval. The value of the UDAP is zero during off-peak periods and is equal to the MCAP multiplied by 0.5 during peak periods. The value of the DDAP is the MCAP multiplied by 1.1 during off-peak periods and the MCAP multiplied by 1.3 during peak periods.

<sup>33</sup> The rationale for discriminating between all times and times of peak demand for the purpose of Reserve Capacity Crediting of Intermittent Generation is that, the average of a small number of periods of peak demand allows for a more accurate reflection of the Intermittent Generation fleet's actual energy contribution (from accredited Intermittent Generation capacities), at times the system requires the most energy from across the entire generation fleet.

<sup>34</sup> Mid-West Energy, Landfill Gas and Power, Western Power and Synergy (second submission).

transparent manner. The Authority notes that there should be transparency and clarity around how the charges are being developed and how they are to be attributed to classes of generation, so that a nexus is established between costs and charges.

The Authority's view is that all impacts on the market need to be taken into account when assessing the net benefits of intermittent generation. This is particularly relevant to the reliable provision of services. The Authority notes that a method for assessing the reliability contribution of wind generation during peak periods has been developed for the NEM.<sup>35</sup> South Australia has the highest wind installed capacity in Australia (868 MW in 2010).<sup>36</sup> The Planning Council (South Australia) found that, based on the recorded wind performance during the top ten per cent of demand periods, 95 per cent of the time wind generation in South Australia is producing at least three per cent of its installed capacity and for 50 per cent of the time it is producing at least 20 per cent of its installed capacity. VENCORP determined that eight per cent of the installed capacity of a wind farm in Victoria will be available during peak summer periods.<sup>37</sup>

The IMO's Renewable Energy Generation Working Group (**REGWG**) has assessed the treatment of intermittent generation in the RCM and the reliability contribution of intermittent generation.<sup>38</sup> While failing to reach a consensus on the method of assigning Capacity Credits to intermittent generation, the REGWG supported that the IMO would nominate a valuation methodology that better served the Market Objectives.<sup>39</sup> The IMO has recommended the implementation of a methodology,<sup>40</sup> through the Market Rule Change process,<sup>41</sup> that would deliver a Capacity Credit valuation (as a percentage of nameplate capacity) of 16-20 per cent for wind generation and 40-50 per cent for solar. The Authority notes that the contribution of wind generation in the SWIS during the peak summer period for 2008-10 was around 19 per cent.<sup>42</sup>

The proposed IMO capacity valuation is based on a method that assesses the contribution of intermittent generation at times of peak demand.<sup>43</sup> Utilising peak demand contributions is the typical method used in electricity markets to assess the reliability of capacity. In the proposed Rule Change, the IMO notes the importance of 'ensuring that the investment signals provided by the RCM strike a balance between providing appropriate

<sup>35</sup> Note that the NEM does not have a capacity market and the assumed 5 per cent of capacity for wind farms is used for reliability planning purposes.

<sup>36</sup> Electricity Supply Industry Planning Council (SA) 2009, [Annual Planning Report](#), June 2009.

<sup>37</sup> Electricity Supply Industry Planning Council (SA) 2009, [Annual Planning Report](#), June 2009.

<sup>38</sup> The REGWG work program included reviewing the methodology for calculating the capacity value of Intermittent Generation, an assessment of the frequency keeping requirements and the allocation of that cost to Intermittent Generators and recommendations on updated technical rules. Regarding capacity value, a draft report by MMA to REGWG advised that the current level 40 per cent of rated capacity was in line with the proposed approach. No resolution was reached on the MMA advice and Tenet Consulting was engaged to conduct further analysis. Three hybrid proposals on determining Reserve Capacity Credits were then presented to the REGWG.

<sup>39</sup> IMO 2011, [REGWG - Summary of Processes and Outcomes](#), February 2011, p. 11.

<sup>40</sup> Note that the IMO had proposed a methodology on the basis that that the MMA approach 'was based on modelling using a limited data set which did not reflect a one in ten year event'; Allan Dawson (IMO), Chair IMO MAC, [MAC Meeting No. 34 - Minutes, 15 December 2010](#), p. 12.

<sup>41</sup> IMO MAC Meeting, [MAC Meeting No. 33 Papers, 10 November 2010](#), Calculation of the Capacity Value of Intermittent Generation, PRC\_2010\_25, p.104.

<sup>42</sup> For 95 per cent of the summer peak period, 35 MW of output or 19 per cent of wind farm capacity was available. Figures were calculated for the summer period, Feb 1 to March 14; 15:30 to 17:30, 2008-10. IMO MAC Meeting, [MAC Meeting No. 35 Papers, 9 February 2011](#), p. 21.

<sup>43</sup> The method identifies critical peak demand intervals by utilising 12 Trading Intervals which experienced the highest Load for Scheduled Generation (LSG). LSG is calculated using the load that remains after removing the level of intermittent generation in the market.

remuneration for intermittent generation and ensuring system security and reliability can be maintained'.<sup>44</sup> The Authority notes that System Management has raised concerns with the IMO 'around the security associated with allocation of Capacity Credits to Intermittent Generators at the current levels'.<sup>45</sup> Given the RCM is required to deliver sufficient generation and DSM capacity to meet the stringent reliability standards set for the SWIS at periods of peak demand, the Authority considers that the IMO proposal has merit, as it better reflects the value of intermittent generation at times of peak demand.

The Authority considers that any capacity valuation needs to be regularly reviewed to reflect factors such as technological improvements and changes in demand patterns (e.g. shifting of system peak load).

The IMO makes reference to potential changes for Intermittent Generators in past instalments of its annual Statement of Opportunities (SOO).<sup>46</sup> The Authority considers, to the extent possible, that further detail of the potential changes for Intermittent Generators should be included in future SOO's. These details could include the potential for variability of the Capacity Credit allocation from year to year, depending on the particular intermittent generation technology and the applicable method for determining Reserve Capacity Credits. For example, if the level of Capacity Credits is changed to be in the range of 16-20 per cent for wind generation, future data analysis and refinements to the method may see further variations to the designated capacity valuation. The Authority considers that potential investors should be made explicitly aware that the percentage of Capacity Credit allocation to intermittent generation can change in the future – a risk factor to be considered by investors.

## Recommendation 6

### Section 2.3

The Authority recommends the Independent Market Operator include further high level detail of the potential changes for Intermittent Generators in its future Statement of Opportunities. Additional information could include details of the methodology to be applied in determining the allocation of Capacity Credits, and the impact this may have in terms of the potential for variability of the Capacity Credit allocation to the various intermittent generation technologies (e.g. wind and solar) from year to year.

## Demand Side Management

The current 'supply capacity surplus' observed in the WEM includes a growing component of DSM. DSM is expected to account for eight per cent or 454 MW of the certified capacity by October 2012, worth \$84 million per annum.<sup>47</sup> A DSM provider often signs up

<sup>44</sup> IMO MAC Meeting, [MAC Meeting No. 33 Papers, 10 November 2010](#), Calculation of the Capacity Value of intermittent Generation, PRC\_2010\_25, p. 124.

<sup>45</sup> Allan Dawson (IMO), Chair IMO MAC, [MAC Meeting No. 34 - Minutes, 15 December 2010](#), p. 13.

<sup>46</sup> For example, see the IMO website, [2010 Statement of Opportunities](#), p. 60.

<sup>47</sup> Calculated from the 454 MW of capacity multiplied by the \$186,000 per MW capacity payment.

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WESTERN AUSTRALIA

full retail contestability depends on having regulated retail tariffs set at cost-reflective levels).

### **2.5.3     *Impact of intermittent renewable generation in the WEM***

While the Authority is confident that the design of the WEM will be able to accommodate the introduction of a carbon price scheme, there are potential issues arising in the market as a result of the increase in intermittent generation driven by renewable energy policies.

A number of stakeholders have raised specific issues about the effects of intermittent renewable generation on the WEM. For instance, Synergy considers that, under current arrangements, an increase in intermittent generation in the WEM:

- could threaten the economic dispatch of base-load generation at low demand times (particularly overnight);
- may increase the use of low efficiency gas turbines to maintain frequency control at low demand times (particularly overnight); and
- may increase the cost of Load Following Ancillary Services (**LFAS**).

These issues have been the subject of ongoing reviews in the WEM.

Firstly, in relation to the economic dispatch of base-load generation, the Authority recognises that increased renewable generation could threaten the economic dispatch of base-load generation. Specifically, because renewable generation is able to supply power at a very low marginal cost (even a negative marginal cost, because it effectively receives a subsidy to generate) it can displace base-load generation in the dispatch merit order. This means that base-load generators may be forced towards their minimum stable generation levels overnight, when demand is low. This may lead to inefficient overnight shutdowns and consequent restarting costs and delays that may compromise efficiency and next-day system reliability. Indeed, the Authority notes that certain Verve Energy base-load facilities are at times being shutdown overnight and on weekends. The Authority considers that the introduction of a competitive Balancing market from July 2012 should deliver better outcomes with regard to economically efficient dispatch of generation facilities as both Verve Energy and IPPs will be able to compete for the provision of the Balancing service, particularly during low demand times.

Secondly, in relation to the increased use of low efficiency gas turbines and the increasing costs of LFAS, the new competitive LFAS market from July 2012 should also contribute towards more efficient outcomes. The Authority is aware that the IMO has been working on a methodology for allocating the costs of LFAS on a causer-pays basis. The IMO noted that the implementation of this methodology would depend on the introduction of the LFAS market. Now that work on the introduction of the LFAS market is substantially developed, in advance of the 1 July 2012 commencement date of that market, the IMO expects to be able to progress the methodology for allocating the costs of LFAS.

### **2.5.4     *Network connection issues***

Western Power noted in its submission that the AEMC's review of the impact of climate change policies in the WEM made a number of recommendations in regard to network connection and planning issues (which were discussed in some detail in previous Reports to the Minister). Given that climate change policies are expected to continue to drive incentives for new generation investment (particularly for renewable generation) effective network connection and planning is important for supporting these policies.