Discussion Draft

Prepared For:

WA IMO

Governer Stirling Tower

Perth, Western Australia

Review of RCM: Issues and Recommendations

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Following the completion of a comprehensive study of the Reserve Capacity Mechanism, the IMO Board asked The Lantau Group (HK) Limited (TLG) to prepare a note on key areas identified for further review by the Market Advisory Committee. After considering a range of possible directions, and taking into account experience within the WEM and internationally, the IMO Board concluded that the RCM has promoted capacity development and supply reliability in the WEM, but that refinement is needed to improve alignment of the RCM with the Market Objectives.

A number of different capacity remuneration mechanisms, of which the RCM is one example, exist in international electricity markets. Many different markets have features that have merit and can serve as interesting examples, but it is most important that the combined features of any single market work harmoniously. Recommendations for change in the WEM must reflect the design and context of the WEM else they risk being inconsistent or incompatible with the WEM.

As a result, we focus our recommendations on a specific set of issues that arose consistently in our review:

- The formula that establishes the value of the Reserve Capacity Price (RCP), particularly in light of the recent recommendation to reduce the Maximum Reserve Capacity Price (MRCP);
- The inter-relationship between the RCM and the Capacity Refund Regime;
- The extent to which supply- and demand-side resources should be treated similarly;
- The extent to which fuel supply limitations should affect the eligibility of supply-side resources for Capacity Credits;
- The setting of the Individual Reserve Capacity Requirement (IRCR); and
- The extent to which further periodic reviews should be undertaken so as to ensure that the RCM functions as intended to guide

Capacity investment in the WEM is the product of many factors, including demand

Similarly we consider the fuel supply requirements imposed on supply-side resources. These are currently that a supply-side resource qualifying for a Capacity Credit must demonstrate fuel supplies to support operation for 14 hours a day. The issue arising is how fuel supply, which is crucial to the ability of a resource to generate if called, interacts with the RCM.

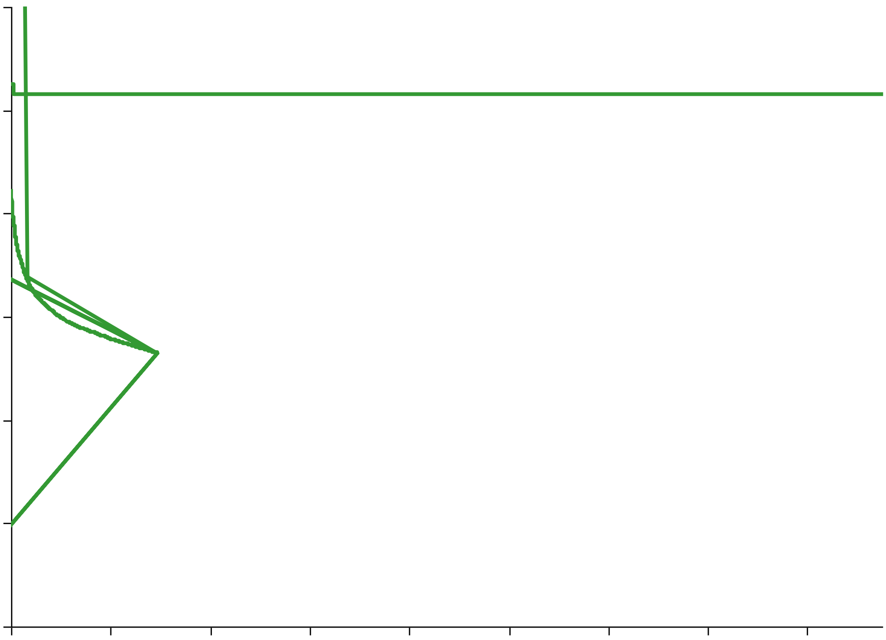
We consider refinements to the Individual Reserve Capacity Requirement (IRCR). The current IRCR settings have some aspects that potentially incentivise rent-seeking rather than value-creating behaviours. We recommend minor changes to mitigate these adverse incentives.

Where capacity mechanisms are employed in electricity markets globally, they have evolved steadily. As an administrative mechanism, the RCM naturally requires periodic calibration and review to ensure it is delivering reasonable outcomes. In particular, a number of key parameters should be reviewed every few years so that they best reflect market conditions.

We review key aspects of these recommendations in the next sections of this report, focussing first on the current supply of reserve capacity and its economic value.

The perceived cost of excess reserve capacity depends on one's perspective. The RCM

Figure 3 also shows the approximate capacity duration curve and the load duration curve for the 2009/10 capacity year. The capacities are based on the allocated capacity credits. The small peak in the capacity duration curve represents available DSM resources, in each of the classes. We implicitly assume that DSM resources can be dispatched perfectly into each of the very top 24 hours that most DSM resources have obligations to be available. Because of planned maintenance needs, the quantity of capacity credits somewhat overstates the actual availability during off-peak periods.



We can calculate the loss of load probability (LOLP) associated with the supply and demand situation at each point in time. For example, the available capacity of each unit in a given hour (C_i) is an uncertain variable, due to the possibility of forced outage. Similarly, the load in that hour (*L)* is subject to forecasting error. The LOLP is the likelihood that *L* exceeds the sum of C_i across all units in the system. A number of different algorithms exist to form this required distribution of load less total capacity and solve for the likelihood that this quantity is positive.

The values estimated in this way correspond to the economic value of adding *one more MW of* reserve capacity to what already exists. Once the WEM is in an excess reserve capacity situation, the value of adding additional supply- or demand-side capacity to the system falls towards zero. This incremental (―marginal‖) value is essentially the spot market value of capacity, taking into account demand conditions and how much reserve capacity exists at that point in time.

The peak demand in WA is concentrated in relatively few hours. The value of reserve capacity is therefore similarly concentrated in a few peak hours. In the example calculation above, virtually all of the value of reserve capacity is concentrated in fewer than 30 hours. This is an overstatement, of course, because it reflects a single actual out-turn rather than the risk of an unknown out-turn, which is what reserve capacity is intended to mitigate. It also assumes that reserve capacity resources are always available.

Even a resource that is available just 24 to 48 hours could theoretically provide a material proportion of the value provided by a resource available much more than that. This feature of peak load in the WEM has implications for the treatment of resources with limited availabilities. As the availability of various resources increases, their value as a source of reserve capacity quickly converges.

Importantly, we assume that each resource is similar enough in all other respects that it can be treated as equivalent by System Management. However, based on stakeholder feedback, dispatch limitations on DSM resources can be sufficiently constraining that the DSM resource is not equivalent in application to a supply-side resource. Clearly, System Management must be able to

A less extreme approach would involve making a change to the resource classifications. The existing classifications can be better calibrated to the value reserve capacity delivers. By eliminating, for example, the 24 to 48 hour availability class, DSM resources would be forced to join a higher availability class or cease to be eligible for Capaci

Of courses, if such robust but flexible fuel supply arrangements are not available, then that would call into question whether a unit would be able to provide reserve capacity when called. A gas supply limitation naturally results in a generation capacity limitation, and this should, if it arises, flow through to the number of Capacity Credits that gas supply can support. If a unit cannot demonstrate access to gas, then it could demonstrate an alternate backup fuel, or it could simply not qualify for Capacity Credits.

Given the concentration of reserve capacity value into a relatively small number of hours, an alternative approach may be possible in which a generation resource without a clear and firm fuel supply access arrangement can qualify for Capacity Credits by submitting and maintaining, on a rolling basis, an approved fuel management or access plan sufficient to support the relevant portion (for that part of the rolling horizon) of the minimum eligibility hours required for a Capacity Credit. Operational testing would also continue to be part of the certification process.

In other respects, if a unit is then not able to perform dutifully when called, the Capacity Refund regime would be the applicable penalizing mechanism. A dynamic Capacity Refund regime in which the refund exposure depends on system conditions assists by promoting appropriate incentives.

In reviewing the RCM we found the idea of decomposing loads into temperature-dependent and non-temperature-dependent loads and the associated determination of the Individual Reserve Capacity Requirement (IRCR) generally reasonable. Some implementation issues arise, however, that merit refinement:

- The use and application of 12 Trading Intervals to determine the IRCR.
    - The more trading intervals are combined to set the IRCR the further away the IRCR moves from its economic intent: to represent the reasonable peak demand expectation of a given load. Considering the use of fewer trading intervals is sensible. The top three trading intervals, for example, have been used for analogous purposes in the UK and New Zealand.
    - The calculation of the IRCR is based, approximately, on an approach based on the median value of 12 top Trading Intervals[3]. The use of the median value approach rather than the mean value means that the highest values are ignored, which makes no sense.
- Alignment with DSM resource offering

3 Not necessarily the very top 12 intervals, but the three highest demand trading intervals on the four trading days with the highest demand.