Independent Market Operator

Issues Paper

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1. INTRODUCTION AND BACKGROUND

1.1 Overview of Clause 4.26.2

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 issues paper.

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 = Max (RTFO, RCOQ-A) + Max (0, B-C) – RTFO

Where A = Min (RCOQ, CAPA)

B= Min (RCOQ – RTFO, DSQ)

C= 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)]: which compares the capacity made available in the day-ahead STEM processes to the Market Participants 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 Participants 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 submit 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)]: which 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[1].

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.

2. NET STEM SHORTFALL CALCULATION

2.1 Issue identification

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 portfolios 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.

2.2 Further assessment

This section provides a further assessment of the two identified issues with the current formulation of the Net STEM Shortfall calculation.

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

[1] 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

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.

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

	SG 1	SG 2	Portfolio
RCOQ	100	20	120
RTFO	40	0	40
DSQ	100	0	100
MSQ	60	0	60
Real-time Shortfall	0	0	**20**

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 20 MW 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 issues paper. 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 portfolios 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).

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 portfolios 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= Min (RCOQ– RTFO, DSQ + X)

C= Min (DSQ +X, MSQ + X)

If X is large enough to raise the DSQ + X above RCOQ –RTFO then [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 a 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.

2.3 Conclusions

The two issues show that clause 4.26.2 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).

2.4 Potential Solutions

As the specific issue impacting on Griffin Energy currently relates directly to issue 1, the following potential interim solution has been identified:

- 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) (Issue 1).

This solution will need to be tested for any unintended consequences, but the IMO considers that it should be relatively simple to implement.

In adopting this interim solution the issues around portfolios with multiple generators would not be solved. To provide a long term solution a combination of options may be required. For example:

- Facility level calculation of the Net STEM Shortfall:
    - Calculate the shortfall for each Facility separately then sum Facility shortfalls to arrive at a portfolio value of the Net STEM shortfall (Issue 1 & 2); or
    - Amend clause 4.26.2 to only calculate the pre-STEM shortfall and treat DSQ and MSQ in a separate calculation (Issue 1 & 2).
- Amend clause 4.26.2 so that the portfolio adjusted reserve capacity obligation quantity excludes quantities associates with capacity that was not dispatched (Issue 1);
    - Modify the portfolio's reserve capacity obligation used in term B so that each facility contributes the lesser of its Dispatch Schedule and its Reserve Capacity Obligation Quantity. Note that a slightly different approach may be needed for loads with a negative Dispatch Schedule.
- Amend clause 4.26.2 to explicitly remove the contribution of facilities with output above the facilities RCOQ eg. Intermittent Generators (Issue 2);
    - Remove the contribution of "unwarranted capacity" to the portfolios MSQ and DSQ; or
    - Remove a quantity equal to the amount by which Resource Plan Quantities exceed Capacity Credits from term A (recognising that RCOQ may be zero)
- Amend clause 4.26.2 to include the contribution of facilities with output above the facilities RCOQ in term C, therefore preventing the capacity from reducing the Net STEM shortfall (Issue 2).

Further amendments to the Market Rules will be required to take account that the Electricity Generation Corporation is not required to have a Resource Plan (therefore DSQ = MSQ).

3. RECOMMENDATIONS

The IMO recommends that the MAC:

- Review this paper and the worked examples of the Net STEM shortfall calculation provided;
- Consider the two issues and the outcomes on the Net STEM Shortfall calculation;
- Consider the identified solutions; and
- Provide comments to the IMO on the issues and identified solutions before 5pm Thursday 18 February.

APPENDIX 1: HISTORY OF AMENDMENTS TO CLAUSE 4.26.2

RC_2007_05 Reserve Capacity Refund Shortfall Calculation

In December 2006 clause 4.26.2 (b) was amended to address a potential anomaly in the Reserve Capacity Shortfall calculations, which lead to an overstatement of a Market Participant's fulfilment of its Reserve Capacity obligation. It was found that this change may have had an unintended adverse impact on participant refund calculations. In practice, the formula at the time could result in an understatement of the capacity made available to the market when a STEM submission is not provided.

To correct this, the IMO proposed to amend the rules to add back in the determination of the Reserve Capacity Shortfall participant's own demand, in cases when the participant does not have a valid STEM submission in any Trading Interval.

RC_2007_36: Maximum Refund

At the time of the Rule Change Proposal, the definition of the Maximum Refund was drafted to cap the maximum refunds at the Participant level. This, therefore, applied refunds to the entire facility portfolio of a Participant, instead of limiting the refunds to individual facilities as was intended. The Rule Change Proposal sought to rectify this issue.

In particular the Rule Change Proposal:

- amended the term "Maximum Refund" to "Maximum Participant Refund" (Clause 4.26.1);
- Added the new clause calculating the "Facility Forced Outage Refund" (clause 4.26.1A);
- Added the new term and rule for "Participant Forced Outage Refund" (Clause 4.26.1B);
- Amended clause 4.26.2 from a "Capacity Shortfall" to a "Net STEM Shortfall"; and
- Amended clause 4.26.3 (the calculation of the Capacity Cost Refund clause), also adding the new term "Net STEM Refund".

RC_2009_19: Correction of minor references and drafting errors

The Rule Change Proposal corrected of a cross reference at the end of the RTFO(p,d,t) definition in clause 4.26.2.

RC_2008_20: Demand Side management Operational Issues

The Rule Change Proposal:

- added the words: “associated with a generation system” to clauses 4.26.1 and 4.26.2;

- added an obligation into the rules to ensure that MP’s with CCs associated with CLs who fail to meet its RCOs then they must pay refunds (clause 4.26.1C);

- added the concept of Relevant Demand (clause 4.26.2C);

- added the new term and process for “Capacity Shortfall”, which is associated with MPs holding CC associated with curtailable loads (clause 4.26.2D);

- added clause 4.26.2E regarding the calculations of refunds

- amended clause 4.26.3 to the formula for calculating the Capacity Cost Refund associated with a generation system;

- added clause 4.26.3A which is the formula for the Capacity Cost Refund associated with a Curtailable Load.