9 October 2014

Mr John Pierce
Commissioner
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Submitted online: www.aemc.gov.au

Dear Mr Pierce

ERC0165 – Generator ramp rates and dispatch inflexibility in bidding

Origin Energy (Origin) appreciates the opportunity to provide comments to the Australian Energy Market Commission (AEMC or Commission) Draft Rule Determination on generator ramp rates and dispatch inflexibility in bidding.

The intent of the original Rule change proposal, as we see it, is to minimise the potential for any inefficient dispatch outcomes brought on by generator ramping. The inherent difficultly in achieving such an objective, however, is that any Rule must take into account, and strike an appropriate balance between, the technical and commercial aspects of generator ramp rates.

Origin supports the AEMC's decision to make a more preferable Rule as the proposed Rule did not adequately take into account these commercial considerations. A requirement for generators to bid their maximum technical ramp rate at any given time would limit a generator's ability to minimise wear and tear and optimise the life of the plant. Additionally, we agree with the AEMC's assessment that there are likely to be some practical difficulties in applying the proposed Rule.

Origin supports the AEMC making a more preferable rule: We agree the original Rule change proposal could be difficult to apply in practice. Generator ramp rates are not constant, depending on mode of operation, mill movements and level of output. Complying with a maximum technical ramp rate could increase the compliance burden for generators updating ramp rates to reflect the maximum technical capacity or providing a technical rebid reason when a lower rate is required.

Origin considers the AEMC more preferable rule could create unintended consequences: Origin considers that the AEMC's more preferable Rule does not recognise the nature of ramping profiles. The preferred Rule places a disproportionate burden for ramping on larger units and fails to recognise operation requirements for mill movements and plant impacts from increasing the thermal stress on units with an increase in wear and tear and reduction in asset lifecycle.

Applying an arbitrary target to determine minimum generator ramp rates applies inconsistent minimum ramping capability across NEM regions with no clear rationale or benefit. Ramping requirements are not proportionately shared across participants based on regional weighted average capacity. The practical outcomes of the preferable rule does not align incentives with the ramping requirements of NEM regions, for example, South Australia with a high level penetration of renewable generation with a high rate of change with a low ramp rate requirement.

The maximum capacity of some aggregated units (particularly combined cycle generating systems with gas and steam turbines), can be impacted by the number of units in service. To minimise the potential to discriminate or impose a disproportionate burden on these generating systems, the maximum capacity should reflect the number of units in service.

Origin's preferred solution would be for the AEMC to revisit the 2009 draft determination: Applying a 3MW/min minimum ramp rate requirement across all NEM participants is consistent and proportionate to the ramping requirements to preserve power system security. It is, in addition, easy to determine and implement. Where the 2009 determination did not apply the rule requirement to aggregated units this decision should be revised and applied to aggregated units albeit with a lower requirement per unit.

If the preferred Rule is adopted, it should allow for exceptions in instances where compliance would result in undue 'wear and tear' for a generation plant notwithstanding such plant being technically capable of meeting the new requirements. The Commission has previously recognised this issue of undue wear and tear, [1] in addition, the compliance burden from providing technical rebids to reflect technical limitations should be minimised.

Should you have any questions or wish to discuss this information further, please contact Ashley Kemp on (02) 9503 5061 or ashley.kemp@originenergy.com.au.

Yours sincerely,

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[1] AEMC 2009, 'Ramp rates, market ancillary service offers, and dispatch inflexibility, Rule Determination, 15 January 2009, Sydney. p. 11.

1. Origin supports the AEMC making a more preferable rule

Origin supports the AEMC draft determination to make a more preferred rule. We agree with the AEMC that the rule, as proposed by the AER, could be difficult to apply in practice.[2] Generator ramp rates are not constant and fixed but variable depending on a range of technical factors that may limit or enhance the ramping capability of a generating unit, indeed the optimal ramp rate varies within the ramp up (or down) cycle of a unit. Attempting to determine a generating unit's maximum technical ramping capability could increase the compliance burden for participants as would continually providing a technical rebid in every instance where this time a rebid in submitted below the maximum technical capacity.

2. Origin offers in principle support for the AEMC consideration of commercial incentives:

Origin agrees, in principle, with the approach of the AEMC to be technology neutral in applying the draft preferred Rule.[3] The potential for unintended consequences from this approach is the performance characteristics of different generation technologies across coal, gas and hydro are inherently diverse. In applying a single Rule to be technologically neutral it may impose a disproportionate commercial and technical burden on larger and older generating units in favour of smaller and more flexible plant.

Origin supports the AEMC's assessment framework for the Rules to enhance productive efficiency. A rule requirement, however, that imposes a disproportionate burden for ramping on larger thermal units may increase the commercial costs for maintaining the technical operation of the unit in addition to an increase in fuel costs. Where these increases in costs are reflected in bid offers, productive efficiency is likely to be diminished.

3. The AEMC more preferable rule could create unintended consequences

Origin considers the AEMC's more preferable draft Rule could be detrimental to productive efficiencies and create unintended consequences. The practical implication is a disproportionate burden for providing ramping capability is placed on larger units with material commercial and technical limitations. Smaller units, in contrast, that have lower commercial and technical limitations, have a lower ramping requirement. The potentially perverse market impact of the preferable draft rule in a region like South Australia that requires a high level of ramping capability would have the lowest ramping requirement.

It is not clear whether basing a ramping requirement on an arbitrary number will contribute to distributing the burden for providing ramp rate capability proportionately across all participants.[4] It is less clear that there is a logical basis for a region's minimum ramping capability to be based on a percentage of regional generator capacity. What is clear is the potential for unintended consequences and perverse market outcomes under the draft rule.

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[2] AEMC 2014, Generator ramp rates and dispatch inflexibility in bidding, Rule Determination, 28 August 2014. p. 5.
[3] Ibid. p. 25.
[4] The AEMC more preferable draft rule is to require participants to provide a ramp up and ramp down rate that is at least one percent of maximum of registered capacity, rounded up to the nearest whole number.

Ramp rates are influenced by a range of commercial and technical factors. Categorising ramping capability into either commercial or technical ignores the more complex interrelationship between the cost impacts and stable operation of the unit over time.

Commercially, a high ramp rate for a unit would increase the pressure and thermal stress within the generating unit and station boiler. This would not only result in higher wear and tear costs for the unit but decrease the economic life of the asset. The bid offer by the generator would need to be structured to recover the increase in operating costs, diminishing productive efficiency.

Technically, a high ramp rate for a unit would risk the stable operation of the generating unit depending on step changes in the level or mode of operation. Maintaining a high rate of change could risk the stable operation of a unit at higher levels of mill ranges or where unit output is close to minimum and maximum operating levels. In addition, maintaining a high ramp rate when changing a unit's mode of operation, for example, shifting from cogeneration to combined cycle mode or introducing power augmentation including duct firing for gas fired units may not be attainable.

Assessing and determining what these parameters are for individual generating units is likely to increase the compliance burden for participants. This burden could be expected to remain over time as the generator performance changes over the economic life of the asset. The compliance burden could also be expected to extend to rebidding where a participant would be required to provide a technical rebid when the unit's capacity is below its maximum capacity to remain compliant with clause 3.8.3A of the NER without a clear market benefit.

Proportionate distribution of ramping capability

The AEMC outlined the regional change in aggregate minimum ramp rate requirements in table 4.2 of the draft rule determination. What is clear from the table is a region's minimum ramping capability will shift from around the current rule requirement of three megawatts per minute to a level reflective of the size of units within those regions. That is to say a region's ramping capability largely reflects the legacy decisions of state governments decades ago as to what generators they would invest in. There is no logical basis for a region's ramping capacity to be tied to the weighted average of installed generator capacity.

A reconciliation of the minimum ramp rate capability for New South Wales, for example, suggests ramp rates are not distributed proportionately across all participants. While the ramping contribution from installed baseload coal generators is approximately proportionate to the unit's contribution to regional capacity, other generation technologies produce some perverse outcomes:

- Open Cycle Gas Turbines contribute to approximately four percent of regional capacity but contribute to less than one percent of ramping capability; and
- A hydro unit that contributes around ten percent of regional capacity but contributes to over twenty-five percent of regional ramping capability.

These perverse outcomes are compounded by the higher commercial and technical impacts a higher ramping requirement imposes on older coal generators compared to the negligible commercial and technical impacts the preferred draft rule imposes on open cycle gas turbines. While the rule is applied consistently, the impact on different generation technologies is not proportionate to the size of the units or the performance standards and technical requirements of different generation technologies.

Potential unintended consequences

The AEMC preferred draft rule has the potential to create unintended consequences. With a region's minimum ramping capability tied to the weighted average size of installed capacity, South Australia would inherit a lower ramp rate than under the current rule requirement. The potential for unintended consequences could arise through the generation composition in the state consisting of a large level of renewable generation, with a high ramp rate, and synchronous generation, with a low ramp rate requirement.

Renewable generation requires back-up generation for when there is limited or changing output from installed capacity. This could be expected to be through peaking or intermediate generation coming online or ramping up to offset a potentially rapid decrease in renewable generation. The potential for unintended consequences could be where there is a low ramp up from generation to offset a large and rapid decline in renewable generation. These consequences could be amplified where PV output declines as the summer demand peak increases. This could significantly erode productive efficiency.

Defining maximum capacity

The maximum capacity of some generating systems, particularly combined cycle generating systems with gas and steam turbines are impacted by how many gas turbines are in operation. In these instances the AEMC Rule should not be limited to the registered maximum capacity of a generating plant but should rather reflect the number of units in service. This would minimise distortion and any added burden on these generating systems.

Origin's preferred solution

Origin's preferred solution is for the AEMC to revisit the 2009 ramp rates, market ancillary service offer, and dispatch inflexibility determination and apply the Rule requirement to the units in an aggregated system. Origin acknowledges the AEMC determination to apply the Rule to the registered capacity of the aggregated system to avoid imposing a disproportionate burden for providing ramping capability on aggregated generators.[5]

A solution could involve a 'tool-kit' approach to equitably manage units registered individually or as an aggregated system. This could involve a fixed number or a percentage, for example, 3 MW/min or 0.5 percent as determined by the AER. This approach would require the AER to consult and revise its Rebidding and Technical Parameters Guideline to outline its approach to applying a fixed number or percentage to individually registered or aggregated units.

If the AEMC decides to make a Rule based on the draft one percent of maximum capacity, it should be cognisant of the likely impact on larger and older thermal units where they may not be able to attain the ramp rate. There are also instances where compliance with the Rule would result in undue wear and tear for some plant, despite being technically capable of meeting the requirements. To mitigate the impact of a high ramp rate, exemptions to comply with the Rule requirement may need to be sought from the AER to minimise the compliance burden from rebidding a technical rebid reason below one percent of maximum capacity.

[5] AEMC 2009.