Macquarie Generation

28 March 2014

Mr John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

Reference: ERC016

Dear Mr Pierce

GENERATOR RAMP RATE RULE CHANGE PROPOSAL

Macquarie Generation welcomes the opportunity to comment on the AEMC's Consultation Paper detailing the Australian Energy Regulator's Rule change proposal: *Generator ramp rates and dispatch inflexibility in bidding*, as published in February 2014.

Powering Our Community

Macquarie Generation has limited its comment to a discussion of the practical difficulties of imposing an obligation to bid and rebid a maximum technical ramp rate at all times. We frame this discussion from the perspective of a large, coal-fired generator.

Calculating an accurate maximum ramp rate capability

Coal-fired generators are designed to operate as baseload plant with high, reasonably stable loads – the mode in which fuel and thermal efficiency is maximized. From an engineering and economic perspective, fast start and high ramping plant such as gas and hydro operations are generally best suited to meet peak system demand and real-time fluctuations in customer loads.

The vast majority of the coal-fired generation fleet in the NEM is now more than 30 years old with original design specifications accommodating a level of ramping capability in the vicinity of 1% to 2% of continuous maximum rating. However, over time a degradation of the original design tolerances and a decline in coal quality now mean that most coal-fired plant would struggle to achieve ramp rates close to original design.

There are a number of factors that make it difficult to calculate an accurate ramping capability for older, coal-fired plant at any point in real time:

1. *Ramping movements in previous dispatch intervals*: coal-fired generators cannot maintain a linear maximum ramp rate over any period of time due the physical nature of the delivery system (boiler condition, steam pressures, fuel supply systems). In general, when ramping, ramp rate capability declines with time. This rate of decline is not constant and as a result is difficult to estimate.

2. *Conditions in the boiler*: a critical issue that determines maximum ramp rate capability is the consideration of boiler flame stability and other furnace conditions. Each operator will form a different view of maximum ramp rate based on experience and their interpretation of current plant conditions.

3. *Unit security is first priority*: operators make decisions dynamically in response to plant conditions. At times, this means that there will be lags in reporting changes to the maximum rate ramp as the operator first responds to unit security issues before contacting the spot trader to update any technical rebidding requirement.

4. *Mill performance variability*: maximum ramp rate capability is dependent upon the supply of coal from multiple pulverized fuel mills. The actual performance of each mill is dependent on the internal physical condition of the mill. Individual mills also display variable performance improvement following routine maintenance.

5. *Mill numbers and configuration:* ramping capability is impacted by the number of mills in service at any time as well as whether the mills are in an adjacent cluster or there are gaps in the mill stack.

6. *Coal quality*: Macquarie Generation experiences daily variations with respect to specific energy of coal content (19 to 24 GJ/tonne), ash content (28% to 34%) as well as coal hardness and moisture. Such variations require constant adjustment to the control characteristics of mills in service and significantly impacts boiler conditions in real time. The 'visibility' of such real time variations in coal quality is difficult to predict even with good coal blending practices and the best intent of coal suppliers and currently available coal sampling techniques. This makes it extremely difficult to determine a maximum technical ramp rate capability at any time.

7. *Control system tuning:* whilst generators do routinely engage control system experts to tune various sub systems of the overall unit control systems, control system drift is inevitable, resulting in the control of the unit being less than design. There is also the issue of temporary failure of minor control system components that in normal operation may be difficult for unit operators to

immediately identify but under high ramping conditions emerge and threaten unit reliability.

Unlike other aspects of operating a power station, there is no automated control system that can critically monitor and report the maximum ramp rate capability of a generating unit at a particular point in time. Much relies on the knowledge and experience of control room operators in assessing the performance limits of a generating unit.

Difference between a safe level of ramp rate change and an absolute maximum technical capability

Macquarie Generation questions the merit of an approach that relies on the constant reporting of a maximum technical capability when that limit is subject to a host of dynamic factors.

A useful analogy in this case would be asking a sprinter to nominate how fast he is going to run 100 metres? He would have difficulty giving an accurate time as much would depend on track conditions, headwinds, weather, recent form, injuries, physical condition at the exact time of the race and the like. The estimated time would then change again part way through the event depending upon reaction time and fatigue levels. However, the same sprinter would be much more comfortable nominating a time that could be bettered under any circumstance.

Requiring generators to bid a maximum technical ramp rate in every dispatch interval could result in a number of outcomes:

1. the generator nominates a ramp rate figure that is untested in dispatch – no impact as the generators dispatch does not change;
2. the generator's offer is the marginal bid and the unit is unable to achieve the nominated maximum ramp rate. The generator is non-compliant in this instance and exposed to enforcement action. The ramp rate shortfall will lead to a greater likelihood of higher spot prices to dispatch fast start plant with an associated possibility of increased system stress. A related scenario may see unit trips, with possible negative impacts on customer reliability, as generators attempt to achieve maximum ramp rates (eg, due to boiler flame instability);
3. the generator's offer is the marginal bid and the generator's output increases by more than the nominated ramp rate. The generator would be subject to compliance action.

Of the above three scenarios, an approach that allows a generator to nominate a ramp rate capability that it can safely and consistently achieve provides the best outcome in terms of system reliability and lower spot price volatility, while minimizing costly compliance and enforcement action.

The change to a maximum ramp rate capability means an increased risk of dispatch target shortfalls across the NEM leading to increased system stress and higher spot prices. Returning to the sprinter analogy – the AER is requiring all sprinters to first nominate their personal best time and then run to that time in every race they ever participate in (plus if they fail this standard they are then subject to compliance action). In Macquarie Generation's view this is an unrealistic threshold given the multitude of factors that could impact each sprinter's ability to a) predict their best time and b) perform to their best time. The logical outcome under such an arrangement is for sprinters to lower expectations of personal best times resulting in a loss of capability to the market overall.

Compliance costs and complexity

The Rule change proposal would require generators to constantly update their actual maximum technical ramp rate capability. This could dramatically increase the frequency of rebidding for coal-fired generators as plant conditions change and ramp rate capability moves up or down. In each instance, the generator would also need to submit a brief, verifiable and specific reason explaining the basis for the ramp rate rebid. In some cases, rebidding will occur within a trading interval as plant conditions change.

In addition, a risk exists that a unit operator seeking to secure a unit's security may adjust local control system parameters impacting SCADA ramp rate capabilities automatically transmitted to AEMO which will override bid ramp rate capability. IN this scenario it is likely that a time delay would exist before the spot trader is advised or local control parameters are readjusted to normal settings.

Macquarie Generation does not operate a 24-hour trading room. Spot traders are on call overnight to respond to problems and changes that occur at the power stations requiring a unit rebid. For the reasons stated above, a requirement to constantly update the maximum ramp rate capability would impose additional costs for any generation business, including:

- additional spot traders and cost of specialist training;
- development of new IT and forecasting systems to predict the maximum ramp rate capability under a myriad of dynamically changing operating conditions (with no guarantee of success);
- development of testing regimes and records management systems to demonstrate compliance.

The AER's rule change proposal does not adequately address these increases in compliance costs.

Concerns with the AER's proposed approach to compliance

The AER's rule change proposal states that the approach to compliance with the requirement to offer a maximum technical ramp rate value at all times would be described in an amended *AER Rebidding and Technical Parameters Guideline*. The AER has indicated it would take a pragmatic approach to monitoring and enforcing compliance, and would not expect precise ramp rate values or pursue a breach in respect to minor variations in offered ramp rates.

Should the AER have concerns regarding the ramp rate offered by a particular generator at a point in time, we would expect that the regulator would appoint an independent technical expert to review the physical conditions during those dispatch intervals. However, an after the fact review when data is available (which is still likely to be incomplete) when there exists plenty of time to make an offline assessment of the range of a unit's ramp rate capability does not reflect reality. In practice, spot traders and control room operators need to make snap judgments at times of variable and sometimes volatile plant and market conditions.

Macquarie Generation is concerned that the AER has drafted a rule change that effectively requires market participants to "trust the regulator". That is, to accept that the regulator will monitor and enforce the rule requirement in a targeted and reasonable manner. This would apply from the introduction of the rule, and while ever the rule is in place. Macquarie Generation does not share the same degree of goodwill as it pertains to all future regulatory enforcement practices.

Summary

Macquarie Generation does not support the rule change proposal as currently drafted. We do not consider that AER has made the case to require a maximum technical ramp rate limit for all generating units at all times, and has underplayed the costs of implementing the proposal.

Macquarie Generation believes adoption of the rule will increase system stress either due to increased shortfalls against dispatch targets (as generators over estimate ramping capability in fear of AER compliance action for under estimating) or due to a reduction in available ramping capability across the market (as generators under estimate to avoid AER compliance action for over estimating). Further, under high demand scenarios where intra-regional constraints are more likely to bind, faster ramping of units increases the risk of unit trips that could result in the loss of reliable supply to end users.

Macquarie Generation considers that the AEMC should not give the AER unfettered discretion to interpret and enforce the Rule as drafted. We are of the view that it is not possible to make an accurate ex-ante or even ex-post assessment of a maximum technical ramp rate capability at a particular point in time. Should the AEMC approve the AER proposal, any new rule should set out detailed guidance and limits on how the rule could be applied and enforced in practice.

Yours sincerely

TIM ALLEN
GENERAL MANAGER
MARKETING & TRADING

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