



23 October 2017

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

Submitted online: www.aemc.gov.au

Dear Mr Pierce

Five Minute Settlement – Draft Determination

Origin Energy Limited (Origin) welcomes the opportunity to provide comments on the Australian Energy Market Commission's (AEMC) Draft Determination on Five Minute Settlement.

Origin agrees a shorter settlement interval would arguably lead to wholesale prices that more accurately reflect supply/demand conditions. As such, conceptually, the alignment of settlement and dispatch timeframes at five minutes represents a natural shift in the continuing evolution of the market. But given the trade-offs associated with implementing five-minute settlement, the Draft Rule requires further consideration with a view to minimising the level of market disruption and maximising overall benefits for consumers.

While the AEMC has conducted additional analysis to understand the implications for the existing generation fleet, Origin remains of the view that the alignment of settlement and dispatch will have a destabilising effect on the market if implementation is not well timed. The NEM is currently undergoing a significant transformative period and so the impact of any further instability should be carefully considered. Some of the issues of concern that should be taken into account are set out below.

- Ramping limitations will impede the ability of peaking generation (and base load plant) to underwrite cap contracts due to a reduced capacity to respond to price spikes that aren't correlated with demand. The AEMC's analysis of five minute interval data in South Australia during 2016-17 demonstrates this very issue, with the unpredictability of price spikes in that region manifesting in lower generator operating levels during high price periods relative to other regions.
- The economic viability and suitability of new investment remains unclear. The new open cycle gas turbine (OCGT) plant identified by the AEMC are still unable to respond in five minutes from rest, including aero derivatives. As such, they would face similar challenges to the existing fleet of peaking plant, albeit to a lesser degree. The extent to which battery storage can supplement or contribute to the supply of cap contracts is also unproven and will depend on battery providers' risk profiles as well as their storage capabilities.
- The supply/demand balance in the NEM has tightened in recent years. Where coal-fired generation exit the market at the end of their economic life and (or) in response to emissions reduction policies, this could reduce available capacity, further limiting the volume of caps provided by base load plant.
- While there are current work streams aimed at enhancing the reliability and security of supply, many of these are yet to be fully progressed and any associated reforms will only have been in

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place for a limited period prior to 1 July 2021. Whether these reforms will be sufficient to address any reduction in the availability of generation capacity and consequently the supply of cap contracts is therefore uncertain.

In addition to the market issues identified above, Origin has significant concerns around the limited period of time market participants will have to upgrade internal systems and processes to accommodate five minute data. The obligation on AEMO to amend and publish its relevant procedures by 1 December 2020 ahead of the 1 July 2021 start date leaves market participants with only 7 months to finalise/test system changes in accordance with the final procedures.

Further, if the AEMC's decision in its final determination is to make the rule, Origin and other market participants would then need to commence the task of fully understanding the scope of the required system changes that would help to inform the implementation timetable. Even if the required changes could feasibly be made within the specified timeframe, there is no allowance in the event of contingencies. The Power of Choice implementation indicates that changes of this magnitude are rarely implemented smoothly, particularly when internal systems are required to interface with numerous external parties (e.g. AEMO, meter data providers etc.)

The path forward

In light of the uncertainties identified above, our suggestion is that the proposed transitional period of three years and seven months set out in the Draft Determination should be designated as the minimum transitional period. Ideally, this timeframe should be increased by one year to build redundancy into the timeframe and allow any unforeseen issues to be addressed. Alternatively, if the rule is made AEMO could be charged with developing a detailed implementation plan in consultation with industry that can be used to more accurately inform the scope of required system changes and therefore the appropriate length of the transitional period.

Since the purported efficiency benefits of the rule change are expected to accrue over the longer term, any extension of the transitional timeframe will not detract from the overall value of the rule change. Rather, it will minimise the level of market disruption and potentially avoid exposing consumers to any resultant costs. Critically, it will also afford all participants an appropriate amount of time to ensure system readiness.

Design options

If the AEMC determines that five minute settlement should be implemented, Origin is supportive of the following design features.

- five minute settlement should be compulsory for both the retail and demand sides;
- underlying five minute data should be derived from revenue meters rather than supervisory control and acquisition (SCADA) data; and
- existing type 4 and 4A metering (that is not at a transmission network connection point or distribution network connection point) as well as type 5 and 6 metering installed prior to 1 December 2018, should be grandfathered.

Attachment 1 provides further details on elements of the Draft Determination. If you wish to discuss any aspect of this submission further, please contact Shaun Cole at shaun.cole@originenergy.com.au or on 03 8665 7366.

Yours Sincerely,

A handwritten signature in blue ink, consisting of a series of connected loops and a vertical stroke at the end.

Steve Reid
Group Manager, Regulatory Policy

Five Minute Settlement in the NEM

1. Impact on the existing generation fleet

As noted in the Draft Determination, a number of stakeholders (including Origin) have raised concerns about the implications of five minute settlement on existing generators and their ability to underwrite cap contracts. This includes a significant proportion of peaking plant within the NEM that would be incapable of responding to five minute price signals, since start-up times generally exceed this timeframe and minimum run times can extend for as long as two hours.

The AEMC has considered this issue further by analysing the correlation of underlying demand with trading interval price spikes greater than \$1,000/MWh and the operating level of peaking plant during peak pricing intervals. The historical analysis indicates that for the most part:

- price spikes are most likely to occur in peak times and when demand is expected to be at least 80 per cent of the maximum demand for that quarter; and
- peaking generators may be generating in anticipation of price spikes so that start-up times and ramp rates are less of a constraint.

Origin notes the above findings and agrees that tracking underlying demand will be important to optimise the operation of peaking plant under five minute settlement. But there are a number of limitations with this analysis that should be considered, as discussed below.

- *Predictability of price spikes:* While it can be observed that price spikes in New South Wales and Victoria are generally well correlated with demand, this is not the case in Queensland or South Australia. The AEMC's analysis demonstrates that price spikes greater than \$1,000/MWh occur only 78 per cent of the time in Queensland when demand is greater than 80 percent of the quarterly maximum, and 52 per cent of the time in SA.

Further analysis of the average loading levels of generators during 2016-17 also shows that when the trading interval price spiked, plant in SA were operating at lower levels than observed in the other regions during equivalent periods. This included the Torrens Island power station, which as a base load generator you would expect to already be online when many price spikes occur. As noted by the AEMC, the relatively high penetration of variable wind and solar generation, as well as interconnector limits and outages likely contribute to the heightened unpredictability of price spikes in SA. But given the changing energy mix across the NEM more broadly, it should not be assumed that these issues will not emerge elsewhere.

- *Frequency of price spikes:* A likely outcome of five minute settlement will be that the capacity factor of peaking plant would actually reduce, with peaking generators simply forgoing the opportunity to access price spikes that are unlikely to be sustained. Given analysis prepared by Russ Skelton & Associates demonstrated that price spikes above \$1,000/MWh generally only last for one trading interval (i.e. they are not contiguous)¹, it should not be assumed that the responsiveness of peaking plant under current arrangements will be replicated under five minute settlement. Further, where peaking plant sell a lower volume of caps due to an inability to protect their full capacity, their incentive to respond to price spikes will be reduced.

¹ Russ Skelton & Associates, *Five Minute Settlement – Assessing the Impacts*, report prepared for the Australian Energy Council, March 2017.

- *Tightening supply/demand balance*: Base load generators are one of the largest sellers of caps in the market. While the AEMC believes these generators will not be impacted by the rule change, tightening supply/demand conditions could result in increased baseload operating levels and a reduced volume of excess capacity available to underwrite and sell cap contracts. This is in addition to the impact of plant ramping limitations, which apply to base load and peaking generators alike.

Given the above factors, it is not clear how the AEMC can state with confidence that the volume of impacted caps will be limited to 625 MW. Further, while alternate financial products will emerge, the extent to which these products would fully capture the additional market risk imposed by five minute settlement is unclear. It will also take time for liquidity in such products to develop, given historical analysis of behaviour under 30 minute settlement cannot be wholly relied on to inform future contracting and operational decisions under five minute settlement.

2. Economic viability and suitability of new investment

The benefits of the rule change are largely contingent on a view that investment in new, more responsive technology will occur. Potential options include aero derivatives / industrial (frame) open cycle gas turbines (OCGT) and energy storage. But it must be recognised that the new OCGT plant identified (including aero derivatives) are still unable to respond in five minutes from rest. As such, they would face similar challenges to the existing fleet of peaking plant, albeit to a lesser extent.

Further, the outlook for widespread deployment for battery storage remains uncertain. While technology is evolving rapidly, large scale battery projects are still in their infancy around the world and reliant on substantial subsidies to be economic. According to Energy Edge, while some large-scale battery projects may be installed in the short to medium term, they will be a long way from addressing the estimated shortfall in caps. The extent to which battery storage can supplement or contribute to the supply of cap contracts is also unproven and will depend on battery providers' risk profiles as well as their storage capabilities.

The overall impact of mass deployment of battery storage on the NEM (e.g. on system frequency) is also unknown and could potentially give rise to additional costs that would need to be considered when undertaking such an investment. This issue was recently raised by AEMO in the context of SA, who noted the ability of inverter based technology to ramp very quickly could cause power system problems (e.g. frequency disturbances) and ultimately lead to contingency type events.²

The AEMC acknowledged these concerns in the Draft Determination but noted that '*given the large amount of work currently being undertaken to address system security and reliability issues, and the developments in the market, the Commission is satisfied that there is no direct threat to system security or reliability from making the rule change*'. Notwithstanding the strong focus on reliability and security of supply, many of the current work streams are yet to be fully progressed and any associated reforms will only have been in place for a limited period prior to 1 July 2021.

Further, the adequacy of more recent reforms such as the requirement to register batteries (and battery facilities) greater than 5MW as *scheduled generating units* are yet to be tested in practice. It is conceivable that the proliferation of batteries and battery facilities below this threshold could still give rise to the issues identified by AEMO.

² Australian Energy Market Operator, *ESCOSA – Inquiry into the Licensing Arrangements for Generators in SA*, Workshop Presentation, 16 May 2017.

3. Implementation issues and systems changes

As noted in Origin's response to the earlier Directions Paper, implementing the proposed rule change will necessitate fundamental changes to internal systems and processes that currently have limited capability to accommodate five minute settlement data. If the AEMC's decision in its final determination is to make the rule, Origin and other market participants would then need to commence the task of fully understanding the scope of the required system changes that would help to inform the implementation timetable. A fundamental issue that Origin would need to resolve very quickly in this respect is whether the existing settlements system could be upgraded to accommodate five minute data or whether a completely new system is required.

Origin's experience with significant IT and system changes is also that they are often subject to unexpected delays, particularly given the level of customisation that is required to accommodate NEM settings. Even if the required changes could feasibly be made within the specified timeframe, there is no allowance in the event of contingencies. The Power of Choice implementation indicates that changes of this magnitude are rarely implemented smoothly, particularly when internal systems are required to interface with numerous external parties (e.g. AEMO and meter data providers). Further, given many market participants will be undertaking similar changes concurrently, there is also uncertainty as to whether there are sufficient vendors available to undertake such a task within the specified timeframe.

We also note that AEMO is obliged to amend and publish its relevant procedures by 1 December 2020 ahead of the 1 July 2021 proposed start date. This would leave market participants with only seven months to finalise/test system changes in accordance with the final procedures. This would seem inadequate based on the scope of changes required and potentially compromise the ability of market participants to be ready by the proposed start date.

Given the above, Origin has significant concerns regarding the proposed transitional period and would urge the AEMC to consider this further. Our suggestion is that the proposed transitional period of three years and seven months set out in the Draft Determination should be designated as the minimum transitional period. Ideally, this timeframe should be increased by one year to build redundancy into the timeframe and allow any unforeseen issues to be addressed. Alternatively, if the rule is made AEMO could be charged with developing a detailed implementation plan in consultation with industry that can be used to more accurately inform the scope of required system changes and therefore the appropriate length of the transitional period.

This will assist with minimising the level of market disruption, potentially avoid exposing consumers to any resultant costs and afford all participants an appropriate amount of time to ensure system readiness. Regarding the latter, Origin would likely be required to run two systems simultaneously and begin collecting five minute data on both the supply and demand side ahead of the implementation deadline to inform operational and investment decisions and test systems, which will be challenging.

As noted by the AEMC, the expected benefits of five minute settlement are likely to accrue over time. The suggested extension to the AEMC's proposed transitional period will therefore not detract from the overall value of the rule change. It is also unlikely to result in additional investment in less responsive plant, given any significant investments made during this period will be considered against the back-drop of five minute settlement rather than the existing market framework.

4. Five minute settlement design options

If the AEMC determines that five minute settlement should be implemented, Origin is supportive of the following design features:

- five minute settlement should be compulsory for both the retail and demand sides;

- underlying five minute data should be derived from revenue meters rather than supervisory control and acquisition (SCADA) data;
- existing type 4 and 4A metering (that is not at a transmission network connection point or distribution network connection point) as well as type 5 and 6 metering installed prior to 1 December 2018, should be grandfathered;
- bidding/offering, the online dispatch process, settlement, intervention pricing, the calculation of trading amounts and the calculation of the cumulative price threshold should be done on a 5 minute basis; and
- the threshold for Affected Participants and Market Customers entitlements to compensation in relation to AEMO intervention should be reduced from \$5000 to \$1000.

The above elements of the rule change will ensure both the supply and demand side of the market face the same price signals. They will also assist with minimising the significant metering costs associated with upgrading/replacing existing meters to collect five minute data.