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Submitted via email: [wholesaleperformance@aer.gov.au](mailto:wholesaleperformance@aer.gov.au)

24 July 2020

Dear Mr. Adams,

**Response from AMS to the Australian Energy Regulator's (AER's) *Issues paper - Semi scheduled generator rule change(s)*, dated June 2020.**

AMS is a software technology company which provides services to several semi-scheduled generators in the National Electricity Market (NEM). AMS provides software tools that enable scheduled and semi-scheduled generators to execute their trading strategies by formulating and submitting compliant bids to AEMO.

AMS is grateful for the opportunity to respond to the AER's issues paper. AMS acknowledges the issues raised by the AER and is generally supportive of the AER's efforts to mitigate their impacts. AMS expects that renewable energy generators will continue to play an increasingly central role in the future NEM. AMS supports regulatory refinements that ensure renewable generators are integrated into the NEM in a manner that allows AEMO to sustainably manage the power system, while also accommodating continued growth of renewable generation capacity. AMS looks forward to supporting these reforms by continuing to supply its semi-scheduled clients with technology solutions that aid their participation in AEMO's central dispatch processes in a compliant manner.

AMS is supportive of the AER's initiative to introduce a mechanism that deters semi-scheduled generators from ignoring and/or intentionally deviating from their dispatch targets prior to submitting a rebid to AEMO and receiving an updated dispatch target – which the AER has noted is the "key issue" that requires reform. It is clear that the current mechanism for incentivising semi-scheduled generators to closely adhere to dispatch targets (the Causer Pays framework) does not provide an adequate incentive to do so in all circumstances, and accordingly, the introduction of a new (complementary) incentive or enforcement mechanism is worthwhile.

AMS is supportive of the AER's initiative to design such a mechanism, but suggests that it may be possible and practical to do so without discarding the existing semi-scheduled classification, and without requiring semi-scheduled generators to cap their output at their dispatch target at all times.

With any questions relating to this submission please contact Matt Grover via [mgrover@advmicrogrid.com](mailto:mgrover@advmicrogrid.com). AMS would be glad to contribute further to the AER's consultation process upon request.

Yours sincerely,

[signed]

Matt Penfold  
Chief Commercial Officer



## Clarifying the separate issues raised in the AER's issues paper

The AER's issues paper raises numerous distinct issues that it considers problematic, and which could adversely impact AEMO's ability to manage the power system into the future. The distinct issues raised by the AER appear to be:

- **Issue 1 - Early Economic Curtailment:** Some semi-scheduled generators are, at times, ignoring their dispatch targets, and choosing to reduce generation "early" for economic reasons, prior to submitting a rebid to AEMO and receiving an updated dispatch target. This submission will refer to this issue as "early economic curtailment"<sup>1</sup>. This is the issue illustrated in the AER's Figure 1 and Figure 2 in its issues paper, and which the AER has characterised as the "key issue".<sup>2</sup>
- **Issue 2 – Weather Intermittency:** Semi-scheduled generators have an uncertain energy source, necessitating the use of a forecast in determining a dispatch target, which can result in the generator regularly over or under achieving their dispatch target. This submission will refer to this issue as "weather intermittency".
- **Issue 3 – Ramping Between Targets:** Semi-scheduled generators have been observed to ramp between five-minute dispatch targets in a manner that does not adhere to the ideal "linear ramp" upon which the orderliness of central dispatch is premised. This is the issue illustrated in the AER's Figure 3. This submission will refer to this issue as "ramping between targets".

The AER's issues paper presents all three issues as if they are one consolidated issue that is a direct symptom of the semi-scheduled category itself. The issues paper suggests that abolishing the semi-scheduled classification and re-classifying all intermittent generators as scheduled, or otherwise significantly redesigning the semi scheduled category to enforce a continuous dispatch cap, are the AER's preferred paths forward for remedying the issue. In contrast, AMS suggests that these are three distinct issues, and that the AER should consider them as such when deciding its path forward – as each issue may be best addressed through its own unique solution.

Specifically, AMS suggests that the AER's forthcoming rule change request should focus narrowly on solving what the AER has noted is the "key issue" (early economic curtailment) – and suggests that it is not necessary to discard the existing semi-scheduled classification in order to remedy this issue, nor is it necessary to impose strict dispatch caps at all times. A simple rule to disallow the practice, with an accompanying compliance monitoring regime -, would be sufficient to remedy the issue.

We suggest that the problem of weather intermittency would be best dealt with through continued reform and refinement of the NEM's forecasting frameworks and requirements, as it is only through improved forecasting that more accurate and achievable dispatch targets will be formulated.

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<sup>1</sup> This submission uses the term "curtailment" because semi-scheduled generators are likely to only deviate from their dispatch target in a downwards direction (i.e. reducing output, or curtailing), whilst acknowledging that a deviation could occur in either direction. It would be prudent for any rule change to adequately cater for bi-directional deviations, but in practice, the types of deviations that are occurring today are all in the downwards direction.

<sup>2</sup> Issues Paper, p4



We suggest that the issue of ramping between targets can be dealt with through refinement of other mechanisms, including the NEM's generator performance standards and economic incentives including the existing causer pays framework. It is not clear that abolishing the semi-scheduled classification would cause any improvement to the way renewable generators ramp between dispatch targets.

Whereas the latter two issues are emerging and best addressed through refinements to existing standards and mechanisms (and/or consideration during the Energy Security Board's (ESB's) forthcoming Post 2025 Market Design process), the problem of early economic curtailment is apparent and significant today, the symptom of a gap in the market rules, and addressable by a relatively simple and straightforward rule changes to close the gap. AMS suggests that the AER's rule change process focus primarily on closing this gap.

The following sections of this submission provide AMS' detailed views on each of the three issues.

## Issue 1 - Early Economic Curtailment

### **The "key issue" is material and worthy of reform**

The AER has presented clear evidence that this issue is occurring today, and that it can have adverse impacts on system security. The growth of these type of responses – particularly if concurrent – can cause undesirable changes in system frequency and consume available Regulation FCAS resources. A rule change to 'close the gap' in the current rules (that apparently permit early economic curtailment), should be simple to design, implement, and enforce.

### **Current mechanisms fail to provide adequate incentives**

The AER's issues paper provided limited discussion of the market incentives that are driving some market participants to engage in early economic curtailment. The discussion would benefit from further exploration of these incentives.

AMS suggests that participants are engaging in this practice because the benefits to the participant (minimising economic losses due to unanticipated negative prices) outweigh the costs to the participant (potentially, a slightly worsened Causer Pays Factor<sup>3</sup>). Further, any additional costs that arise from an individual participant's actions are likely to be socialised across all market participants, and not borne directly by the participant itself<sup>4</sup>.

From a practical perspective, early economic curtailment allows a generator to commence reducing output 5 minutes earlier than if the participant waited to submit a rebid and receive a revised dispatch target prior to reducing output. In the hypothetical example in **Figure A** below, the generator reaches 0 MW output a full 9 minutes before AEMO was expecting it to. Relative to AEMO's expected outcome (the generator rebidding, waiting to receive a 0 MW target, and then ramping linearly to 0 MW over the next 4.5 minutes), early economic curtailment allowed

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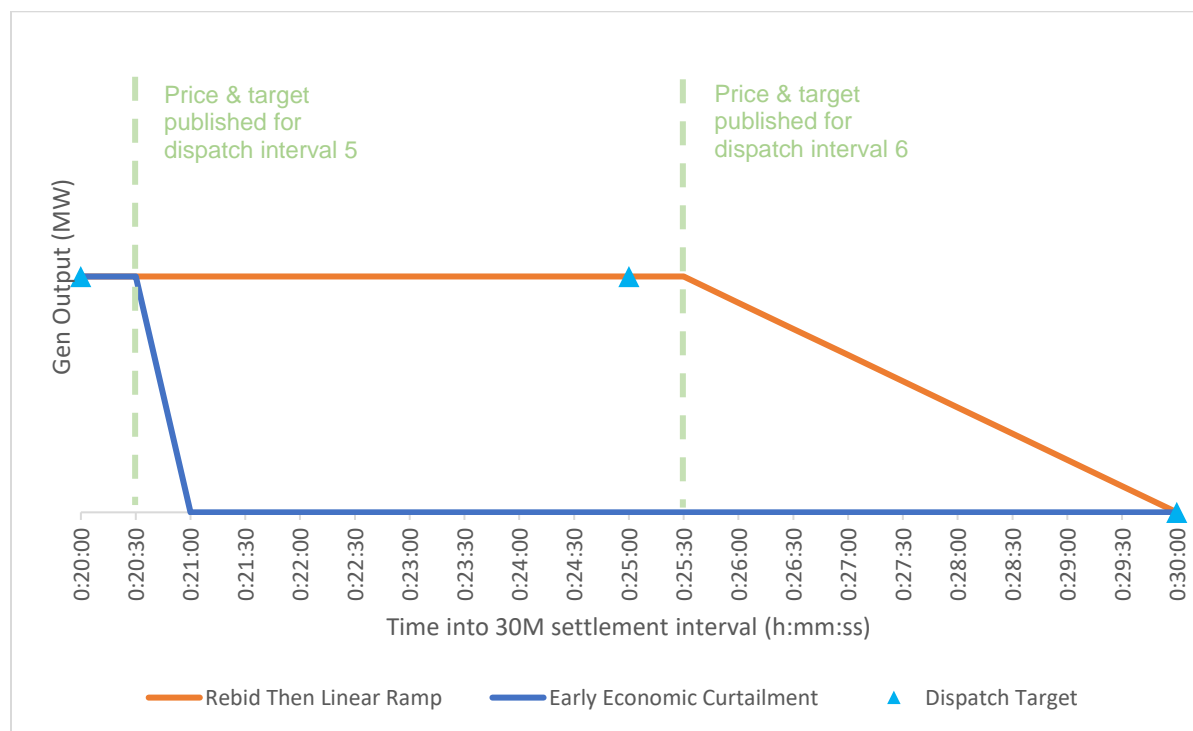
<sup>3</sup> Noting that it is possible that, depending on the prevailing system frequency at the time the early economic curtailment is occurring, the generator's individual action is on the "right side" of system frequency, and thus does not adversely impact the generator's Causer Pays Factor or impose any cost to the generator.

<sup>4</sup> Examples of these types of socialised costs might include: in the short term, increased Regulation FCAS utilisation affecting the dispatch merit order in the following dispatch interval and causing a higher spot price determination, and in the medium term, AEMO raising the Regulation FCAS Requirement.



the generator to reduce its generated energy (i.e. the area under the curve) by 90% during the pictured ten minute period (i.e. the final two dispatch intervals in the settlement interval), which equates to reducing its settled energy by 25% during the 30 minute settlement interval<sup>5</sup>. Reducing financial losses by 25% could be considered a significant incentive to engage in early economic curtailment.

**Figure A:** Hypothetical generator engaging in early economic curtailment, resulting in a 25% reduction in energy settled during the 30-minute settlement interval, relative to the energy AEMO expected from the generator during the settlement interval.



Under the current rules, the only mechanism incentivising semi-scheduled generators to closely track their dispatch targets is the Causar Pays framework, which provides a financial incentive<sup>6</sup> to ramp linearly between targets, and not deviate from them. Because this economic incentive has been observed to be insufficient to deter early economic curtailment, a stronger "stick" style disincentive mechanism is worthy of consideration.

<sup>5</sup> This hypothetical example presumes that the dispatch price and dispatch target are published 30 seconds into each dispatch interval (as is typical), that the generator began reducing output immediately upon observing the published dispatch price (and realising it would result in the generator making a loss during the 30M settlement interval), and that it took the generator 30 seconds to (linearly) ramp the plant down to 0 MW. This example would likely represent an instance of both issue #1 (early economic curtailment) and issue #3 (ramping too fast).

<sup>6</sup> In the form of a cost



### **The role of automated technologies in enabling early economic curtailment**

The AER's issues paper correctly notes that "automated dispatch software"<sup>7</sup> is likely aiding some semi-scheduled generators engaging in early economic curtailment. The conversation on the role of new technologies in the semi-scheduled dispatch process would benefit from a key clarification: There is a difference between *automated dispatch software* and *automated bidding software*.

Automated *dispatch* software is integrated with plant control systems and is capable of changing output upon observance of defined conditions (i.e. the publication of a dispatch target, or the publication of an unanticipated negative price). In contrast, automated *bidding* software (which AMS supplies to numerous semi-scheduled generators in the NEM) is not integrated with plant controls, and is only involved in the formulation and submission of compliant bid files – which in turn inform the generator's future dispatch targets. Combined with continuous forecasting of anticipated prices and network constraints, the use of an automated bidding system improves a semi-scheduled generator's ability to ensure the bids it has put in the market at all times reflect its economic preferences and intentions, and that transparent and compliant rebids and associated rebid reasons are submitted each time changed market conditions necessitate a change to the generator's intentions.

### Issue 2 – Weather Intermittency

#### **Not the "key issue"**

We suggest that weather intermittency and semi-scheduled availability forecasting is a separate issue from early economic curtailment and could be considered as being outside the scope of the request that the COAG Energy Council made to the AER. We suggest that it is possible and practical to ensure that "*semi scheduled generators be obligated to follow their dispatch targets*"<sup>8</sup> without making new rules that limit or change the way weather intermittency is incorporated into the dispatch process and without abolishing the existing semi-scheduled category. Rather, the AER could implement a narrow rule change to prohibit early economic curtailment. We consider that the impacts of weather intermittency are more usefully mitigated through continued refinements to i) the way forecasts are generated, ii) the data that renewable generators are obliged to collect and pass on to AEMO, iii) the way *availability* is indicated in a bid file and iv) the way AEMO formulates dispatch targets.

### Issue 3 – Ramping Between Targets

#### **An important issue, but will not be remedied simply by abolishing or amending the semi-scheduled classification**

The type of ramping illustrated in the AER's Figure 3<sup>9</sup> is clearly undesirable from a power system management perspective. It appears the generator in Figure 3 is using an automated dispatch system that is not tuned to pursue a linear ramp to its new dispatch target, and instead is tuned to enact a step-change in output (i.e. non-linear ramp) every 5 minutes. In nearly all dispatch intervals in the Figure 3, the unit appears to be spilling available energy in order to strictly adhere to its dispatch target, and in two dispatch intervals (09:00 and 09:05) intervals it appears to have insufficient resource to achieve its dispatch target. Configuring the plant's

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<sup>7</sup> Issues Paper, p10

<sup>8</sup> AER representation of COAG EC request, <https://www.aer.gov.au/publications/reviews/semi-scheduled-generators-proposed-rule-changes>, accessed 20 July 2020

<sup>9</sup> Issues Paper, p16



dispatch software in this manner is likely due to a lack of familiarity with the intended dispatch process, or a lack of adequately sophisticated dispatch software / plant controls. The strategy was likely not implemented with the intent of maximising profits, as operating in this manner will result in increased costs in the form of a worsened Causer Pays Factor, and no clear economic advantage in the energy market over the long term.

Whichever is the case, this behaviour can be dis-incentivised through any number of reforms, including:

- Strengthening the Causer Pays framework to align 5-minute actions with 5-minute costs and assessing costs at the individual unit level.
- Strengthening the generator performance standards to ensure that all generators have sufficient control capability to operationalise a linear ramp between targets.
- Providing an option for renewable generators to choose to leverage AEMO's AGC system to guide semi-scheduled generators along the desired ramp by supplying new setpoints on a 4-second basis, similar to the manner in which generators enabled for Regulation FCAS are guided by AGC<sup>10</sup>.

It seems to us that ramping is a material consideration worthy of attention and potential new requirements. However, it is not clear that abolishing the semi-scheduled classification would cause any improvement to the way renewable generators ramp between dispatch targets.

## Overlap with other NEM reforms

Several market reforms are already in progress that are likely to impact the behaviour of semi-scheduled generators and could serve to mitigate the impacts of the three issues raised in the AER's issues paper. In particular, *Mandatory Primary Frequency Response*, *Five Minute Settlement (5MS)*, and the *participant self-forecasting* initiative are all agreed reforms in the early stages of implementation. We suggest the AER consider whether it would be premature to abolish or otherwise overhaul the semi-scheduled category before the impact of these other reforms has been assessed. However, we consider that a rule change narrowly focused on preventing early economic curtailment is complementary with these other reforms and need not wait.

The introduction of 5MS in October 2021 will see the "5/30 issue" disappear, along with the incentive to rebid to take advantage of it<sup>11</sup>. For generators exposed to negative spot prices, the potential consequences of bidding at the market price floor will become more severe without the benefit of the 5/30 issue, however it is anticipated that some generators will continue to bid at the market price floor at times, in order to minimise spilled energy during instances of bound network constraints and anticipated positive settlement prices<sup>12</sup>. The incentive to bid in this manner is likely to persist so long as the NEM continues to utilise local connection point prices for dispatch, and regional prices for settlement. Because of this, the switch to 5MS will not eliminate the opportunities to - nor the incentives for - engaging in early economic curtailment. Accordingly, it remains prudent to implement a rule to prevent the practice.

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<sup>10</sup> It would seem the generator in Figure 3 would be indifferent to this latter option, as the plant clearly has quite fine setpoint controls, a demonstrated willingness to spill available energy in order to strictly adhere to a dispatch target, and would be no worse off (would not sell more or less energy, in the long run) from allowing AEMO's AGC to ramp the plant linearly between its dispatch targets.

<sup>11</sup> This incentive is faced equally by all spot exposed generators and loads, regardless of classification

<sup>12</sup> More specifically, anticipated Regional Reference Prices above the generator's economic "break-even price" (which may be at a negative RRP).





## Consequences of abolishing the semi-scheduled classification

Abolishing the semi-scheduled category and/or requiring intermittent generators to cap their output at their dispatch target 100% of the time could have an unintended consequence whereby a one-sided underfrequency bias is introduced. Under today's semi-scheduled classification, it seems probable that in most circumstances the power system benefits from the relative diversity of the semi-scheduled fleet at the regional level. This is because semi-scheduled units are equally likely to generate above or below their target (due to general forecast inaccuracy). If this effect is prevalent, over performance and under performance have the potential to offset one another, mitigating the impacts of weather intermittency and forecast inaccuracy on the power system.

Introducing an "always on" dispatch cap would remove all instances of overperformance. This could leave the power system with a problem of persistent generation shortfalls from the semi-scheduled fleet. This effect would seemingly introduce a persistent under-frequency bias, which could necessitate increasing the volumes of Regulation Raise FCAS procured by AEMO to mitigate the effect, adding significant costs to the market. Further, the introduction of an "always on" dispatch cap seems designed to mitigate the 'weather intermittency' problem, as it does nothing to address the 'early economic curtailment' problem.

This potential effect would benefit from study from AEMO or the AER, and consultation with industry so that the costs and benefits can be assessed prior to a decision on the introduction of permanent dispatch caps.

## In Conclusion

The AER has highlighted a significant gap in the market rules that is allowing a problematic activity to occur in the form of early economic curtailment. This "key issue" is material and worth addressing, as growth of early economic curtailment can create market distortions, adversely impact system security, and may ultimately introduce socialised costs and inhibit the power system's ability to accommodate incremental renewable energy capacity. AMS suggests that early economic curtailment can be prevented via a simple rule with a narrow scope, and that it may not be necessary to abolish the semi-scheduled category or introduce strict dispatch caps in order to remedy the issue.