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Response to AER Semi-Scheduled Generator Rule Change Issues Paper

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Introduction

The AER has recently published an issues paper to discuss possible rule changes for semi-scheduled generators to address concerns of the COAG Energy Council for system security and reliability issues caused by semi-scheduled generators deviating from dispatch targets and not informing the market of possible availability restrictions.

The AER has responded in the paper with options to make semi-scheduled generators respond to dispatch targets by various means such as increased FCAS causer pays incentives, removing the semi-scheduled classification, or imposing severe restrictions on the operating flexibility of semi-scheduled generators.

Based on a preliminary analysis of the AER issues paper, the paper:

- Shows a fundamental lack of rigorous analysis of the system security problems,
- Only considers solutions that would severely restrict the operation of semi-scheduled generators,
- Does not consider efficient market-based solutions, and

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- Raises serious concerns that could materially affect the viability of Variable Renewable Energy (VRE) generators.

The problem to be addressed

The problems identified in the paper are really short term issues or are issues that can be better managed via market arrangements rather than regulation and do not adequately justify the proposed rule changes :

- The AER issues paper examples of problem semi-scheduled behaviour are both highly selective and are significantly influenced by the current 30-minute averaged market settlement process that would not occur when the 5-minute settlement rule change takes effect [**AER 1**],
- The observed instances of behaviour illustrated in Figure 4: “South Australian semi scheduled generation - events where output was more than 20 MW below the target during negative prices” used in the issues paper to indicate a significant market trend, ignore many of the likely reasons for generating reduced output at these times due to forecasting issues, high wind cutout, local plant issues or recovery from low levels of generation that are **NOT** associated with deliberate generator behaviour [**GANNON 1**],
- VRE generators are responding to legitimate market signals through rebidding during periods of negative pricing to maximise revenue in a similar manner to gas and hydro generators during high price periods, and
- As the AER paper points out, deviations from targets do not currently contravene the existing market rules.

Proposed rule changes

The draconian rule change options discussed in the AER paper take a very heavy-handed and simplistic regulatory approach that could lead to very poor outcomes for all semi-scheduled generators and the entire National Electricity Market (NEM), resulting in:

- Substantial loss of generation output and consequently revenue due to the need for each VRE generator to meet a dispatch target based on a forecast, and therefore curtailing variable renewable energy generation and increasing fossil fuel-based generation. The actual output of a VRE generator is a random process. The forecast output of a VRE generator that is used to determine its dispatch target is the expected value of its generation. Roughly 50% of the time the VRE generator will be able to generate more and 50% of the time less. Thus if the output of the VRE generator is always restricted to no more than its forecast generation then its output will be reduced roughly 50% of the time and the VRE generator will on average generate substantially less than what it is capable of generating.
- Increased “causer pays” costs for regulation because the generator will be able to stick to the linear trajectory if the energy resource over the five minute period is in excess of what is required for the target but if the resource is less than what is required then the generator will drop below the target. Thus, over the NEM as a whole, the total output of the VRE generators will always be below their aggregate target causing either a systematic drop in system frequency or requirements for more

regulation services. Either way, this will result in a greater allocation of the costs of these services to VRE generators,

- A large increase in the trading requirements and obligations for VRE generators with a need for continuous real-time trading and serious investment in forecasting, trading and storage systems,
- Some VRE generators with long term PPAs that require them to turn off their plant when the price goes negative may suffer significant short term financial losses,
- A severely restricted operating flexibility of the plant that significantly diminishes the financial viability of the asset in comparison to the market rules at the time of the investment decision, and
- Unnecessary disincentives for investors that leads to reduced economic investment in VRE generation.

The approach proposed in the AER issues paper seems to be an attempt to integrate new technology such as VRE generators and Battery Energy Storage Systems (BESS) into an energy and FCAS market framework designed over 20 years ago for the technology of the time, namely gas, hydro and coal generators.

VRE generation is the lowest cost form of generation available and might enable Australia to meet its obligations in COP21. It is in the interest of the industry regulatory bodies and will provide the greatest financial benefit for energy consumers to economically accommodate VRE generation into the power system at the lowest system-wide cost. Investment costs, ultimately, are reflected in the prices that consumers pay, thus efficient integration of the lowest-cost source of new generation, VRE generation, will lead to the lowest costs for consumers.

Power system security requirements can accommodate VRE generation systems without forcing them to behave like synchronous machines and scheduled generators. Taking a constructive least-cost approach that recognizes that the NEM can accommodate and should accommodate a portfolio of BESS, VRE, hydro, gas and coal generators that have different characteristics and capabilities would allow all technologies to effectively participate in the NEM and in turn would meet the National Electricity Objective (NEO). BESS generators are very versatile and can readily address the issues the AER's proposal is trying to solve, but current rules and AEMO policies prevent these solutions from being implemented.

The principles used in the original design of the NEM were based on the doctrine of market efficiency and it is these principles that should again be used to reform the market design when new technology needs to be integrated into the NEM. It was always anticipated that a process of continuous improvement of the market design, in particular dispatch, pricing and provision of information, would be needed to enhance market efficiency and deal with new technologies, and that the obligation to improve the market was removed from the market operator and that the market design has stagnated since the introduction of the eight FCAS markets about 20 years ago.

Much consideration has been given to the development of extremely tough technical standards and the imposition of broad performance standards on new investments. On the market side, there has been less development and the present market design and systems date from around 20 years ago, with the last significant market reform being the introduction of world-leading market-based frequency control ancillary service (FCAS) markets. Rather than continuing to develop markets that encourage efficient delivery of products and services,

recent changes show a retreat from efficient market arrangements to an increased reliance on mandated approaches, with little serious attempt to justify these impositions with reference to the NEO.

Limitations of the AER issues paper submission process

Given the potentially serious impact of many of the AER proposed solutions, a short 4-week submission for comments on the AER issues paper that included a participant workshop after 1 week of that period was not sufficient time to organise a more detailed collaborative industry response and allow for the analysis of the basis of many of the assertions in the report and the estimate the potential impact of the proposed solutions.

Therefore, this submission is constrained by not having sufficient time and resources to provide a more comprehensive response to the AER issues paper, that would include analysis of the impact the AER proposed solutions in comparison to our suggested recommendations.

Recommendations

Based on the issues paper and without the benefit of being able to review the identified market system security and reliability problems that are being attributed to only renewable energy, we would like to offer the following recommendations to address the identified market problems in order of short term to long term time frames for implementation.

R1. A fast-tracked rule change is not appropriate.

The AER proposal to fast-track the rule changes for any of the proposed solutions or any other changes that necessitate a rule change is highly inappropriate considering the serious potential impact on the existing or future financial viability of semi-scheduled generation in the Australian NEM, even for system security and reliability concerns. No analysis was presented in the AER issues paper or in the participant workshop to estimate the financial impact on the operations of VRE generators for each of the proposals or the costs of implementation of systems associated with the changed trading and operations of VRE generators of each of the proposals. It is our contention in this submission that the system security and reliability concerns for the short-term can be dealt with by mechanisms that do not require rule changes and may, in fact, be implemented in a much shorter time-frame than even a short-tracked rule change.

Specifically, the FCAS arrangements need to be updated to reflect the power system as it is now not how it was 20-25 years ago. The current NEM Rules for market-based ancillary services - FCAS (NER 3.11.2) are adequate to accommodate revised arrangements. The NER does not stop AEMO from splitting the fast contingency services into two or more subcategories and the regulating services could also be split into a market-based primary regulating response (not contingency response but linear governor like response to smaller frequency deviations) and a secondary regulating response (AGC like response). How this can be done is outlined in the report Frequency Control Frameworks Review: Market-based Solutions [WALLACE 1]

R2. The problem examples and analysis provided in the AER issues paper are insufficient to justify the measures proposed and solutions.

The selective use of illustrative examples and superficial analysis of trends in the AER issues paper was not suitable nor appropriate to justify the severe market changes that were proposed by the AER in the issues paper that would have a very significant impact on all renewable generators in the NEM. No credible analysis was provided in the paper to correctly determine the number of incidents of renewable generators reducing generation in dispatch intervals with negative prices prior to a new target associated with a rebid and whether the number of those incidents is increasing or decreasing. The analysis provided for the observed instances of problem VRE generation behaviour was flawed and included many incidents that could easily be attributed to legitimate reasons unrelated to deliberate economic reductions in generation by the VRE market participant [GANNON 1].

R3. VRE generator trading positions and rebids in the presence of large negative prices are economically rational and justified.

The common trading strategy of VRE generators bidding all of their capacity at the market floor price and then rebidding when large negative prices occur in the market is a perfectly rational and reasonable strategy and does not imply an obligation to generate at that price for subsequent dispatch intervals. Most VRE generators would bid their capacity at their revenue breakeven point, taking into consideration contract and certificate revenues (at say -\$20 to -\$80 / MWh) which is the economically rational offer, except for two important market limitations. Firstly the thirty-minute trading interval averaging of dispatch interval outcomes distorts the market dispatch so as to provide incentives to rebid to the floor when a high market price event occurs in a single dispatch interval (which gas and hydro generators have exploited for many years [RENEW 1]), and conversely rebid to reduce generation for the remainder of the trading interval in the presence of large negative regional spot prices. Secondly, when constraints are binding, regional pricing ensures that generators are in a relative price competition with other generators for their share of generation. In the absence of market locational pricing, the generators need to consider the relative risk of reduced generation due to constraints to the risk of negative revenue with low prices and, by bidding their capacity at the market floor, the generators have demonstrated that they consider the risks associated with lost generation to be more significant than the risks associated with large negative prices.

R4. Explicitly define the AER expectations for generator behaviour in the presence of negative prices.

It is our position that it would be possible to remove the ambiguity stated in the issue paper “To be clear, a semi scheduled generator deviating from its target may not currently contravene the rules.” and for the AER to explicitly define the expected behaviour of VRE generators to not unilaterally reduce generation output in response to negative prices for economic reasons as part of a semi-scheduled generator’s compliance with dispatch instructions. This would still allow the VRE generator’s output to drop if this were due to a drop in its energy resource. To respond to negative price signal, VRE generators would need to rebid if they wish to reduce generation and receive confirmation of a capped dispatch target BEFORE they reduce generation and that the plant ramps to the dispatch target over that dispatch interval. AER could then investigate incidents where generators do not comply with this behaviour. **No rule change would be required as this is covered by NER 4.9.8 (a) and 3.8.22A.**

R5. VRE generators that are constrained to a dispatch target use an approximately linear ramp rate to meet that target by the end of the dispatch interval.

New plants currently being commissioned are being required to implement control systems that ensure that ramping occurs in a linear fashion when operating to a changing dispatch cap. We believe that this capability could be introduced to existing semi-scheduled generators if there are persistent system security issues.

Also, a maximum ramp rate when a constraint cap is removed would also be useful for the stability of the system rather than using a forecast generation value, that is likely to not represent the true potential generation. The maximum ramp rate could be used to limit the effects of high ramping on the market when not capped. Though with revised FCAS arrangements including a better range of services for regulating power system frequency this restriction may not be necessary and is likely to be uneconomic compared to the costs of a revised set of regulation services. In particular, the NEM could introduce as part of the regulating FCAS services a fast ramping service that could offset any fast ramping of VRE generation. BESS could easily provide such a service. **No rule change would be required.**

R6. The need for FCAS market reform.

The existing FCAS market in the NEM was designed about 20 years ago from the prevailing generation technologies of the time, namely gas, hydro and coal generation. Given the increasing proportion of VRE generation in the NEM and the introduction of new BESS technologies, it is our contention that the existing 6 contingency and 2 regulation FCAS market categories are no longer appropriate. The availability of Fast Frequency Response (FFR) generators and loads, low system inertia and the possible need for high ramping services for systems with large percentages of VRE generation mean that the entire FCAS design and framework need to be reconsidered [GEORGE 1] and [WALLACE 1], in a process similar to the formulation of the Eire Secure Sustainable Electricity Programme (DS3), for the Australian NEM. **No rule change would be required.**

R7. The need for reform of the Australian National Electricity Market.

Many of the compromises that limited the initial design of the Australian NEM, such as lack of experience with competitive electricity markets, technological limitations and limited regional interconnections, no longer apply and new generation technology is providing many challenges for the efficient management and operation of the present market design. Locational pricing and the incorporation of dynamic losses into the electricity dispatch, where the market more closely aligns with the physics of the electricity system, provides the most rational and reasonable long term solution to the present issues with the management and operation of the market with the greatest potential benefit for the entire electricity market with the most efficient market outcomes.

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