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28 March 2014

Mr. Sebastian Henry
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Mr. Sebastian

Subject: ERC0165 National Electricity Amendment (Generator ramp rates and dispatch inflexibility in bidding) Rule 2014

Arrow Energy Pty Ltd (Arrow) welcomes the opportunity to provide comments to the Australian Energy Market Commission (AEMC) on the proposed rule change for generator ramp rates and dispatch inflexibility bidding.

Attached with this letter is Arrow's submission, covering the questions raised by the AEMC. Arrow supports the need to address inefficient market outcomes and maintain system security, however, we believe that the proposed rule change to the bidding of ramp rates and dispatch inflexibilities may not necessarily achieve the AER's objective and the concerns outlined by the AEMC are appropriate. In fact, the rule change as proposed may lead to unintended consequences resulting in greater uncertainty in both price outcome and compliance requirements.

If you require further clarification on our submission, please contact Walter Schutte, Commercial Manager Market Operations on phone (07) 3012 4681. Arrow would be happy to be involved in further consultation with the AEMC in regard to the Review.

Yours sincerely

Paul D'Arcy
Vice President Corporate Services

ARROW ENERGY SUBMISSION – MARCH 2014
AUSTRALIAN ENERGY MARKET COMMISSION
GENERATOR RAMP RATES AND DISPATCH INFLEXIBILITY IN BIDDING

Background of Arrow Energy

Arrow Energy is owned by Royal Dutch Shell and PetroChina. In 2011 Arrow Energy took full ownership and operation of Braemar 2 Power Station (**Braemar 2**), from ERM Power Limited. Braemar 2 is a 450MW Open Cycle Gas Turbine (OCGT) located approximately 40km south west of Dalby, Queensland.

The rule change request

On 21 August 2013, the Australian Energy Regulator (**AER**) submitted a rule change request to the Australian Energy Market Commission (**AEMC or Commission**) proposing a requirement for generator ramp rates and dispatch inflexibility profiles to reflect the technical capabilities of generating plant.

The rule change request is intended to address alleged inefficient market outcomes resulting from the incentives generators have to rebid ramp rates to low levels at times of network constraints. The AER proposes that this be achieved by requiring generators to provide ramp rates that at all times reflect their technical capabilities. The AER considers that this would essentially require participants to submit a ramp rate that is the maximum the plant can safely attain at the time.

The AER also notes that dispatch inflexibility profiles can be used by participants with fast-start plant to achieve commercial objectives and that this also results in market inefficiencies. The AER considers that this can be addressed by requiring fast-start generators to submit dispatch inflexibility profiles that reflect the technical capabilities of their plant at the time.

Arrow Energy's summary position

Arrow supports the view of the AER that the dispatch process and rules should be structured to ensure system security is not at risk and that economically efficient price outcomes are achieved, unpredictable price excursions are not in the interest of a properly functioning market. Arrow does, however, have some concerns that the proposed rule change may have some unintended consequences. Arrow questions if the impact assessment is broad enough to highlight unintended consequences.

The proposed change has real technical implications for generators such as Braemar that could lead to perverse impacts for the generator (from a risk perspective) while endeavouring to remain compliant with the new rule. Arrow suggests that further work should be undertaken to understand the root cause, develop alternatives and analyse the consequential impacts of those alternatives. Possible solutions (if found to be required) should be widely consulted and be modelled in detail to assess the risk of unintended consequences.
Purely as an example, and assuming there is a need to introduce a rule change, one such potential alternative may be to allow generators to bid two ramp rates, one a technical[1] maximum and the other at a

[1] Note that Arrow Energy has identified a number of issues that should be considered in determining this value. This is discussed later in the submission.

'reduced[2]' technical limit or commercial levels. The constraint violation penalty (CVP) applied to the latter could be set at below that of system security (say 35) allowing NEMDE to dispatch those units in advance of potentially increasing system risk.

Responses to AEMC questions

Question 1: System Security

Arrow has not been made aware of any system security issues in Queensland, therefore cannot conclude that ramp rate limitations compromise system security. Arrow suggests that AEMO would be best placed to provide more information in this regard.

Question 2: Counter price flows

Counter price flows are a natural consequence of the design of the market. From a purist perspective these are anomalous and unwanted, yet practically they are required to ensure orderly dispatch algorithm solutions. This compromise is well understood and was accepted as part of the market design. Arrow agrees with the AER's assessment of the costs associated with counter-price flows, however, it is our understanding that counter-price flows are driven by both generator ramp rates and other forms of bidding behaviour. It would be useful to understand the magnitude of the residue resulting purely from dispatch where rebidding of ramp rate resulted in counter-price flow.

In comparison to the cost of network constraints the total cost of negative settlement residue seems minor.

Question 3: Productive efficiency losses

Arrow is not clear what is meant by "loss of productive efficiency", especially in the context of a dynamic competitive market[3]. In essence, the market is delivering exactly what is described by "Production Efficiency" where the economy in general is making the most prudent use of the resources available. NEMDE is a very complex dispatch algorithm that solves for "the lowest cost solution". Where the NEM differs from the textbook definition, is the competitive bidding structure that underpins pricing and not cost of production (on average, with strong competition, one would expect the market to result in a price that is less than or equal to that of production). Generators assess economic and opportunity costs every 5 minutes and will rebid ramp rates, volume and price to manage their efficiencies.

Arrow does not see significant differences between ramp rate bidding and other forms of bidding behaviour (such as shifting price-bands), therefore does not believe that the proposed rule change would reduce the extent of productive efficiency losses.

Arrow believes that a factor that ought to be considered is whether there is sufficient demand side response. Even though the wholesale market is designed around price transparency and signalling, there

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[2] Allowing for operational considerations to be included in its determination

[3] Note that Allocative and Productive efficiency are static concepts of efficiency

seems to be little demand side participation. In terms of ramp rate, demand side could theoretically provide a near infinite rate of change (for a given volume of interruptible load).

Question 4: Higher risk premiums

There are a number of factors, in addition to short term spot market volatility, that may impact forward market product premiums. Short term spot market volatility can result in higher risk premiums on near term hedge contracts. It is more difficult to quantify the extent to which longer term contracts are affected. However, assuming market participants adopt a typical risk management approach whereby the purchasing strategy has a progressive build of position (usually over a 3-4 year period for a particular risk window); the impact of any short term impacts is diluted as more fundamental drivers influence pricing.

Question 5: Inefficient price signals

Arrow is yet to be convinced that rebidding ramp rates should be isolated as the sole issue causing inefficient price signals. The supply side of the market is designed around 5 minute competition with economic dispatch (by NEMDE) setting 'least cost' - considering a number of factors including demand requirements, constraints (dynamic and manual), ancillary services requirements, generation volumes at price levels and ramp rates amongst other things. Price outcomes rely on multiple components and are thus impacted individually and in combination by changes in those components.

The impact of any one of these components on price depends on the market dynamics at the time and in a competitive market this is exactly what is monitored as part of the optimisation process. Currently there is little if any demand side response to market conditions – or even to price excursions, thus it would seem that there is little interest from the demand side in managing price volatility, which might be due to retailers effectively managing this on behalf of customers at an acceptable cost.

The Australian electricity spot market is one of the most volatile markets in the world (price can move between -$1000/MWh and $13,100/MWh). From a potential investor perspective, being exposed to this degree of volatility could pose too great an uncertainty. The availability of a mature and liquid market for traded derivatives provides the risk management products required for constructing an acceptable risk level. In the absence of this important component of the market, many participants would already have run into financial difficulties.

Questions 6 and 7: Settlement Residue Auctions

Arrow declines to comment on Questions 6 and 7.

Question 8: Maximum ramp rates of generators

In its consultation paper the AEMC has correctly identified that determining a unit's maximum ramp rate is a complex issue. In fact, this may require significant testing over extended periods of time to establish a rate that is reflective of the variability across a range of conditions.

Whereas the theoretical maximum is a relatively static number over time, the actual ramp rate is variable and may have a subjective aspect to it. It is not practical to undertake real time analysis to precisely

determine the maximum ramp rate (operators use their experience to gauge this) and hence it is not appropriate to have an objective test for compliance set against it.

An example of this may be where a unit has just ramped down hard and is then required to swing to a fast ramp up mode. Firstly, the maximum attainable ramp rate may decrease as the unit switches from down to up ramp. Where repeated swings result in oscillatory effects, the operator may consider the plant to be at greater risk, thus reduce the rate. It would be inappropriate to apply a retrospective test to the maximum as reproducing the specific conditions under which such a decision was made would be difficult at best.

It is not valid to assume that generators would be able to operate at maximum ramp rates. In the extreme, continually ramping a unit at maximum ramp rates would result in significant wear and tear and puts the unit at risk. By definition the 'maximum' ramp rate is the highest ramp rate that a machine is ever capable of achieving. It may not be able to achieve this ramp rate under 'general' conditions.

In respect of Braemar 2 units, there are two ramp rate modes available namely 'Fast' and 'Slow'. The 'Fast' ramp rate has significantly higher cost[4] implications than the 'Slow' ramp rate. The Trader selects the appropriate mode based on the expected market / contract position impact as well as the cost of the selected ramp rate. This commercial decision is not able to be achieved by reflecting the cost in the bidding profile.

Further, complicating the determination of the maximum ramp rate is the ability of Braemar 2 to generate at higher generation modes. The ramp rate available while in these modes is determined by the technical characteristics of that mode and environmental conditions. Quantifying the rate is generally only determinable by performing a test at that time.

Question 9: Risks of operating at maximum technical capacity

Other than the physical increase in risk and cost described in Question 8, there may be longer term financial consequences associated with generation being constrained down during periods of high price. The AEMC makes a valid point in the Consultation Paper in stating that if generators were regularly unable to manage their contract exposure due to constraints during market events the overall contract cover made available may be diminished. Arrow notes that this is an example of the potential unintended consequences that may have a far more significant and broader ranging effect than what is currently being contemplated.

Question 10: Reducing technical ramp rate, wear and tear of ramp rates

The rule change may well incentivise generators to reduce the technical ramp rate capability, in particular those generators that have significantly higher rates than other generators in a similar network location. This again points at the potential perverse outcome that could result from the introduction of such a rule (proper root cause analysis design, impact assessment is critical) that could impact broader market operation.

Arrow is uncertain as to what was intended by the statement that "generators should be able to negate the effects of wear and tear by bidding volumes within price bands".

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[4] The cost is described in terms of Equivalent Operating Hours (EOH)

Questions 11, 12 and 13: Alternative approaches

Arrow's view in relation to the proposition or alternatives is that more detailed impact assessment should be undertaken to understand the costs and benefits of any change. Assessing the appropriateness of the rule in dealing with the root cause and any unintended consequences should form part of such analysis. Arrow believes that any change be robustly reviewed prior and post implementation to determine its effectiveness. The rule should also describe the compliance metric precisely such that there is no conjecture as to what the rate should be; deviating from this may lead to unnecessary compliance risk.

As an example, one of the alternatives that was considered requires the maximum technical ramp rate to be bid at times of constraint. Often times constraints bind without prior warning and would thus require traders to 'guess' when constraints may bind in an attempt to remain compliant. In the case where, in quick succession, a constraint repeatedly binds and then unbinds (which they often do), the trader may be required to bid repeatedly.

Question 14: Other approaches

Arrow remains concerned that the proposed rule change may result in unintended consequences. Based on the AER's Rule Change request and the AEMC's consultation paper Arrow understands the main areas of concern to be:

1. System security
2. Counter price flows
3. Productive efficiency losses
4. Risk management costs
5. Price volatility; and
6. Settlement Residue Auction

It is Arrow's view that ramp rates and dispatch inflexibilities may be only a symptomatic part of the underlying problem and that other factors potentially have a greater bearing.

Other alternative approaches to address the above could be:

1. As described above, an alternative may be to allow a generator to bid two ramp rates which have different CVPs applied – one being a commercial ramp rate and the other a technical rate (that allows some flexibility for variability)
2. Separate ramp rates from the energy bid (similar to ancillary services) to allow transparent bidding and costing of ramp rates i.e. varying ramp rate capacities are bid available at different compensation rates. This would allow generators with multiple ramp rate modes to recover increased costs for different rates.
3. Ramp rates can only be changed once within a particular half hour (this would still require the ability to rebid ramp rates if not technically achievable)

Summary

Arrow Energy has similar concerns to that of the AEMC in terms of the effectiveness and applicability of some of the aspects of the proposed rule change. Arrow Energy suggests that further analysis is required and if a rule change is to be implemented to limit ramp rate bids, a monitoring program be in put place to determine the effectiveness of that change. Any rule should be sufficiently specific to not result in ambiguity when assessing compliance.