



EnergyAustralia
LIGHT THE WAY

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Dear Commissioners

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Submission to AEMC Directions Paper – Five minute settlement

EnergyAustralia is one of Australia's largest energy companies with over 2.5 million electricity and gas accounts in NSW, Victoria, Queensland, South Australia, and the Australian Capital Territory. We also own and operate a multi-billion dollar energy generation portfolio across Australia, including coal, gas, and wind assets with control of over 4,500MW of generation in the National Electricity Market (NEM) and an annual gas portfolio of over 100PJ.

We welcome the opportunity to respond to the Commission's Directions Paper for the rule change proposed to implement 5-minute settlement (the proposal). In principle, EnergyAustralia considers that if implemented correctly the proposal may provide material benefits in the long term.

The position taken by EnergyAustralia in reviewing the proposal is to assess it against the Energy Trilemma. That is, we have sought to consider whether the proposal is likely have a beneficial impact on system security and reliability, affordability of energy supplies and in reducing emissions.

We find it challenging to assess this proposal without understanding the interactions with and implications of the key reviews into system security by both Dr Alan Finkel and the Commission, in addition to a broader review of climate change policy by the Department of Energy and the Environment as well as other potential changes (noting there are over 25 reviews or Rule changes underway at the moment into different aspects of energy markets).

The theoretical benefits of aligning dispatch and settlement are clear but we suggest this Rule change should be considered after at least the Finkel review and the response from governments, to ensure coordination of outcomes.

Clearly, in any case, there are further details on this proposal to work through including further benefit testing of different scenarios and contract market implications. These should be tested appropriately and balanced with implementation costs to ensure the best long term outcome for customers. Transitional arrangements for implementation

also need to be balanced against cost and benefit realisation, likely requiring 3 to 5 years to generate the best outcomes for customers.

In preparing our submission, we have undertaken our own detailed analysis, much of which we have shared in the detailed submission attached. We invite Commission staff to participate in a workshop with us on the nature, extent and timing of the impacts and benefits of the proposed rule change.

If you would like to discuss this submission, please contact Melinda Green on 03 8628 1242 or Chris Streets on 03 8628 1393.

Regards

A handwritten signature in black ink, appearing to read 'M Collette', is positioned above the printed name.

Mark Collette
Executive – Energy

1. Context for the review

We argued in our submission to the Independent Review into the Future Security of the National Electricity Market (the 'Finkel review'), that the NEM was not broken or in need of fundamental redesign. Rather, a combination of factors has led to a deterioration of market outcomes, namely:

- insufficient policy stability, which has severely challenged investor confidence to make long term decisions;
- information gaps that are negatively impacting planning and contracting and investment behaviour by market participants and large energy purchasers; and
- a lack of a firm, durable emissions trajectory which is vital to guide long term investment in large capital intensive assets.

We observe high prices and threats to energy security and reliability, particularly with the increasing penetration of nonsynchronous, variable renewable generation and progressive closure of synchronous coal-fired generation. Governments are responding in different ways, further compounding the confusion.

Increasing levels of direct intervention in the market by state and federal governments adds further uncertainty. In the past 6 months the market has already had announcements of various schemes relating to storage technology, including Snowy 2.0, the Victorian Energy Storage Initiative¹ and the South Australian Energy Plan.² The South Australian Energy Plan provides a raft of government investments and obligations on participants that are expected to impact on the benefits of the 5-minute settlement proposal, including the construction of new gas plant, the construction of grid-scale batteries, providing incentives to secure additional gas supplies and an energy security target that requires local synchronous generation to be contracted with by retailers active in South Australia.

There is also considerable uncertainty about Australia's climate change policies – and by implication, the role of different forms of generation as the NEM transitions - in light of the Department of the Environment and Energy's current review of how Australia will meet its 2030 target and Paris Agreement commitments.

At the same time, the Commission itself is still considering numerous rule change proposals that will impact on the dispatch process and its efficiency:

- a) Rule change submitted by Snowy Hydro seeking market loads greater than 30 MW, which are or intend to be price responsive, to be registered as scheduled loads and being required to submit bids and follow dispatch instructions.
- b) Rule change submitted by ENGIE seeking to include non-scheduled generating units between 5-30 MW in the central dispatch process.
- c) Rule change submitted by AGL seeking the introduction of a NEM-wide Inertia Ancillary Services market.

¹ <http://www.delwp.vic.gov.au/energy/energy-storage>

² <http://ourenergyplan.sa.gov.au/>

The joint review by the Essential Services Commission of South Australia and Australian Energy Market Operator into the requirements for inverter-based generator, specifically the impacts of fast-ramping generation and load on the NEM, is also likely to have ramifications for the assumed benefits of the proposal.

Additionally, a change to the good faith rebidding provisions of the rules was made on 10 December 2015 and came into force on 1 July 2016. While it is not yet possible to determine its precise impact on market outcomes, initial indications from work presented by Russ Skelton and the Commission's 5-minute settlement public forum suggest this change has at least in part begun to address many of the perceived problems that Sun Metals put forward as justification for proposing the 5-minute settlement rule change.

1.1 The need for policy certainty

Clearly, stakeholders have diverse views about what is producing observed outcomes and how they could be improved. We view resolution of the various issues of affordability, system security and transition as the immediate priorities for policymakers and regulators; they should focus attention on developing a complementary suite of reforms to achieve a secure, affordable and a clean electricity system. Having this policy certainty would allow market signals to drive required investment while providing clarity about the role of different forms of generation as the energy sector transitions, including their role in supporting the system.

Until we get policy certainty from the broader reviews of wholesale market design and arrangements for system security including governments' response to recommendations we do not believe the AEMC can estimate the net benefit of the 5-minute settlement rule change.

Furthermore, it is not easy to assess whether 5-minute settlement will alter bidding behaviour and hedging strategies, or encourage investment in more flexible generation, load or demand response until the broader policy framework is settled. It would seem extremely challenging for the AEMC to conclude with any certainty whether this proposal would create a net benefit, particularly where short term transitional costs are substantial.

2. Incentives to invest in generation, flexible load and demand response

The Commission has looked at the potential for new investment – particularly in more flexible generation, load and demand response – in its consideration of the potential benefits of moving to a 5-minute settlement market. EnergyAustralia has made substantial investments in a broad range of thermal and renewable plant under the current arrangements. Additionally, we are exploring opportunities to develop our portfolio in regards to storage including pumped hydro, grid-scale batteries and behind-the-meter batteries. We also work closely with our customers to explore various demand response opportunities that reflect the flexibility of their work practices and processes.

We agree in principle that the proposal has the potential to produce a net benefit to consumers over the longer term; it should produce more efficient pricing, sending appropriate signals for consumption and investment. In part, the proposal seeks to provide a market signal to provide the 'correct' incentives for generation that can react to price signals on a much quicker basis than much existing plant and theoretically

provide a more efficient mechanism for dispatch. We are supportive of market mechanisms that allow participants to determine the most efficient means to respond and benefit accordingly. However, we see that market signals are becoming increasingly distorted by numerous external factors, such as the lack of a clear policy in regards to emissions reduction. This distortion is likely to impact on the ability of the proposed market signal to produce the assumed benefits in the absence of any broader policy response.

Furthermore, the cost of additional investment in generation that can better capture price spikes or shorter durations – such as the augmentation of existing peaking plant to improve ramp rates or the installation of large scale batteries – must be recovered from customers. Such investment may come at a higher cost if necessitated over a shorter time frame, with new technologies not offered time to mature and augmentation decisions being required without certainty on the ability to recover costs. This means the benefits that the proposal is seeking to provide are more likely to be captured in the long term. While this may be consistent with the National Electricity Objective, there is clearly an offsetting cost in the short to medium term. For this reason, we have reviewed the proposal framed against three time periods, the transitional period, short to medium term and long term.

2.1 Risks to system security in the short term

The transition covers the period from any decision to implement the proposal through to it coming into effect in the market. We have identified short term impacts as those likely to occur in the 3 to 5 years following implementation. Long term impacts are those more likely to occur in the period roughly 10 years and beyond following implementation, with medium term covering the intervening period.

Energy storage, particularly batteries, are not yet installed in sufficient quantities across the NEM to provide the required response to times of low renewable generation, without support from existing thermal plant. In the short term, we are concerned the penetration of storage into the market will not provide the level of capacity equivalent to this plant, specifically peaking gas powered generation. Even if investment in storage was sufficient to provide this capacity, the firmness of supply is not guaranteed as storage is far more constrained by its quantity of stored energy than constraints on thermal plant.

The Directions Paper suggests the timeframe over which increased penetration of storage is required is quite short. While we agree that much of the existing thermal plant within the NEM is ageing and increasingly operating past the intended operating life, the actual retirement schedule provides a much longer period over which replacement can occur. This plant represents a sunk cost but also a valuable asset whose ongoing utilisation represents avoided replacement costs for consumers, while also providing a smoother, cheaper and more secure transition to a low emissions generation fleet.

We recommend a balance between seeking increased investment in an appropriate level of storage and ensuring that inefficient (and costly) replacement or duplication of assets does not occur. As the costs for installation of storage continue to decrease the price impacts are likely to decrease, whereas the shorter the term over which the costs of increased installation are borne the more cost is likely to be borne by consumers.

2.2 5-minute settlement impacts to different types of generation and batteries

The Commission suggests the proposal is technology neutral and will simply trigger more efficient investment decisions at the right time and in the right locations. However, this view fails to fully account for the current stock of generation assets in the NEM. This is important as it influences decisions to maintain, expand or withdraw existing assets which in turn, has implications for pricing and system security. Investment decisions made in a short timeframe in an uncertain environment are likely to come at greater cost, or not be made at all, which creates further potential for price and system security impacts on consumers.

The claim that 5-minute settlement is technology neutral does seem inaccurate given that a change to this market model would have a significant detriment on gas powered generators, that is much larger than the suggested disadvantages that batteries are subject to under the current 30-minute settlement market. The proposal has a significant effect on the economics of thermal plant, with peaking gas powered generators most impacted; potentially speeding up the exit of peaking plant. Various coal plant has already been identified as exiting the market over the next 15 years and each of these retirements will cause a large step-change in the supply of firm capacity. There is lumpiness in the withdrawal of capacity that will need to be addressed as it is replaced with other energy sources, particularly storage.

It is difficult to estimate the overall flow-on effect to the operation of remaining plant, and specifically whether these retirements will act as impetus for peaking plant to remain in the market, alter their operational parameters or undergo upgrades or retrofitting of equipment to enable them to operate more effectively under 5-minute settlement. It is this uncertainty that adds additional risk that both affordability and security of supply may be adversely impacted by the proposal.

Further review of the effect of the proposal on gas powered generation and whether it will be able to capture sufficient revenue under 5-minute settlement has also led us to review the effect of the proposal on coal fired plant. Interestingly, units that can capture isolated price spikes will either be those units that can ramp at a very rapid rate, or those units that are already generating. This would cover baseload coal plant and may have the effect of potentially delaying retirement of coal fired plant. Owners of that plant, in particular those that also have peaking gas plant, may choose to defer investment in maintenance or upgrades on lower emission gas plant in favour of extending the life of coal powered units.

Looking at the investment incentives on storage and batteries as they exist currently we note that energy storage is currently able to capture benefits under the existing 30-minute settlement market. Investment in this technology is continuing and accelerating under this market, something that would not be occurring if this technology was unable to earn revenue.

Additionally, many storage systems rely on market volatility to gain a return on investment. Charging from the grid, or pumping water for later release, needs to be done at times of low prices with discharge or generation of power performed during times of high prices to derive revenue. This reliance on volatility to maximise revenues may provide incentives on participants to big their stored energy into the market in a manner which would exacerbate this volatility.

3. Bidding behaviour

In the Directions Paper the Commission relies heavily on some analysis of the existing market, focussing heavily on specific regions, and concludes that material benefits will outweigh the costs of implementation. In part, we would note that some of the behaviour modelled is related to the structural elements of those regions, and thus the extent to which 30-minute settlement is the key driver behind the observed behaviour is open to discussion.

There has been little in the way of detailed modelling performed on the potential bidding behaviours of participants. Such modelling, covering various scenarios across a range of investment levels in storage with rapid ramping capabilities will provide useful insights into the nature and extent of the costs and benefits. While potentially complex, it is this difficulty regarding the ability to forecast these two key elements that casts such a degree of uncertainty over the assumed benefits. Further, there has been no consideration of the time over which such benefits maybe captured. The Commission should consider more quantitative analysis of this issue as we see a range of feasible outcomes under revised arrangement.

Part of this analysis would be to model the likely bidding behaviour that would be possible as rapid ramping technologies achieve higher penetration. Bidding behaviour is also influenced by the following and the Commission would need to explicitly take these factors into account in its modelling:

- Nature of generation assets, including age, technology, ramping and its impact on asset integrity
- Technical standards
- Fuel (including existing contracts, price and alternative uses)
- Trading and hedging strategies, some of which could be described as strategic and was the focus of BIGF rule changes. Other strategies reflect trading and hedging positions
- Markets for other services, e.g. FCAS, and returns available to providing these services
- In the case of load and demand response, flexibility of work practices and production processes
- PPAs and other legacy contracts.

In the absence of modelling the assumption that bidding behaviour will change for the positive should be considered against the fact that bidding behaviour may increase wholesale costs. Some of the possible factors that could drive these increases, particularly in the short to medium term, are discussed below. Specifically, we see potential behaviour changes resulting in increasing wholesale energy costs from both gas powered generators and rapid ramping storage technologies.

3.1 Higher wholesale prices in the short term

By changing the scope for gas powered generators to capture high price periods and cover any caps sold, the proposal alters the conditions under which they can gain a sufficient return on investment and cover fuel costs. Each unit has various technical and

locational differences that will alter this equation but generally the decision will likely be either a withdrawal of units from service or altered bidding behaviour.

Where gas power generators make the decision to withdraw then it is likely that reduced capacity following that units exit would result in increased wholesale prices. This may be mitigated to an extent by an increase in storage or new capacity, or it may provide a signal for that capacity to be added. The primary concern, however is the potential reduction in firm capacity. Where gas powered generators are replaced by storage, and in particular batteries, then the energy capacity of that replacement source is likely to be much lower than for a gas powered generator.

In order to have a similar capacity factor, or availability of firm supply, the quantity of storage will need to be much higher than the units it replaces. That is, a 100MW gas powered generator may be able to provide that capacity for an extended period (although we note this is constrained by available gas and the price of that gas), whereas a 100MW battery is only going to be able to provide that capacity for a few hours before recharging and pumped hydro may be constrained by water to far less than a day (depending on the size of its dam and water available). Therefore, each replacement unit may have to be several multiples of the unit being replaced. This adds further cost, in addition to also comprising a large load on the remaining generation within the market during times when the energy source is recharging or pumping.

For those units that remain in the market the main impact will be that there may be a reduced ability to capture revenue from isolated price spikes, either from the spot or by offering caps, which forms a key part of their current economic viability. There is a genuine prospect of a reduction in the volume of caps in the short term (if they cannot be defended) and this creates more exposure to high prices for retailers at least until new products emerge. We are confident the market will find a way to overcome this as new products emerge but the Commission should consider these shorter term, adjustment costs as it assesses whether the proposal will generate a new benefit.

3.2 Bidding behaviour by new entrants

An impact that has not been adequately addressed in the Directions Paper is the expected bidding behaviour of energy storage and the possible price impacts of strategic behaviour by participants controlling rapid ramping energy sources. The Directions Paper contained some discussion of the variety of these sources, particularly batteries. Notably, it was highlighted that batteries may be installed behind-the-meter where there is reduced visibility and certainty about their strategies. Other issues may also exist depending on the location and nature of installation.

We note that grid-scale batteries may be more observable than those located behind the meter, however we also note that due to the classification of scheduled generators there is significant potential for large batteries to be installed below this threshold. The impact of a potentially high volume of battery capacity is being installed in a manner that has no ability to influence price may be detrimental to the operation of the market. Without being scheduled the ability to accurately gauge demand is diminished which in turn may increase volatility in the market. As raised earlier, this volatility may be valued by energy storage that would be seeking low prices to recharge and high prices to discharge.

Without modelling the impact of different installation scenarios, there is greater uncertainty the proposal to deliver the assumed benefits. Further complicating factors that need to be understood in relation to the potential bidding behaviour of batteries exist including, but not limited to:

- Strategic use of battery charging to increase demand and thus price that is captured by other assets owned by same participants.
- Use of ramp rates to discharge during times of high prices, but cease power delivery prior to end of dispatch interval in order to reduce price mitigation impact of additional capacity.
- Non-price effects (such as causing instability in synchronous units) of rapid ramping by batteries on other units connected to grid, and potential for these non-price impacts to exacerbate negative aspects of 5-minute settlement on these units.
- Application of bidding in good faith rebidding type requirements on rapid ramping technologies.
- System security implications that relate to price sensitive bidding behaviour by batteries – particularly in light of AEMO considering limitations on the ramping of rapidly responding energy sources that could create contingency events.³

It is the complexity of the modelling of the above bidding behaviour that makes it more imperative that such modelling is undertaken. The breadth of potential scenarios simply adds more risk that the benefits assumed in the Directions Paper are not adequately captured and that consumers bear the significant costs that will occur in the short to medium term.

4. Financial market considerations

EnergyAustralia broadly supports the findings of the Commission's consultant report on the effects of the proposal on the financial market. Additionally, we consider that if anything the Energy Edge assumptions on the reduction of cap contracts are conservative and could potentially be much higher. Further, we support the conclusions drawn by the Australian Financial Markets Association in their submission. Particularly, we agree that the uncertainty of the effect of the changes on the financial market is likely to be reflected in reduced liquidity and thus higher forward prices in the short term, until confidence in these markets returns to current levels.

We do agree that over time new products, suited to the available energy sources within the NEM, will emerge. The cost of these products is, however, uncertain but we consider it probable that in the short term there will be significant price impacts. While over the long term it is expected that financial products would reflect any lower wholesale costs that occur due to 5-minute settlement (assuming they do), this period may be significantly longer than the 3 year transitional period noted by the Commission.

³ AEMO presentation at ESCOSA stakeholder workshop from Inquiry into generator licensing conditions, Crowne Plaza, 16 May 2017

5. Cost of implementation and transition

The Commission has expressed that it is seeking further information on the costs likely to be imposed on participants if the rule change were to be made. On this point, we note that the specific form of implementation still raises questions for us due to lack of design details. Until the Commission publishes a draft rule that outlines the proposed changes to the National Energy Rules, the system changes, compliance requirement and other related costs cannot be accurately quantified.

However, based on the Directions Paper, some of the costs that are highly likely to be imposed on the wholesale operations of the business have been quantified in work performed by Russ Skelton & Associates on behalf of the Australian Energy Council. Even with the uncertainty of specific design choices we support the conclusions outlined in that work and note that while the total estimated cost is high, recent experience with similar changes (such as the required changes for the Power of Choice - Competition in Metering rule change) give us confidence in that values are very indicative of the impact of such wide-reaching system changes across the industry.

Further to this we support the Commission's conclusion that a transitional period of adequate length may help reduce these costs. While some of the costs will be borne no matter the transitional length, there are some benefits to a longer transition. Of significance are the resource requirements from IT vendors when making such detailed changes. This resource requirement becomes significantly higher when timeframes for specifying, designing, implementing and testing are compressed. Further, the actual vendor resources are more likely to be spread thinner during a time when every related energy business is attempting to contract for these services. Such scarcity will have an impact on the price able to be demanded by vendors, facing significant time pressures to complete the required work.

Beyond the IT changes linked to the proposal there are various other costs that will be borne by the market if the proposal is to proceed. Of these, the Directions Paper touches on the issue of metering and the necessary replacement of metering installations over a transitional period. We support the proposed move to the use of revenue metering, over SCADA data that is set out in the Directions Paper. However, we also consider that the proposed 3 year transitional period may not align with the 'natural' replacement of meters at the end of their life. Whatever transition period or process the Commission considers – for example, transitioning large customers initially and then smaller customers over a longer period, noting the challenges this would create for retailers – it should be mindful of the cost of replacing meters prior to the end of their life when assessing whether the proposal generates a net benefit.

Other cost impacts are likely to occur, including but not limited to:

- Project design and implementation requiring additional staffing in lead up to project.
- Ongoing operational requirements continuing through transition so staff are preparing for new market, while continuing to operate in existing market.
- Ongoing post-implementation costs due to unfamiliarity with new processes, additional analysis required to build up bidding parameters, risk management rules, fuel purchasing strategies etc.

6. Preferred transition

If the Commission, upon finalising its analysis, determines that the proposal's benefits do outweigh the likely costs then the path to a revised wholesale market should be orderly and mindful of legacy contracts, the current stock of generation and existing mechanisms for managing financial risks. It should provide new and incumbent market participants with a reasonable opportunity to respond to these revised incentives, which could offset or reduce some of the potential risks.

In order to allow for this orderly transition, as outlined earlier, there must be adequate time to allow for adjustments to wholesale trading and settlement systems, financial markets, metering installations and AEMOs own processes. Rather than the three years the Commission proposed, we recommend a period of not less than five years from any announcement to proceed with the alignment would allow for a much lower cost transition to a new market structure.

