Major Energy Users Inc.

Australian Energy Markets Commission

National Electricity Amendment (Five Minute Settlement) Rule 2017

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Submission by

The Major Energy Users Inc

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The content and conclusions reached in this submission are entirely the work of the MEU and its consultants.

TABLE OF CONTENTS

Executive summary

The AEMC has made a ground breaking draft decision to transition to 5 minute settlement in the National Electricity Market (NEM) by July 2021. This is despite some very strong arguments provided by stakeholders that the change will incur significant costs and that the benefits will be modest at best. Overall, those stakeholders heavily involved in the electricity market have expressed a view that any benefits of 5 minute settlement will not exceed the costs that will be incurred to make the change.

There is a fundamental fallacy in the AEMC assessment, and this fallacy is driven by a lack of proper assessment by the AEMC of what will occur after 5 minute settlement is implemented.

The fallacy arises when there is a high priced dispatch period, the AEMC analysis shows that generators and demand side "pile in" to provide significant competition in subsequent dispatch periods – this is an incentive provided by 30 minute settlement. This incentive will be removed by 5 minute settlement. What the AEMC assumes is 5 minute settlement will prevent the high priced dispatch period occurring and then continuing.

However, the ACCC analysis of the National Electricity Market (NEM) in its Retail Electricity Pricing Enquiry, considers that the NEM is highly concentrated and that there are times when market power is exercised. This means that if there is no increase in competition to prevent subsequent dispatch periods also exhibiting the same high prices (currently incentivised by 30 minute settlement) there will be no countervailing competition for subsequent dispatch periods.

Since the AEMC provided its draft decision, the ACCC has released its preliminary report on its Retail Electricity Pricing Enquiry which, amongst other aspects, has identified that the levels of competition in the NEM are currently very low and that the wholesale electricity market is considered to be highly concentrated. The AEMC draft decision does not address the issue of the very low levels of competition in the NEM that the ACCC has identified or whether the proposed change will further reduce levels of competition.

It is clear that the levels of competition will be impacted by the change as the AEMC does comment there will be generation that will not be able to provide competitive services under 5 minute settlement[1]. To counter this loss, the AEMC assumes that the incentive provided by 5 minute settlement will deliver new investment to offset the generation that will be lost but there is no evidence provided that the new generation to replace that lost will be delivered by July 2021; nor does the AEMC provide any assessment of the risk if provision of this new generation does not occur.

The AEMC considers that the 5 minute settlement provides a positive benefit to offset the cost s for making the change but has not undertaken any assessment

[1] The AEMC also observes that if these generators can provide services in 5 minute settlement, there will be increased costs involved, implying prices will rise

to demonstrate this is the case[2]. At most, the AEMC provides a considered view that a reduction in wholesale prices by $0.50/MWh will offset the costs involved, yet provides no substantiation for the $0.50/MWh reduction. In counter to this, the MEU points to the ACCC view that the loss in competition occasioned by the closure of Hazelwood power station was a prime cause in the doubling of the wholesale contract prices, even though the loss of supply was less than 3.5% of available generation in the NEM. This shows that any reduction in competition from current levels will result in higher prices to consumers.

The AEMC comments that 5 minute settlement will reduce reliability and security but considers that upcoming reviews will address this loss. The Federal Government's new National Energy Guarantee policy is couched in terms of enhancing reliability and security. This means that any loss of reliability and security from the implementation of 5 minute settlement will detract from achievement of that policy.

The AEMC makes some reference to changes towards 5 minute settlement in overseas markets overseas. Despite this, examination of the detail of that overseas experience does not support the proposed change or that there will be net benefit for consumers. The overseas actions support a view that the AEMC approach is leading edge and essentially unproven in an energy only market such as the NEM.

The draft decision is heavy on assumptions and lacking in detailed quantitative assessments of the way the market will react to the proposed change. Ultimately, the AEMC has assumed that a solution that reflects pure economics will deliver a better outcome for consumers but has not assessed in any significant detail whether this is the case. Specifically, the AEMC has assumed that technology will solve the problem but without assessing in detail whether engineering can deliver the change, whether competition levels will change and at what the costs will be. Specifically, the AEMC has not included in the costs of making the change, any costs for the loss existing generation and the costs for introducing the new generation and plant – the AEMC has concluded these costs are for Market Participants to carry, yet these costs will ultimately be passed onto consumers.

The AEMC has not addressed the temporal implications of its draft decision, or quantified the risks. It allows for a transition of 3.7 years with the expectation that when this time is complete by July 2021, all of the new generation and other plant (eg batteries) needed to provide the necessary competition to make 5 minute settlement work for consumers will have been installed.

As the ACCC has already shown that the concentration of the NEM is already exhibiting higher prices in a highly concentrated market, any loss of generation will result in further reductions in competition. The absence of any assessment of the loss or even risk of loss of competition due to the transition time frame not considering competition issues, is of great concern.

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[2] The AEMC asserts that this is too difficult but the MEU points out that Frontier Economics has carried out an exercise similar to this for the EU (see section 6)

The MEU notes the recent change in NEM energy policy to implement a National Energy Guarantee announced by the Federal Government and questions whether the AEMC should implement its proposed rule change before it is clear what the impacts of the new policy directions will be and whether the 5 minute settlement rule change is needed.

Bearing in mind the ACCC observations and the Federal government new energy policy which focuses on enhancing reliability and security, the MEU considers that a move to 5 minute settlement is at least premature, especially as competition in the NEM is likely to further reduce when 5 minute settlement is introduced, potentially increasing prices and reducing security and reliability.

1. Introduction

The Major Energy Users Inc (MEU) welcomes the opportunity to provide its views on the AEMC Draft Determination regarding the proposed rule change from Sun Metals Corporation P/L which seeks to have aligned dispatch and settlement (trading) periods of five minutes in the National Electricity Market (NEM).

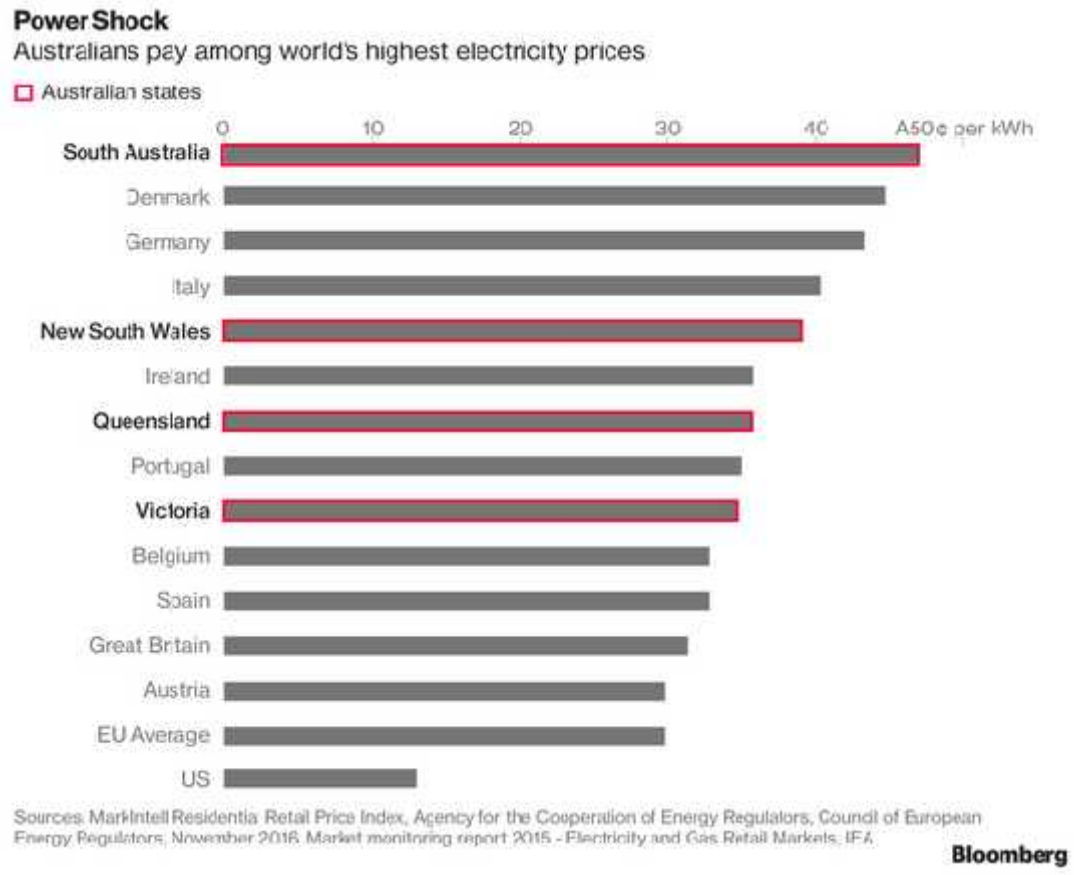
The MEU has already provided its views on the Sun Metals proposal in its response to the AEMC Consultation Paper and the following Directions Paper. These views have been augmented, and modified, by the MEU active involvement in the workshops and forums the AEMC implemented to discuss the issue further.

The MEU notes that the AEMC has recently concluded assessing two other rule change proposals (from Snowy Hydro and Engie) which would have been impacted by the five minute settlement rule change; the AEMC final determination was that these two rule changes would not have been in the long term interests of consumers. The AEMC reached this conclusion on the basis that the costs imposed on participants would outweigh the benefits (if any) that the proposed rule changes would deliver.

The draft determination regarding the 5 minute settlement rule change is that the AEMC considers that the rule change will result in a net benefit to consumers. However, the AEMC has not provided any evidence that this will be the case, despite receiving advice from stakeholders active in the market that the costs will be greater than the AEMC identifies and the benefits less than those assumed (but not quantified) by the AEMC.

It is of great concern that the AEMC has not assessed the risks of this rule change bearing in mind the current parlous state of the wholesale prices the NEM provides to consumers. In this regard, it is important to note that NEM electricity prices are amongst the highest in the developed world as the following chart[3] from Bloomberg shows

[3] Published in The Age 6 October 2017



The AEMC has not undertaken any risk assessment that its rule change could result in higher prices, exacerbating already excessively high prices for consumers.

The MEU notes the very recent announcement of major changes to the NEM resulting from the recommendations of the Energy Security Board (ESB) which mandates reliability requirements to be provided by retailers and presumably generators through contracts with retailers. As the changes that will result from the implementation of the ESB recommendations will be far reaching (potentially including some form of payment by retailers to ensure sufficient dispatchable generation will be available), the 5 minute settlement rule change proposal should be deferred, modified or even not enacted, pending development of the details needed to implement the changes to the NEM to implement the National Energy Guarantee policy.

2. Assessment of the AEMC draft decision

The AEMC is testing the boundaries of electricity market knowledge as to how the 5 minute settlement rule change will affect the National Electricity Market (NEM) and whether it will deliver lower electricity prices rather than result in further increases in the already excessively high electricity wholesale prices seen now in the NEM.

Electricity prices have been driven to their current high levels by a perfect storm of ill-informed decisions by governments who have delivered very high gas prices and rule makers that have encouraged excessive network costs and allowed generators free rein to game the electricity market which has resulted in consumers having to buy electricity under contracts effectively set at gas fired generation prices.

The AEMC has not shown how its proposed move to 5 minute settlement changes this high priced reality.

In its just released preliminary report on the Retail Electricity Pricing Enquiry, the ACCC attributes the recent rises in the wholesale electricity market to generation and retail sectors of the market being highly concentrated. The ACCC cites that this provides a greater opportunity for the exercise of market power.

What is absent from the AEMC assessment is any analysis as to whether the new 5 minute settlement rule change will result in further increases in market concentration. The MEU is very concerned that the AEMC has reached its decision based purely on economic theory and hope.

Even while making this decision, the AEMC has failed to carry out even basic assessments of key aspects of the change.

In its draft decision, the AEMC has not made any:

- risk assessment about if their assumptions are incorrect or if new investment in generation and other plant assumed to be made, is not delivered in time
- quantitative assessment of the counterfactual (ie how much will the market respond to the change) to balance against the costs
- modelling to evaluate how the market might operate after the change[4]
- evaluation of the way the new plant incentivised by the change (eg batteries and pumped storage) will interact with the market, bearing in mind their engineering limitations which the AEMC has glossed over

[4] In fact generators at the AEMC workshops have stated that they would have a totally different approach to bidding under a 5 minute settlement regime implying that any conclusions drawn from 30 minute data (on which the AEMC has relied to substantiate the change) is highly suspect.

- assessment of the changes in market concentration and market power opportunities that the change could bring
- investigation as to why most other energy markets that have not moved to 5 minute settlement and the reasons why[5]
- assessment as to what benefits the change will deliver that the demand side responses expected from the change but who have not been active under the current settlement period, noting that 30 minute settlement does provide incentives already
- detailed assessment of the benefits other than observe that a 50 cent reduction in the spot price would be sufficient to offset the costs involved with the change
- calculation of the costs involved with providing the new equipment (eg batteries) and generation plant that will be needed to enable the market with 5 minute settlement, operate as securely as it does now. The AEMC considers that this cost will be carried by Market Participants and implies this will not be a cost to the market or consumers[6]. Consumers will ultimately bear the cost.
- identification of the cost impact on consumers of the generation made redundant by the change

Consistent use of terms like “expects”, “should”, “likely” and “may” are used widely throughout the AEMC draft determination, but the AEMC provides little in the way of certainty that would result from better more detailed assessments, especially more quantitative analysis such as carried out by the ACCC to inform its conclusions.

The only quantitative assessment made about the benefits of the rule change were that if the wholesale price fell by $0.50/MWh then this would offset the costs coming from the change. However, the MEU notes that the reduction in competition in the wholesale market caused by the closure of Hazelwood power station effectively caused the wholesale contract prices to more than double. While the loss of competition in the wholesale market is addressed in more detail in the following sections 3 and 4, the MEU points out that any loss of competition in the NEM will cause significant harm to consumers and there is every expectation that the move to 5 minute settlement will result in a loss of competition, especially in the early years after the change..

The AEMC recognises that the change will result in a risk to system security and reliability yet considers that its work on various reviews currently underway will offset these risks and that the transition period will provide time to resolve

[5] The MEU notes that the US regulator FERC has mandated common dispatch and settlement periods but has not mandated these to be of 5 minutes

[6] See AEMC response to ERM comment under “Costs”. ERM raised the costs of the new generation technology will result from the change – the AEMC response is that Market Participants are best placed to evaluate and manage costs and risks of investment. While the MEU agrees with the sentiment, these are still costs that the AEMC has to assess to ensure that the rule change provides a net benefit to consumers.

these. What the AEMC does not discuss about these other reviews, is that there are likely to be costs to consumers that will eventuate from changes these reviews might have to deliver to obviate the impact of the 5 minute settlement change on reliability and security.

What is most concerning is that the AEMC has not considered there might be other solutions to the problem they have identified with 30 minute settlement. Such other options include:

- Earlier gate closure on rebidding, such as a one hour ahead as used in the UK and elsewhere in the EU
- No rebidding within the 30 minute settlement period
- Capacity markets like those used extensively in most electricity markets[7] and implied for the NEM under the new National Energy Guarantee policy. Even the UK which pioneered energy only markets like the NEM has opted for a capacity market due to the difficulties inherent in energy only markets
- Marginal pricing over 30 minute settlement periods

The AEMC has not examined the reasons why other electricity markets have not transitioned to 5 minute settlement. For example, in section 6, the MEU points out that the EU commissioned Frontier Economics to assess the benefits of normalising EU markets to 15 minute settlement yet the conclusion was that at best the change would be marginally positive and at worst strongly negative. Also, the UK examined in detail the 30 minute settlement process and elected not to even look at shorter settlement.

It is clear that the AEMC has assumed that the economic purity of its draft determination will result in benefits to consumers. At the same time, it has downplayed the costs of making the change and the significant opposition to the proposal by Market Participants. Of great concern to the MEU is that the AEMC has not fully appreciated the limitations[8] of the technology it considers will be needed to deliver the benefits of 5 minute settlement, nor of the impacts on the levels of competition that are likely to result.

This means that it is essential that the AEMC must fully investigate and carry out detailed studies to assess, in quantitative terms, likely responses that the rule change will cause. With the very high electricity prices consumers now face, if the rule change results in further increases in prices, then the AEMC will have failed in its responsibilities to ensure deliver an outcome that meets the National Electricity Objective.

In the absence of better analysis of the impact that its proposed rule change will deliver, the MEU is not convinced that the change will provide a long term

[7] AEMO has effectively introduced capacity market features to provide security of supply in SA and Victoria for this coming summer and the one after through the Reserve Trader process
[8] Discussed in more detail in section 5

benefit to consumers, sufficient to offset the costs that will be caused to implement it.

The AEMC has decided that the transition time needed to implement this change will be 3.7 years with a start of 1 July 2021. This time frame has been assessed on the basis that this is needed to

- Exit most contracts
- Align requirements for metering
- Implement IT systems

What is totally missing from any assessment of time, is the time needed to ensure there is adequate competition for all services at the date of changeover (1 July 2021). There is a need for an evaluation of the time needed to provide the necessary replacement of the generators that can't operate within 5 minute settlement with the new plant and equipment. The AEMC has decided that this replacement is the responsibility of Market Participants yet if there is insufficient replacement by 1 July 2021, then the generators able to operate in a 5 minute settlement market will have increased market power.

As the ACCC has already shown that the concentration of the NEM is already exhibiting higher prices in the highly concentrated market, any net loss of generation will result in further reductions in competition. The absence of any assessment of the loss (or even risk of loss) of competition due to the transition time frame not considering competition issues is of great concern.

3. The ACCC Retail Electricity Pricing Enquiry

The ACCC preliminary report on its Retail Electricity Pricing Enquiry provides a number of very important issues that the AEMC has not addressed in its draft decision.

One of the critical conclusions drawn by the ACCC is that the NEM is highly concentrated in both generation and retail and this level of concentration provides a mechanism to exercise market power. In its report (page 81) the ACCC comments

> "The high levels of concentration, and the very high market shares of certain generation businesses, raise real concerns. The effective operation of the NEM is predicated on a competitive market. The potential for the exercise of market power has increasingly been a concern as market concentration has increased."

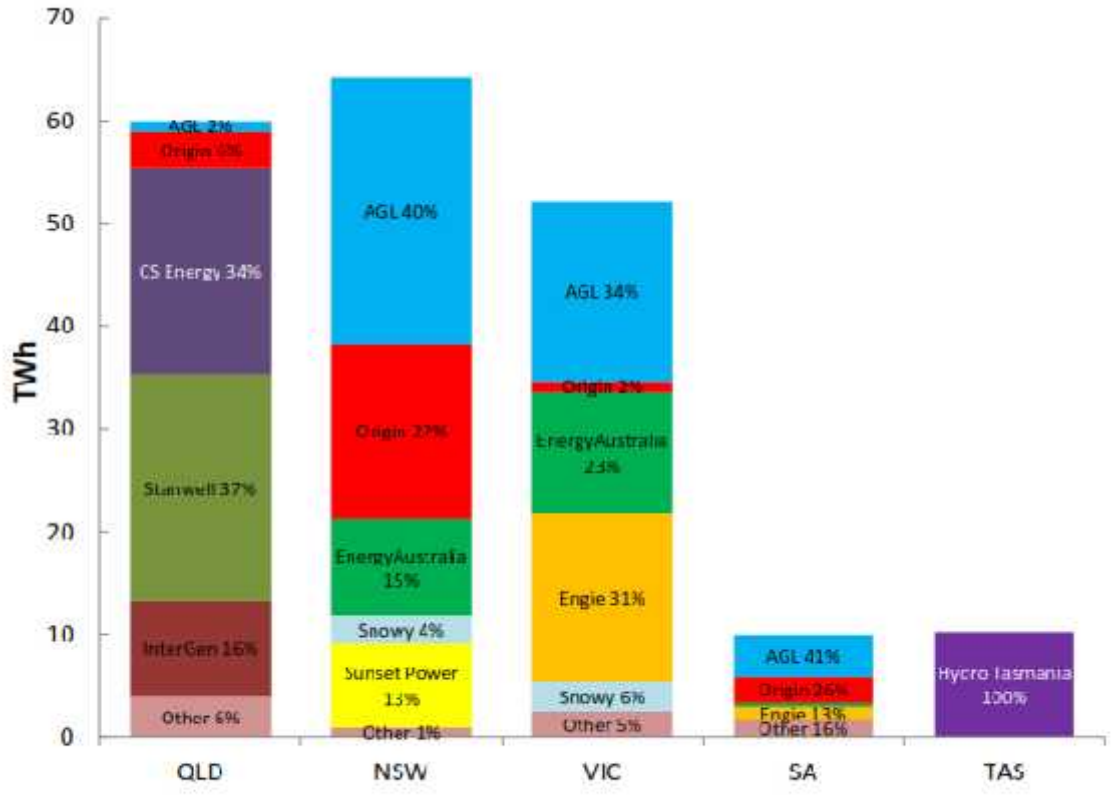
It is this exercise of market power, especially in an energy only market, that allows generators to cause prices to reach very high levels. Thus, any change to the rules needs to examine the potential for the any change in the exercise of market power. That the AEMC has assumed that 5 minute settlement will reduce the potential for exercise of market power is a major concern because if market power is exercised as a result of the change, the incentive to reduce the ability to exercise market power implicit in 30 minute settlement, will no longer apply, providing the conditions for the exercise of market power to be continued in subsequent dispatch periods.

In its report, the ACCC cites the example of ability of Stanwell to exercise market power and drive prices higher (page 81)

> "The effect that large generators may have on a market is illustrated by recent experience in Queensland. In June 2017 the Queensland government, concerned about prolonged high wholesale prices in the state, directed state-owned Stanwell Corporation to offer more capacity in the NEM and alter its bidding strategies to put downwards pressure on wholesale prices. As noted in Figure 3.3 above, 37 per cent of electricity dispatched in Queensland in 2016–17 was generated by Stanwell Corporation.
>
> The intervention achieved immediate impacts in the market. Before the direction to Stanwell Corporation, futures contracts for the 2017–18 summer months in Queensland were trading at around $120 per MWh. Following the direction to Stanwell Corporation, those futures prices dropped to around $100 per MWh and have stayed at that mark since.
>
> It is clear that market concentration overall, and the very high market shares of particular generation businesses in some NEM regions, is a risk to wholesale prices. The NEM is designed to operate with effective competition among generators and any sustained ability for generators to exercise market power is a barrier to effective competition."

That actions by Stanwell have had such a significant impact on both spot prices and contract prices shows that the levels of competition in the NEM are at critical levels. While the ACCC example is focused on the Queensland region, it is important to note that certain generators in other regions have similar degrees of concentration due to the presence of pivotal generators, as the figure 3.3 referred to in the ACCC quote above shows.

Figure 3.3: Market share by generation dispatched, 2016–17



Source: ACCC calculations, AEMO market dispatch data
*The Engie figure includes Hazelwood's output from 1 July 2016 until its closure in March 2017. Engie's generation output in Victoria will be significantly lower in 2017–18.

The ACCC also draws attention to the loss of supply caused by the closure of Hazelwood power station in Victoria and the ACCC comments (pp 84 and 85)

> "The decommissioning of Hazelwood is significant for the Victorian market as it contributed a large proportion of Victoria's baseload generation. Wholesale prices in Victoria increased by 40 per cent between 2015–16 and 2016–17, and prices for 2017–18 are tracking to be significantly higher again—the average price so far this financial year is 65 per cent higher than the 2016–17 average, and almost double the average price over 2015–16. ... **While this jump is significant, it should be noted that Hazelwood's closure does not fully explain the current high wholesale prices in Victoria**." (emphasis added)

The implication of the ACCC observations is that it was not merely a tightening of the supply/demand balance as a result of the closure, but there were other forces that caused the higher prices.

For the AEMC not to examine the potential for exercise of market power under a 5 minute rule change due to concentration of the market is of great concern.

In its preliminary report, the ACCC provides a concerning observation (page 151)

> "The solutions to Australia's affordability problem will not be straightforward, nor is there a 'silver bullet' that will address all problems. Some mistakes of the past are beginning to be unwound, while others, unfortunately, will affect electricity markets and consumers for decades to come."

The ACCC goes on to state (page 152)

> "...the ACCC will be mindful of the history of interventions in this market which have too often had unintended consequences to the detriment of electricity users. For this reason, policies targeting improvements in this market will need to be carefully considered prior to implementation."

These ACCC observations raise concerns that a decision to move to 5 minute settlement could well fall into the same category of other past mistakes, especially if there is a lack of detailed quantitative assessments and analysis. Specifically, the ACCC has identified that the reduction in the level of competition in the generation and retail sectors is the main cause of the recent massive increase in wholesale contract prices, and highlights the need for the AEMC to assess the levels of market concentration before and after the rule change is implemented.

Amongst other causes[9] of price rises, the ACCC points to the massive incentives that were provided to networks with the changes in the rules for network regulation that were made in 2006. The ACCC comments (page 112)

> "The AER has previously stated that the 2006 NER were deliberately set to create a favourable environment for investment but in doing so, the balance of cost and service was not given sufficient attention. In its inquiry into the Electricity Regulatory Frameworks, the Productivity Commission found that flaws in the design of the framework contributed to network price increases between 2007 and 2012. The Independent Review Panel report on network costs in Queensland similarly found that the framework "limits the ability of the AER to drive the [network operators] towards the delivery of efficient capital and operating programs."

The MEU pointed out to the AEMC that its decision to change the network regulation rules in 2006 provided too strong an incentive for investment in networks. After the network rule changes were made in 2012, there were still excessive incentives provided to networks and the MEU proposed a number of

[9] Over-forecasting, limited merits review,

rule changes to limit these incentives. Despite the MEU efforts, the AEMC expressed a view that the long term interests of consumers needed such strong incentives to ensure reliability of the networks.

It is now clear that the changes to the network rules were made without sufficient investigation into the potential costs that could ensue. As noted in section 2, the MEU considers that the AEMC draft decision on 5 minute settlement suffers from a similar lack of more detailed assessments than those undertaken so far.

With regard to the 5 minute settlement rule change, the ACCC, whilst providing some limited support for the change, provides a number of notes of caution and implies that deeper investigation is warranted with specific attention to the levels of competition seen in the NEM before and after the rule change to identify whether 5 minute settlement will further reduce the levels of competition now being seen in the NEM.

4. More competition in supply is critical

As the ACCC notes in its report (see section 3), electricity prices in the wholesale market are already very high and lower wholesale prices will only come if there is more competition amongst providers for the various elements of electricity production.

This point is reinforced in the commentary on NEM issues by the Federal Minister for Environment and Energy Josh Frydenberg[10] and by the ACCC (see section 3), yet the AEMC draft decision does not provide a view on the outturn levels of competition in the NEM after the 5 minute settlement is implemented.

The principle behind the electricity wholesale market is that there will be vigorous competition in the supply of electricity in every dispatch period. The incentive in 30 minute settlement ensures that there will be increased competition in dispatch periods subsequent to a high priced dispatch period. The 5 minute settlement proposal will remove this incentive and so allow the conditions that caused the initial high price to continue.

At the forum to discuss the proposed change, the MEU raised the question as to whether the AEMC had assessed the impact of the proposed rule change on the levels of competition for each service that the supply side provides.

The AEMC advised that an assessment of the impact on competition would be carried out, but a review of the AEMC draft decision shows that there has been no assessment of the impact of the rule change will have on the level of competition amongst generators after the rule change, other than expression of the view that (page 14):

> "More accurate spot prices **may** also encourage efficient supply side competition with generators entering the market that are able to take advantage of spot price variability or existing participants investing in additional flexibility." (emphasis added)

The ACCC opines that the current price spikes seen in the market are a result of limited competition already being seen in the market, so the MEU questions the AEMC assertion that more accurate spot prices will encourage more competition.

On page 34 of its draft decision, the AEMC notes the MEU commentary that there have been high prices in a 5 minute dispatch period, but these high prices did not continue because of a subsequent increase in competition from more generators being dispatched thereby driving prices down. The AEMC attributes the price spikes in a 5 minute dispatch period being caused by the 30 minute settlement period. Implicit in the AEMC assertion is that a move to 5 minute settlement will remove high prices from the market.

[10] See appendix 1

The MEU points out that the high prices in the initial dispatch period can only be present if there is already a lack of competition, allowing the exercise of market power by the generators to "spike the price".

Under 5 minute settlement, if there is a high priced dispatch period, then the conditions that caused the high price will continue into subsequent periods as there will not be the competition engendered by 30 minute settlement to reduce prices in the subsequent periods. The ACCC assessment is that there is already insufficient competition in the NEM to ensure that no high priced dispatch periods will occur, so an incentive is needed to increase competition for subsequent periods, such as that provided by 30 minute dispatch.

However, the AEMC does not carry out any assessment as to the extent of any lack of competition in the market which might drive high prices. In contrast, the ACCC, in its preliminary report from its Retail Electricity Pricing Enquiry highlights that the electricity wholesale market is highly concentrated and that this is contributing to the high prices now being seen in the market. The ACCC points to a major concern with regard to the level of competition in the wholesale market, including in the contracts and secondary markets.

The ACCC identifies its concern by observing (page 151)

> "There appears to be insufficient competition in both generation and retail markets, which both raises prices and increases barriers to entry"

What is of concern is that the AEMC does not accept that the move to 5 minute settlement will reduce liquidity in the futures market, especially the liquidity of price cap products but at the same time accepts that the change will result in existing technology generation assets ("frame type" gas turbines) exiting the market as they do not have fast enough response times to operate with 5 minute settlement (page 43)

This issue of competition needs to be assessed in greater detail before deciding on whether 5 minute settlement will deliver benefits to consumers.

The AEMC identifies that the existing generation fleet is ageing and the investment in new faster response technology to allow 5 minute settlement merely replaces retiring generation. While this might be true over the longer term, the observation overlooks some basic facts.

1. The new rule change is to come into operation on 1 July 2021, yet there is little (or no) existing generation forecast for retirement within this time span. Throughout the draft determination, the AEMC highlights that there will have to be new investment made with more flexible plant as a result of the rule change and implies that the new generation will be change out for plant that will exit the market through age; as existing plant will face premature retirement there will be a cost to consumers.
2. Replacing old partly depreciated plant with new undepreciated plant adds to the total costs consumers have to pay for. The MEU points out

that this is a cause of the ever increasing real regulatory asset base that is seen in network regulation.

3. The existing generation has demonstrated that it cannot operate under the 5 minute settlement arrangement, causing a loss of competition in each 5 minute settlement period which has to be replaced
4. The AEMC considers that demand side responses will be incentivised under 5 minute settlement. However, there are already significant incentives for the demand side to be responsive, yet this has not occurred. In fact, 5 minute settlement will remove much of the demand side responsiveness that is already provided, but this fact is not addressed by the AEMC.
5. The AEMC considers that there will be fast response plant incentivised under 5 minute settlement, such as batteries, but storage options such as these only provide an arbitrage service and do not provide new generation to replace the generation no longer able to operate within 5 minute settlement. Storage has to be accompanied by generation.
6. An arbitrage service increases the cost of electricity as it needs electricity already generated to provide this service. While the plan would be to access electricity at times of low price, this might not be possible as high prices and low competition occur for extended periods, most commonly on weekday afternoons. This means that storage devices once discharged will either buy at high prices or be unavailable until the following day after recharging at times of low prices. This means that there has to be sufficient storage to cover extended periods without recharge
7. The AEMC points to new generation with fast start operation (eg aero-derivative gas turbines) but points out that these are more expensive than the existing style of gas turbines in the NEM, thereby increasing costs for producing electricity
8. The AEMC points out there is significant generation plant already operating in the NEM that could provide responses within 5 minute settlement yet the AEMC also adds[11]

   > "...analysis shows that responses in the hundreds of megawatts in five minute periods can be provided by existing generators in the NEM, **though there may be additional costs associated with faster ramping**." (emphasis added)

   This implies that costs will increase thereby delivering higher prices

The MEU has noted that the loss in competition caused by the closure of Hazelwood power station impacted the Victorian market significantly by reducing available generation by 13%, the available competition in generation

[11] AEMC draft determination page 163

reduced by some 3.5% across the NEM yet an even relatively small reduction such as this resulted in a doubling of the wholesale contract prices across all NEM regions.

5. Assessment of technologies

The AEMC draft decision has assumed that new technologies will provide a greater ability to respond within a 5 minute settlement period and the MEU agrees with the concept but considers that the AEMC has over-estimated the abilities of these new technologies.

Technological neutrality

The AEMC posits that it needs to implement solutions that provide technological neutrality. There is little doubt that the 5 minute settlement will prevent some technologies (eg ramp rates for "frame style" gas turbines or coal fired generators) from being able to maximise their value to the market and to prevent the exercise of market power by those generators that are able to respond within a 5 minute settlement period.

In contrast, 30 minute settlement does not provide a barrier to entry of other technologies such as batteries and aero-derivative gas turbines as these types of technologies have already entered the market. In contrast, plant that cannot respond within the 5 minute settlement period, will be effectively barred from the market, biasing the market towards faster start plant and a barrier to lower cost slower start plant

As noted above, what is of significant concern is that there has been no quantitative assessment of the change in market concentration of generation which will result from the proposed change. If the change is made, there will be significant changes in market concentration for the supply of the various services[12] provided by generators.

What is clear is that the time needed to develop new generation services to replace those that will be lost from the market will far exceed the time allowed by the AEMC to transition to the new settlement regime.

System security

The AEMC does note that there may be some challenges, such as system security issues, that will occur as a result of the change but points out that these will be addressed by reviews that are currently underway. The AEMC cites

- AEMO future power system security program
- AEMO guide to generator exemption
- AEMC Distribution market model
- AEMC System security work program
- AEMC Frequency control frameworks review

[12] Including FCAS, inertia, base load, intermediate, peaking, price caps

- AEMC Reliability frameworks review
- ARENA/AEMO Demand response competitive round
- Reliability standard and settings review

The AEMC comments that taken together these will address the concerns raised by stakeholders about the volumes of new plant required (eg batteries) needed and the exit of gas fired peaking generators.

While this might be the case, there is no certainty that the implementation of the outcomes of the reviews will address the problems that stakeholders have identified.

But what is absent from all of these reviews, is any assessment as to the levels of competition that will result from the proposed rule change to provide the needed levels to drive the NEM to deliver lower costs for consumers.

Time implications

The AEMC draft decision allows until July 2021 before the new settlement period will be implemented. The assumption is that investment in the new technologies in the intervening period will be sufficient to offset the loss of existing generation that will not be able to provide adequate service when the change occurs.

The AEMC expresses a view that this investment will occur but there is no certainty that it will as all the AEMC provides is an incentive for this to occur. The AEMC has made no provision to address this potential problem should it occur.

Aero-derivative gas turbines

The MEU has discussed the capabilities of aero-derivative gas turbines with engineers experienced in their construction and operation and notes that they are not extensively used in the NEM[13].

These turbine types can operate faster that the more robust “frame” style gas turbines but their capital cost is higher as are the operating costs. Aero-derivative gas turbines exhibit more operational downtime and a need for more routine maintenance, and the more frequent their starts, the more maintenance required.

Although steps can be taken to minimise down time (eg through using change out engines), this increases the capital costs through having to have spare engines available “on call”.

Even with their faster start capabilities, aero-derivative gas turbines still require significant start up times before they can synchronise, limiting the amount of

[13] The MEU notes that aero-derivative gas turbines are located at Snuggery, near Mount Gambier and at some hospitals in Victoria.

energy that can be injected within a 5 minute settlement period. So even though they might be able to provide some response within a 5 minute period, this is not as great as is implied in the AEMC draft decision.

Batteries

There is little doubt that batteries can provide near instantaneous supply into the market. However, once discharged, they require significant time before they can be used again due to limitations on recharge rates.

Batteries only offer an arbitrage service so they do not add to the generation mix. This means that batteries need a generator to be able to recharge them at times when electricity prices are low, so a move to 5 minute settlement not only removes existing generation from the market but requires the replacement to be a battery coupled to another form of generation, effectively increasing the total cost of the replacement technology.

The current technology for batteries (and presumably that which will be still in vogue in July 2021) is based on lithium ion technology. This technology has a fixed MWh life (ie the amount of energy that can be delivered over its lifetime) and such batteries can lose some 10% of its energy storage capacity on an annual basis through operational degradation and frequency of cycling[14]

In order to provide the maximum flexibility, recharging at times might have to occur immediately after discharge, thereby increasing the demand in the market and thereby a reduction in competition and higher wholesale prices.

While the AEMC asserts that batteries (and similar technology) can accommodate 5 minute settlement, the AEMC has made no estimate of the cost that the new technology might impose on the market. The MEU agrees that the cost of batteries is falling and probably will continue to do so

Profiling of end users

The AEMC provides a view that due to a lack of appropriate metering, AEMO will have to develop a profile for use in the 5 minute settlement market. Inherent in profiling is that those consumers included within the profile lose their identity and this makes providing a reward to getting those consumers for their involvement in the electricity market less valuable.

The MEU accepts that small end users of electricity are currently profiled, but the AEMC asserts that moving to 5 minute settlement will enhance the ability of all end users to impact the market. If the majority of end users are effectively marginalised through profiling, and this continues, the MEU points out that much of the benefit that the AEMC asserts will be achieved cannot be delivered under 5 minute settlement until the necessary metering is provided. So far, the AEMC assessment of the costs for converting the necessary metering does not include the conversion of all end users to smart metering

[14] See for example http://jes.ecsdl.org/content/163/9/A1872.full

Demand side responsiveness

While it is recognised that electricity is now considered to be an essential service due to its very pervasiveness, there is a view widely held that responsiveness from consumers of electricity has to be an essential feature of the electricity market. Despite this assumption, research by Electricity Consumers Australia, QCoSS and Business SA reported at the ECA Foresighting Forum 2017 (20/21 February 2017) found that there is a very high proportion (greater than 60%) of residential and small business consumers of electricity that don't engage with the electricity market for many reasons including tenancy, age, disinterest, technical inability, etc.

With this in mind, the MEU considers that while economists discuss efficiency measures in the electricity market as being a driver for efficient outcomes, the MEU points out that electricity supply is not an end in itself. Electricity is needed by all sectors of society and this imposes a responsibility that the price of electricity is no higher than the cost that consumers can carry. For example, if the price for electricity is too high and this causes a user to cease operations (eg a regional manufacturer) the effect of the high electricity prices will result in unemployment and severe disadvantage to that region's economy. So seeking high economic efficiency in the electricity market might lead to a significant loss of efficiency in other sectors and impact the national productivity.

While MEU members do get involved in responding to electricity market signals, by reducing demand when signals indicate a need, they also report that to be active in demand response is not a costless exercise and that a direct outcome of their involvement is a loss of productivity in their operations. It is a major concern of the MEU and its members that there is an attitude that the efficiency of the electricity market is paramount, even if this reduces the productivity of electricity users. The MEU points out that the small gains in productivity seen in the electricity market as a result of demand side activity might well result in a larger loss of productivity when measured nationally.

The AEMC points to the likelihood that demand side responsiveness will increase with 5 minute settlement as this provides benefits from the greater value of the service provided. The MEU points out:

1. Demand side response (DSR) is not a costless exercise, so a view that DSR will deliver lower prices is not correct. At best DSR will obviate a need for new generation investment **if** the cost of the DSR is lower than the cost of new generation
2. Already DSR is incentivised with 30 minute settlement (even that DSR which can be provided under 5 minute settlement). While 5 minute settlement might provide a greater incentive for some DSR, it also removes any incentive and ability to respond to market signals by other DSR.

3. The lack of DSR in the electricity market is not so much a function of settlement period but of other issues associated with a preparedness of consumers to be involved in the market.

While the AEMC opines that 5 minute settlement will deliver more demand side responsiveness, there is no evidence that this will occur in the quantities hoped for. For the amounts of load that might be shed as a result of aggregation of many small providers, the MEU points to the loss of DSR from the numbers of end users that are already active in the NEM but will not be able to deliver reductions in demand within a 5 minute settlement period. That the AEMC has not attempted to quantify the amounts of DSR that will be incentivised by 5 minute settlement or the amounts that will disappear because of it, is of considerable concern

6. The overseas experience

The AEMC states that there are moves in overseas competitive electricity markets to align dispatch and settlement periods. The MEU agrees that there have been some moves in this direction but what is concerning is that most of these are in capacity markets and in the US. A deeper analysis of overseas trends does not provide clear support for the change proposed by the AEMC, and it would appear that the AEMC is entering new territory with its draft decision and there is little overseas experience to show if the change will deliver the benefits that the AEMC assumes will be achieved.

This lack of evidence from other markets that the change will be beneficial is extremely concerning.

The US experience

The AEMC advises that the US energy regulator, the Federal Energy Regulatory Commission (FERC) has mandated a change to align dispatch and settlement period in competitive electricity markets. Of particular note though, is that FERC has **not** stipulated a move to 5 minute settlement although some markets in the US are contemplating such a move.

What is of particular interest regarding the FERC decision is the observation at paragraph 210 (page 115) of the FERC decision[15] on aligning dispatch and settlement periods

> "We reject the proposal to require RTOs/ISOs to conduct a cost-benefit analysis before implementing the settlement reform. The Commission has not previously conducted such analyses when it has considered whether to require various market reforms."

The clear import of the FERC decision is that FERC does not consider that it has the obligation to test the cost versus benefits of such a change.

In contrast, the AEMC is required under the National Electricity Objective (NEO) that it does have a responsibility to demonstrate that the benefits of a change to the rules do outweigh the costs of such a change. Indeed, in other decisions by the AEMC it has carried out cost benefit assessments and has made decisions based on the outcomes of such assessments.

While the MEU does agree that the benefits might well be difficult to quantify, the NEO obligation does impose a requirement that an attempt has to be made, including various tests to provide some confidence that the benefits will exceed

[15] 155 FERC ¶ 61,276, UNITED STATES OF AMERICA, FEDERAL ENERGY REGULATORY COMMISSION 18 CFR Part 35 [Docket No. RM15-24-000; Order No. 825] "Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators" (Issued June 16, 2016)

costs and that the risks have been adequately assessed. As noted in section 2 above, the AEMC has failed to carry out a number of tests and assessments to support its decision to implement the change, despite many stakeholders challenging the AEMC assessments of costs to make the change and the extent of the benefits that might accrue.

The EU experience

Experience in Europe provides valuable insights that should be acknowledged in the determination as to whether settlement and dispatch should be aligned the benefits that will result

Efforts to improve efficiency of arrangements across Europe have included proposals to harmonise specific elements of market rules in each country. This includes suggested alignment of the imbalance settlement period to be 15 minutes. This is from a baseline in which settlement periods across the relevant markets vary and are 15 minutes, 30 minutes or 60 minutes in duration. Harmonisation to 15 minutes would require shortening of the settlement period in over 20 markets of around 30 markets in all.

A cost-benefit analysis (CBA) was performed to inform the appropriateness of this proposal[16]. In concluding that '**the net benefits could be either weakly positive or strongly negative**', the CBA presents a far from compelling case for progressing the change. The cost associated with updating/replacing metering assets and associated systems to operate at shorter intervals is one of the main drivers for the CBA outcome. These costs are estimated to be significant, comfortably outweighing anticipated benefits. Net benefits are estimated to remain negative or, at best, be only marginal if an approach based on profiling existing metering data into shorter intervals were to be adopted as an alternative.

What is highlighted by the experience in Europe is the need to get a good handle on the costs and benefits of this type of rule change. The European analysis shows that costs, particularly relating to metering changes, can significantly outweigh potential benefits. This cannot be ignored in the context of this proposed change to the NEM arrangements. This point about the costs has been made by a number of stakeholders during the assessment process for the 5 minute settlement rule change.

Despite the CBA, the latest European Commission proposals retain the objective for 15 minute imbalance settlement periods[17]. But, perhaps in a nod to the practicalities, the timeline for convergence to 15 minute imbalance settlement periods proposes implementation by 2025, well beyond the timeframe proposed by the AEMC. Part of the rationale for this is that it aligns

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[16] Frontier Economics was commissioned to prepare the CBA. The results can be found at: https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/CBA_ISP/ISP_CBA_Final_report_29-04-2016_v4.1.pdf

[17] See Article 7 (4) of proposal for Regulation on the internal electricity market for electricity at: https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v9.pdf

better with timelines for existing smart meter rollout programmes, and so lessens the incremental costs of settlement period harmonisation. These proposals are still being assessed and negotiated, however, so this is not yet a done deal!

The EU experience and assessment of costs and benefits is salutary for the AEMC assessment, especially as the NEM still has extensive numbers of end users metered by accumulation meters. The AEMC points out that there will be a need to develop profiling of consumer use of electricity to enable the change to 5 minute settlement. AS noted in section 5 above, profiling of large amounts of electricity to large numbers of end users reduces the incentive for those consumers profiled to provide demand side responses

The UK experience

The MEU points out that the UK has in the recent past examined in depth the issue of 30 minute settlement and the challenges that this causes to an electricity market.

Ofgem implemented a review of better implementation of flexible sources of supply in the GB electricity system. This work commenced in 2014 with an examination of the settlement period to be used throughout the market. Ofgem opined that[18]

> "We consider it is in consumers' interests to be settled using half-hourly consumption data from smart meters. In 2014, we commissioned an expert group to explore how this could be achieved."

Ofgem released a report "Upgrading our energy system Smart Systems and Flexibility Plan" in July 2017[19].In this report Ofgem comments (page 4)

> "Our energy system is changing. There is more low carbon generation, much of it located close to people's homes and businesses, and it produces different amounts of electricity depending on factors like the time of day or the weather. New technologies such as storage are emerging and the costs of many of these technologies are falling rapidly. If we take advantage of the opportunities this provides, we can create new businesses and jobs, empower consumers and help people save up to £40bn off their energy bills in the coming decades."

This could just as well have been written about the NEM.

But even more interesting is that Ofgem has based this target on mandatory 30 minute settlement, the same as the NEM operates on now.

However, what is important about the Ofgem approach is that Ofgem did not consider a move to 5 minute settlement, but was satisfied that 30 minute settlement was adequate and appropriate for the needs of the market.

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[18] See https://www.ofgem.gov.uk/electricity/retail-market/market-review-and-reform/smarter-markets-programme/electricity-settlement

[19] Available at https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan

Appendix 1

Commentary on NEM issues by the Federal Minister for Environment and Energy in the Australian Financial Review Oct 9 2017 at 12:00 AM

Energy policy barbecue-stopper requires a multi-faceted plan

by **Josh Frydenberg**

Complex energy policy is no longer an academic issue fought out between regulators and big energy companies but rather a barbecue-stopper, with everyone looking for answers.

This is because Australia's electricity prices have risen sharply and people are worried about the stability of the system.

A decade ago under John Howard, prices were the fifth-lowest in the OECD. We have since have climbed 13 spots to be the 12th highest.

It's a ladder you don't want to be climbing, particularly as it hits our lowest-income households the hardest. The bottom 20 per cent spend five times more on electricity as a proportion of their disposable income than the top 20 per cent.

A weaker network

The resilience of our network has also weakened, with load-shedding and blackouts in South Australia and significant stress at peak demand in both NSW and Victoria.

The reality we must face is that the National Electricity Market, which began in 1998 and served us well for nearly 20 years, is no longer doing so.

With a changing energy mix, supply and demand is much harder to predict, and the pricing and dispatch model, which was predicated on marginal cost bidding by generators, is now less suited to the times.

In an energy-only market, large amounts of wind and solar produce low wholesale prices when they are running, but very high prices when they are not. This volatility creates an uncertain investment climate and makes it more difficult for synchronous generators to recover their fixed costs and remain commercially viable.

It is in this brave new world of disruptive technology and the empowerment of consumers that the Turnbull government is implementing its energy plan.

Faith in well-regulated markets

The principles that guide our plan include faith in well-regulated markets and an abiding commitment to innovation and harnessing new technology to benefit the consumer.

That is why we abolished the Limited Merits Review process and boosted the independent regulator, the AER.

That is why we called in the retailers and agreed with them a wide range of changes to improve transparency and provide timely information in plain English to customers so that they can get the best deals.

That is why we've implemented the most significant reforms to gas pipeline markets in more than two decades, introducing compulsory arbitration in the absence of an agreement between pipeliners and producers.

There is more to be done. We are concerned about market concentration.

Concentrations of power

In each region of the NEM, the two or three biggest generators between them control more than 70 per cent of capacity and dispatched energy. This has been increasing over time. In 2009, the big three – AGL, EnergyAustralia and Origin – had 15 per cent of generation capacity in the NEM between them. Today, it's nearly 50 per cent.

This concentration can affect bidding behaviour, as the companies know their market dominance guarantees dispatch regardless of price.

This is why I have asked the AER to investigate bidding practices by generators with a particular focus on New South Wales. I look forward to receiving their initial findings in November.

Another area where the current market design needs reform is around reliability.

Following the closure of Hazelwood and Northern coal-fired power stations, wholesale price volatility has increased enormously.

For example, in South Australia, the number of price events above $200 a megawatt hour or below negative $100 a megawatt hour (which is due to the intermittency of wind generation) has increased by 400 per cent in just the last two years.

Getting the right advice

It is in this context that the Turnbull government commissioned AEMO to provide advice on the adequacy of existing and future dispatchable resources and what action could be taken to fix any shortfall.

The response was unequivocal. Strategic reserves as recommended by the Finkel Review are needed in the short term, together with an appreciation that the closure of Liddell, scheduled for 2022, would leave a shortfall of 1000 megawatts of dispatchable capacity.

In the longer term, the solution AEMO suggested could be provided by a yet-to-be-specified extended market design change. This could include, "demand-side markets, day-ahead commitments, the articulation of a generator reliability obligation and further approaches to gaining investment in flexible capacity".

The second key principle is the Coalition's commitment to innovation and harnessing new technology.

Just as the mobile phone disrupted the landline and the digital camera superseded film, the energy market is being shaped by the internet of things; behind-the-meter

technology such as solar PV and storage; demand-side responses; and increasingly cost-effective utility-scale renewable generation.

Costs fall all the time

Globally in the past seven years, the cost of wind generation has more than halved. Domestically, solar PV costs have dropped more than 50 per cent. By 2020, costs of battery technologies are expected to fall 40 to 60 per cent and, by 2030, over 70 per cent.

It is against this backdrop of a declining cost curve for renewables and storage, greater efficiencies in thermal generation and the need for sufficient dispatchable power in the system that we are considering the Finkel Review's 50th recommendation – a Clean Energy Target – to which we'll respond before the end of the year.

It's a well-worn aphorism that it often takes longer to fix problems than to create them. With respect to Australia's energy policy, we all must ensure that this is not the case.

Our approach in government has been and will be to seek out the best advice from the expert market bodies and use that input to frame our actions.

The actions we are taking cover gas supply, wholesale market structures, integrated energy and climate policy, network regulation and retail competition. They deal with both the immediate priorities as well as preparing for the long term.

We intend to work with the states and territories to deliver our plan.

If energy policy was easy it wouldn't be the barbecue-stopper it is today. The good news is that we have learned the lessons of the past, we know where we are going and we have a comprehensive plan to get there.

Josh Frydenberg is the federal Minister for the Environment and Energy

AFR Contributor