SUBMISSION

ESB POST 2025 MARKET DESIGN ISSUES PAPER
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EUAA
Energy Users Association of Australia

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INTRODUCTION

The Energy Users Association of Australia (EUAA) is the peak body representing Australian commercial and industrial energy users. Our membership covers a broad cross section of the Australian economy including significant retail, manufacturing and materials processing industries. Combined our members employ over 1 million Australians, pay billions in energy bills every year and want to see all parts of the energy supply chain making their contribution to the National Electricity Objective.

Over the last 10 years, our members have been under increasing stress due to escalating energy costs. These increased costs are either absorbed by the business, making it more difficult to maintain existing levels of employment or passed through to consumers in the form of increases in the prices paid for many everyday items. Low energy cost was once a competitive advantage for Australia's industrial and manufacturing sector, an advantage that appears to have been tragically squandered. We maintain hope that with the right long-term policy settings and appropriate government support, this competitive advantage can be regained after a number of false starts.

Therefore, it is with a strong sense of Deja Vu that we welcome the opportunity to make a submission to the Energy Security Board (ESB) Post 2025 Market Design Issues Paper. There seems to be striking similarities between the work being done on a post 2025 market design and the Finkel Review that was completed in June 2017.

While many of the Finkel Review recommendations have either been implemented or are in the process of being implemented, given the highly disjointed nature of the policy response to date (at both state and federal level), the core issue of the best approach to managing the "Energy Trilemma" of price, reliability and emissions, remains largely unresolved. When this is combined with an ever-accelerating transition of our energy system, new risks and challenges for all market participants continue to be created.

Running parallel to the issues raised in this discussion paper are a number of significant processes that continue to evolve including the AEMO Integrated System Plan (ISP) and the AEMC Coordination of Generation and Transmission Investment (COGATI), the AER Value of Customer Reliability (VCR) review and the proposed Wholesale Demand Response Market. These major reform processes continue to move ahead while other recommendations from Finkel Review and ACCC Retail Electricity Markets Review continue to be rolled out.

All of this parallel work will drive significant change in energy markets at a time when the post 2025 model, which has to be finalised by end of 2020, is occurring including 5-minute settlement, retailer reliability obligation, wholesale demand response market and outcomes from the current AEMC COGATI program including nodal pricing and transmission hedges.

While we acknowledge that the ESB has also recognised these parallel work programs we want to emphasise the importance of timing and coordination of the various reforms being considered. We would be disappointed to see further confusion created by overlapping agendas and poor coordination.

Consumers themselves have been reacting to government incentives, significant increases in network costs, a volatile wholesale market and perceived poor service from retail participants to install behind the meter technologies such as solar PV in record numbers. Increasing penetration of batteries and the emergence of electric vehicles will add additional complexity and costs to managing the energy system.

Many EUAA members have also sought out non-traditional suppliers of energy through corporate power purchase agreements with renewable energy suppliers and are looking to invest in energy efficiency, on-site generation and demand response capability. This growing "non-network" solutions sector is rapidly evolving driven by improving technology, reducing costs and a desire to reduce exposure to the traditional players whom they believe have not served their long-term interests. Feedback from energy users also indicates that faith in our regulatory bodies has been shaken in recent years. Examples that energy users point to as failures of a system designed to protect their long-term interest include:

- While the recent trend has been for reductions in network charges, the perception remains that the system has failed to alter the default reaction to overbuild the energy system while leaving consumers to carry a majority of cost and risk.
- The inability to manage concentration of market power and measures to improve wholesale market competition.
- The reluctance to assist in the progression of rule changes that may advantage customers.
- A lack of transparency and opaque management of system security that only seems to result in higher costs for energy users with little demonstrated additional benefit.
- A disjointed, poorly coordinated and at times contradictory approach by governments to energy policy.

Perceived or real, these issues undermine energy user confidence that regulatory bodies, policy makers and market participants can be trusted to coordinate the roll out of generation and transmission investment over the coming decades in a way that doesn't leave them carrying the risk and cost of poor investment decisions by others. On behalf of our members, we suggest that continuing on with a status quo approach that is not serving the long-term interests of consumers is not an option.

In the context of the ESB Post 2025 Market Design Issues paper, we recommend action is required that:

- Maintains the primacy of the energy only market but considers future appropriate additions to work alongside it including a form of capacity market should the need become compelling.
- Recognises and accepts that the transition of energy markets is inevitable.
- Recognises that a key pillar of future market design must consider a price on carbon, either explicitly through an emissions trading regime or implicitly through risk weighted investments being made by participants. Within this context, recognising the financial risks of climate change and the fiduciary responsibilities of directors is critical.
- Assumes governments, for a variety of reasons, will continue to be an active participant in energy markets. This being the case, governments must be very clear about their investment and operational intentions, put in place sound corporate governance practices and commit to the highest level of transparency to provide non-government investors with a level of certainty regarding the future investment environment.
- Strikes the most appropriate balance between market based and central control approaches to the energy transition.
- Provides the most appropriate combination of policy, regulation and government assistance to deliver the technologies that the new market requires.
- Contemplates a new approach to network cost recovery that re-allocates risk and cost of re-wiring the grid more equitably than is currently the case.

The body of this submission will explore a number of concepts that have been central to EUAA advocacy in recent years. These concepts provide an outline of the nature of change occurring in energy markets and the key areas that governments and regulators should be focussing on to deliver better outcomes for energy users. We also provide brief responses to the questions asked in the issues paper.

MISSED OPPORTUNITIES

The political and policy landscape of the last decade is littered with missed opportunities to develop a long-term transition plan for the NEM. We detail three such missed opportunities in the section, each of which would have provided guidance, stability and lower risk for market participants, investors and energy users than we currently face today.

A Price on Carbon and Emission Trading

While we recognise this is not within the scope of the ESB, we believe it is in Australia's best interests to be part of a global climate change solution that minimises overall costs of decarbonisation of its economy and takes advantage of new technological and economic opportunities. To ensure the transition to low carbon energy market is both economically and environmentally efficient, investment grade policy is required.

The EUAA is supportive of the existing targets set out under the Paris Agreement being a 26% to 28% reduction on 2005 levels by 2030. This is consistent in scope and timeframe with targets agreed by other parties to the Paris Agreement. Future, higher emissions reduction targets must continue to be consistent in scope and timeframe with targets agreed by parties under future international agreements.

Therefore, central to any 2025 market design must be the consideration of the inevitable decarbonisation of the energy sector. This must be supported by a clearly defined emissions trading scheme that delivers an unambiguous price on carbon. This is what owners, operators and investors in energy generation are looking for in order to make the long-term investments in energy infrastructure that we so desperately need.

While aspects of the now defunct emissions trading scheme such as restrictions on international permits and the initial fixed price, were not our preferred approach we believe that its removal has resulted in a rudderless energy market, increased risks for investors and higher costs for consumers. It has also created an environment where state governments have stepped into the policy vacuum, filling it with a kaleidoscope of energy and climate change policies that have been poorly coordinated and overly generous, resulting in an unsustainable boom-bust cycle while lacking in any real consideration of the consequences these policies have on system security, reliability and controllability.

Finkel Review and the Clean Energy Target

In response to growing concerns over the state of the Australian electricity market, brought into sharp focus by the system black event in South Australia, the Federal Government tasked Chief Scientist Alan Finkel with developing a blueprint for the energy transition. Following extensive consultation and a period rigorous analysis, the Finkel Review produced its final report that was presented to COAG Energy Ministers in June 2017.

The key theme of this review was the "Energy Trilemma" of cost, reliability and emissions. The Finkel Review made 50 recommendations that would lead to the most effective means of managing this trilemma. As we know, all bar one of these recommendations was accepted by the Federal Government which has resulted in the establishment of the Energy Security Board and an intense period of reform.

Below is an extract from the Finkel Review Final Report[1] that outlines the need for an economy wide emissions strategy, underpinned by a Clean Energy Target, that should have been the centrepiece of the orderly transition and resolution of the energy trilemma. Unfortunately, the CET was rejected by the Federal Government and as a result a second opportunity was missed to implement a long-term transition plan for the NEM.

[1] https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future

A reliable and low emissions future – the need for an orderly transition	
3.1	By 2020, the Australian Government should develop a whole-of-economy emissions reduction strategy for 2050.
3.2	There is an urgent need for a clear and early decision to implement an **Orderly Transition** that includes an agreed emissions reduction trajectory, a credible and enduring emissions reduction mechanism and an obligation for generators to provide adequate notice of closure. • The Panel **recommends** that the Australian and State and Territory governments agree to an emissions reduction trajectory for the National Electricity Market. • Both a Clean Energy Target and an Emissions Intensity Scheme are credible emissions reduction mechanisms because they minimise costs for consumers, are flexible and adaptable, and satisfy security and reliability criteria. Both mechanisms are shown to deliver better price outcomes than business as usual. With the additional context that a Clean Energy Target can be implemented within an already well understood and functioning framework, and has better price outcomes, the Panel **recommends** a Clean Energy Target be adopted. • To support the orderly transition, the Panel **recommends** a requirement for all large generators to provide at least three years' notice prior to closure. The Australian Energy Market Operator should also maintain and publish a register of long-term expected closure dates for large generators. These recommendations are made in the context of the need for a Generator Reliability Obligation and the Energy Security Obligations. (Recommendations 3.3 and 2.1).
3.3	To complement the orderly transition policy package, by mid-2018 the Australian Energy Market Commission and the Australian Energy Market Operator should develop and implement a **Generator Reliability Obligation**. The Generator Reliability Obligation should include undertaking a forward looking regional reliability assessment, taking into account emerging system needs, to inform requirements on new generators to ensure adequate dispatchable capacity is present in each region.

The following charts, also taken from the Finkel Review Final Report show that not only would average NEM prices would be lower under the CET but a higher percentage of existing dispatchable capacity would remain in the NEM, driven by new system reliability and stability obligations on renewable energy generators.

Figure 3.6: Industrial price, NEM average 2017 to 2050[177]

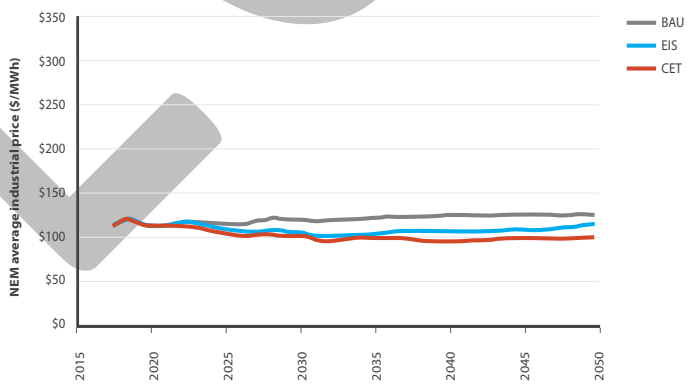


Chart Source: Finkel Review Final Report: Page 94.[2]

[2] https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future

Figure 3.10: Forecast NEM capacity mix, dispatchable, variable, rooftop PV[189]

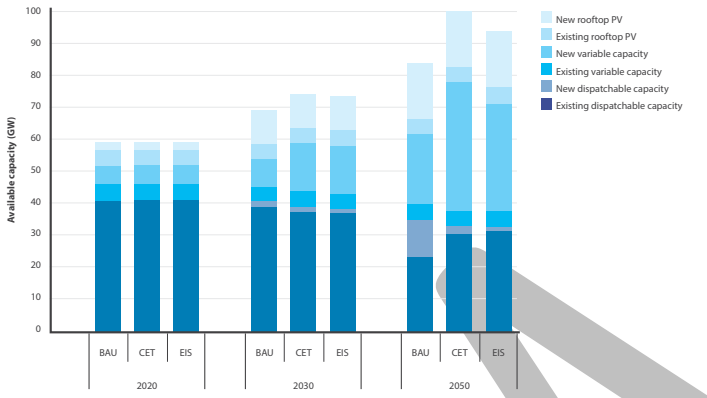


Chart Source: Finkel Review Final Report: Page 99.[3]

National Energy Guarantee and Reliability

The EUAA was supportive of the National Energy Guarantee (NEG). While recognising it wasn't perfect it was certainly a step in the right direction as it provided a foundation for both least cost emissions reduction and investment in new generation while providing a market-based framework for investment in flexible technologies to manage reliability and system stability.

Since its demise, work has been carried on to deliver the reliability guarantee elements of the NEG, predominantly in the form of the Retailer Reliability Obligation (RRO) and to a lesser extent the Market Liquidity Obligation (MLO).

We will need to see the RRO and MLO in operation over the next few years to tell if the reliability aspect of the NEG is successful as a solo act. Complicating this will be the emergence of the Wholesale Demand Response Market, the increased instance of AEMO triggering the RERT mechanism and the potential creation of a strategic reserve. While working at different ends of the issue, all of these elements work to reduce the likelihood of supply falling short of demand.

Again, only time will tell if these mechanisms are sufficient to bring about investment in new resources (either supply or demand) and we would recommend that the impact of these be fully understood before decisions are made on significant changes to the NEM. Continued government participation in energy markets to directly influence deployment of technology and the medium-term price of gas for peaking generation are other key areas for the ESB to keep a close eye on.

CAPACITY MARKETS

There is a suggestion that the National Electricity Market (NEM) is irreparably damaged and that the only way to resolve a perceived reliability problem is to move away from an energy only market to embrace a capacity market. While a capacity market will support investment in new dispatchable capacity it is likely these assets will be used infrequently (i.e. between 5 to 10 times per year) while attracting both a standby fee plus a fee for service when dispatched.

Essentially, capacity markets are a form of insurance product and should not be pursued without careful consideration. At the very least, the primacy of the energy only market must be maintained while leaving open the prospect of capacity type elements to be added at a later stage.

The Finkel Review had this to say on capacity markets on page 83 of the Final Report:

[3] https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future

A capacity market is a significant market reform, which would require a long-term and costly departure from the existing market framework. Such a reform should only be considered in circumstances of irresolvable failure of the energy-only market to bring forward sufficient new capacity to ensure reliability. Given the more immediate nature of the reliability concerns facing the NEM, as well as the adequacy of other policy reforms available, the Panel does not believe a move to a competitive capacity market to be appropriate at this time.[4]

Since the Finkel Review a number of initiatives have been put in place (or are in the process of being put in place) that begin to address the need for additional dispatchable capacity and grid stability.

These include:

- AEMO Reliability and Emergency Reserve Trader (RERT) mechanism which has been a safety-net feature of the NEM for many years without being used until the 2017/2018 summer at an approximate cost of $50 million. It was triggered again in the 2018/2019 summer at an approximate cost of $30 million and is likely to be triggered again in the 2019/2020 summer.
- Retailer Reliability Obligation (RRO).
- Wholesale Day Ahead Demand Response Market.
- Increased grid stability obligations placed on renewable energy generators.
- Consideration being given to AEMO developing a "strategic reserve" that would act as a regulated capacity response.

In addition to this, governments have:

- Provided significant funding for the development of pumped hydro (Snow 2.0, Battery of the Nation).
- Announced 12 short listed projects for the UNGI program that total 3,818 MW in new dispatchable capacity.
- Been involvement in supporting diesel generation.

While not ruling out the introduction of some form of capacity market in the future we believe the energy only market must remain and we would encourage energy stakeholders to participate in the existing suite of responses (including demand side participation) to see if they have the desired effect.

THE ENERGY TRANSITION EQUATION

We recommend the ESB consider the following framework as a guide to post 2025 market design and future policy direction.

Traditionally, comparing the cost of energy on a Levelized Cost Of Energy (LCOE) basis was a reasonable method of building an understanding of where technologies were on their cost curve. This helped to inform policies, especially those that sought to drive down the cost of renewable energy such as the Mandatory Renewable Energy Target (MRET) and its various iterations over the last 20 years.

Using LCOE has been a relevant methodology where there was spare capacity in networks so that new entrant generators could connect without the need for significant network investment and where there was spare dispatchable capacity to "firm up" variable supply from renewable generation.

In 2019, this is no longer the case. Today we are faced with the need to make significant network investment to bring new generation capacity to market and to facilitate a two-way grid as energy users are now both consuming and dispatching energy. We are also faced with a diminishing volume of dispatchable generation as legacy coal fired power stations come to the end of their economic life. This also comes at a time where the cost of gas has increased significantly meaning that energy produced by our fleet of gas fired power stations, needed predominantly to balance out increasing penetration of renewable energy, has also gone up.

[4] https://www.energy.gov.au/publications/independent-review-future-security-national-electricity-market-blueprint-future

The EUAA have looked at this situation carefully and have concluded that in order to grapple with this paradigm shift we need to solve what we call the "energy transition equation". This equation being the cost of energy + the cost of system balancing + the cost of grid infrastructure. When added together this equals the total system cost of the energy transition we are in the midst of. Understanding total system cost is critical to consumers as that is the number that appears on their monthly bill. Equally, understanding what is required to drive down costs of the individual components of the energy transition equation will help guide policy, regulation and targeted government support.

LCOE

Given new build renewable energy is now cheaper than the alternatives it could be argued the energy cost component has already been solved. This being the case we would argue that no additional subsidy schemes are required, which is a great outcome for energy consumers and a further sign of a maturing industry.

What is required is a long-term approach to policy and regulation that seeks to reduce investor risk and support appropriate investment in transformative technology. This should be informed and indeed harness investor trends where there is a clear preference for clean technologies. While it may be politically difficult, an economy wide price on carbon with appropriate transition arrangements and with links to international carbon markets is central to achieving this goal.

System Balancing

Clearly, greater effort to accelerate the deployment of technologies that "firm up" variable renewable energy and balance the energy system must be the new priority. Governments are already playing a role in this through Snowy 2.0 and the Underwriting New Generation Investment (UNGI) program.

The chart below is taken from the CSIRO Total GenCost Report, released in December 2018 which provides an estimate of the total generation cost (LCOE plus firming) of renewable energy compared to a range of other generation technologies in 2040.[5]

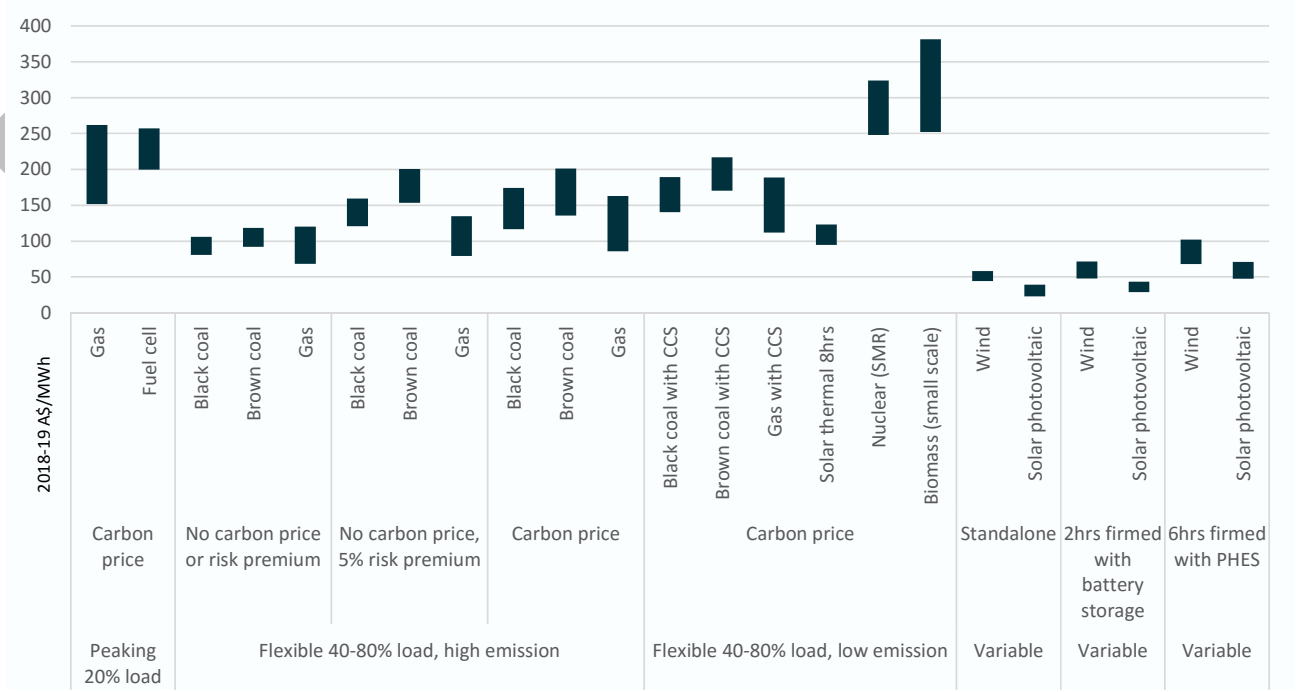


Figure 4-4: Calculated LCOE by technology and category for 2040

[5] https://publications.csiro.au/rpr/download?pid=csiro:EP189502&dsid=DS1

It is clear from this work that in 2040, renewable energy with storage delivers the lowest cost generation outcome. Therefore, we suggest that every effort should be made to accelerate the cost reduction of these energy balancing technologies with the goal of achieving the 2040 cost projections by 2030. This would also align with the closure of a significant amount of legacy coal fired capacity. We recognise a suite of measures are already being pursued (see our comments om Capacity Markets) and recommend that we fully understand the impact of these before making additional, substantial changes.

A discussion on system balancing would be incomplete without discussion the role of gas. Given the highly flexible nature of gas fired power stations they must be seen a playing a significant role in an energy system progressively dominated by variable renewable energy.

Grid Augmentation

The final element of the energy transition equation is grid costs. Historically, consumers would pay all the costs and essentially take much of the risk of upgrades to the grid. However, historically the entire energy system was state-owned where a majority of the benefits were returned to customers and taxpayers. With privatisation of the energy industry this is no longer the case, so costs and risks need to be shared between all those who receive benefit, including renewable energy companies seeking to connect to the shared energy system. Consumers are happy to help pay but are also looking for everyone else to pay their way as well.

For example, many of the assets identified in the AEMO ISP will help facilitate the introduction of new generation including variable renewable energy and access to firming capacity required to balance the system. This new generation, being privately owned and operated, is set to gain significant financial benefit from these assets while consumers cover the cost associated with this access.

The EUAA made a substantial submission to the AEMC COGATI process in October 2018 on this issue. It must be recognised that consumers have no control over the financial viability or operation of these assets but are currently expected to carry the cost, volume and technology risks. While consumers may receive some benefit from new transmission assets, given the fluctuating nature of the energy market and the risks involved, these benefits may be fleeting at best. In any case, the principle of only paying for that benefit that is reliably received should guide future cost and risk allocation in this area.

Therefore, we firmly believe these commercial entities should make a reasonable co-contribution to the cost and maintenance of these assets. We recognise that moving to a form of generator co-contribution could result in slightly higher contract prices (i.e. PPA's) as project proponents seek to recover these additional costs. So yes, while the customer will always pay we should not continue to be asked to absorb aspects of project risks and costs that we have no control over or be faced with paying "full weight" for underutilised assets. Further, we contend that exposing more network costs to open markets and competition will drive better outcomes for consumers compared to a regulated environment that, despite good intentions to deliver a result that replicates a competitive market outcome, has not always proven to be so.

Transmission Hedging

We are supportive of the transmission hedging concept currently being developed by the AEMC as part of the COGATI reform process. The creation of transmission hedging as a market-based means of resolving congestion, managing MLF risk and potentially creating a sufficient revenue stream to help off-set transmission costs (in doing so reduce consumer costs and exposure to risk), is a reform worth pursuing.

The EUAA have been a constant voice arguing for a mechanism or mechanisms by which the costs and risks associated with new transmission infrastructure can be allocated in a more equitable way. We welcome this initiative from the AEMC and look forward to further consultation.

For the EUAA, the key questions regarding transmission hedging are:

1. To what extent will transmission hedges (working with dynamic regional pricing) provide sufficient incentive for generators to resolve congestion on existing assets and for transmission providers to invest in marginal grid augmentation.
2. To what extent will transmission hedges (working with dynamic regional pricing) provide sufficient incentive for generators and transmission providers to invest in new grid infrastructure such as Renewable Energy Zones (REZ).

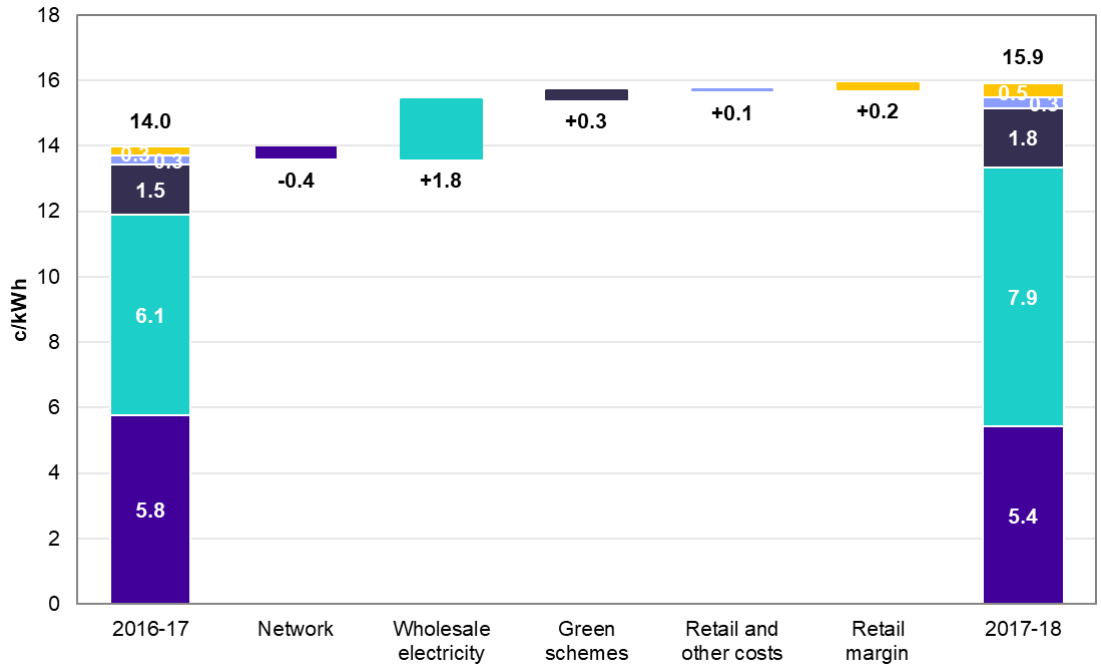
Our initial reaction is that dynamic regional pricing and transmission hedges may prove useful to resolve issues associated with existing assets and provide sufficient incentives for investment. This type of incremental investment tends to be of lower capital value (although not insignificant) and is already largely close to fully utilised (as evidenced by congestion driving the investment).

However, given the significant risks associated with investment in new transmission assets of the nature identified in the AEMO ISP, we are not sure these reforms will provide sufficient incentive. It may be that the risks of committing to such large, long-term investments for all stakeholders is too great, requiring some level of state and federal government support through measures such as capital support or asset underwriting.

WHOLESALE MARKET COMPETITION

As shown in the chart below taken from the most recent ACCC National Electricity Market Report[6], wholesale electricity costs continue to be the dominant driver of increased cost for C&I consumers.

Figure 4.23: Change in average C&I customer effective prices (c/kWh) from 2016–17 to 2017–18, NEM-wide, real $2017–18, excluding GST



Source: ACCC analysis based on retailers' data.

[6] https://www.accc.gov.au/publications/inquiry-into-the-national-electricity-market-august-2019-report

We note that the ACCC states "While we have not undertaken a detailed analysis of wholesale costs for this report, we intend to in future reports." We welcome this increased focus by the ACCC on wholesale competition and recognise the important role they have played in the gas sector to diminish the impact of information asymmetry leading to improved outcomes for consumers. We suggest that the post 2025 market design incorporate recommendations by the ACCC on wholesale market competition once their reviews is complete.

While there are many issues impacting on the wholesale cost of energy, increasing competition in wholesale markets should also be a focus of the post 2025 market design. Competition can come from increasing both supply side and demand side participation and in this regard we are supportive of the Wholesale Demand Response rule change that is currently being considered by the AEMC. We think this is an important component of providing consumers with more control and greater choice. Further efforts to empower the consumer should be a consideration of the post 2025 market design.

We also recognise the efforts by the Federal Government to stimulate more supply side participation/competition through the Underwriting New Generation Investment (UNGI) program and note the following statement from the ACCC on page 15 of their most recent National Electricity Market Report[7].

> The Australian Government is developing a program for encouraging investment in new generation and has shortlisted twelve projects with a combined capacity of 3818 MW and a range of fuel types.
>
> We maintain the view that the scheme will be most effective if: it facilitates new entrants into the wholesale market and does not further entrench the market position of established players; the level of support from government is only sufficient to provide certainty for debt financing and does not underwrite equity; and projects have firm commitments from customers to acquire energy from the project.

We concur with this view and look forward to the Federal Government releasing further program details. A well designed UNGI program could be a good example of government playing a positive role in reducing investor risk, encouraging new entrants and increasing wholesale market competition and is a preferable approach over "big sticks".

[7] https://www.accc.gov.au/publications/inquiry-into-the-national-electricity-market-august-2019-report

RESPONSES TO QUESTIONS RAISED IN THE ISSUES PAPER

Response to questions asked on page 12 of the discussion paper.

QUESTION	EUAA RESPONSE
What scenarios and shocks should be used? How should these be used to test market designs?	Using ISP scenarios as a starting point is reasonable provided AEMO continue to consult widely and improve transparency. The impact of prolonged period of high gas prices must be considered. The impact that hydrogen may have on storage and dispatchable energy technologies should also be considered including the impact of rapid decline in cost. Impact of wholesale demand response market and acceleration of "prosumers" are potential shocks to traditional market design. A scenario that contemplates "demand destruction" where significant portions of heavy industry exit the market in response to both high gas and high electricity costs.
How can market and economic modelling best be used to evaluate individual components of market design or the end-to-end market design?	The CSIRO Total Generation Cost analysis is a very useful starting point for the expected cost curves for various generation technologies including "firmed" renewables. We recommend the ESB utilise this work. In addition, we would recommend that the Total Generation Cost analysis be combined with the economic analysis that accompanies the ISP with a view to understanding what the total system cost of the transition is likely to be. This should be set against a counterfactual of simply replacing fossil fuel generation in a "like for like" scenario along with a scenario that includes nuclear power as part of the generation mix.
Is the assessment framework appropriate to evaluate the effectiveness of future market designs? What else should be considered for inclusion in the assessment framework?	We fully support the overarching principle that the outcome should be in the long-term interests of consumers, consistent with the National Electricity Objective. It should also consider Value of Customer Reliability and the existing Reliability Standard in this consideration. We also support the potential principles outlined on page 12 of the Issues Paper with emphasis on principles D (cost allocation), E (risk allocation), F (transparency and simplicity and G (consumer empowerment).

Questions asked on page 29 of the discussion paper.

QUESTION	EUAA RESPONSE
Have we identified all of the potential challenges and risks to the current market? If not, what would you add?	We agree with the potential challenges and risks identified in the Issues Paper. We would emphasise that governments are likely to remain involved in the market given price pressures and the essential nature of the service. We would also raise the prospect that the risks associated with building long-lived assets in a highly changeable and huge risk environment may be too great for non-government investors to manage alone. The evolving "two way" nature of the grid will progressively pose increasingly greater challenges on network management with the balance of costs paid by the least able to afford it. The absence of a long-term emissions reduction framework and explicit price on carbon is a key challenge to investment in energy infrastructure including demand side investment. The ongoing high cost of gas and potential supply issues create either remove a key firming technology or at the very least make it more expensive than it otherwise should be. Finally, resisting further concentration of market power as the energy market evolves will be a significant challenge. Ensuring that the energy market provides opportunities for new entrants and enhanced competition, which should involve carrots as opposed to "big sticks".
Which of these challenges and risks will be most material when considering future market designs and why?	The absence of a long-term emissions reduction framework and explicit price on carbon is a key challenge to investment in energy infrastructure including demand side investment. Without this, the energy market is lacking a key pillar and clear means by which to quantify and price risk into future investment. The "re-wiring" of the grid poses one of the biggest challenges given the rapidly changing nature of "behind the meter" technology and the need to access renewable energy resources located in remote locations.
Which (if any) overseas electricity markets offer useful examples of how to, or how not to, respond to the challenges outlined in this paper?	Unlike Europe or the United States, Australia is in a unique position in that we have a relatively concentrated population that is connected to traditional generation via a long, highly exposed grid. We have limited ability to "borrow" a wide variety of generation type from a neighbour country or state and therefore most largely "self-solve" this problem. There may be useful lessons from co-contribution to network costs from other jurisdictions along with examples of capacity, day ahead and demand response markets that could be adapted to the Australian context.