Response to ESB Post 2025 Market Design Issues Paper

1 Key messages and overview

1. Future NEM market models need to focus on:
    a. likely real-world customer outcomes, not theoretical ones;
    b. minimising whole of system costs for customers by enhancing wholesale energy competition and enabling efficient transmission investment; and
    c. approaches that allow all customers to access the savings, choices and value created by distributed energy technologies, like solar, batteries and electric vehicles.
2. Review should recognise the benefits to customers of a stable, investable and incentive-based economic regulatory regime.
    a. Within this, it is appropriate for the review to seek to progress regulatory innovations that build on existing strengths - such as TOTEX approaches and reforms to promote more customer/network 'negotiated' style determinations.
3. Any proposed reforms need to be coordinated and compatible with COGATI reforms.
4. Review scope should be focused on adding value in specific priority areas, rather than seeking to be broad but less applicable.

2 Scope of Post 2025 Project

The Issues Paper identifies that the scope assigned from the COAG Energy Council Terms of Reference is broad.

Energy network businesses consider that the scope of the review should be focused on making significant contributions to address current and potential structural issues which are likely to impact on the effective operation of the market design.

As a range of existing review processes discussed by the *Issues Paper* are underway, interlinkages between the ESB's review work and current processes will need to be transparently managed. The *Issues Paper* usefully highlights the range of potential related initiatives. Throughout the review process it may be of significant benefit if further clarity is provided in each case about how each of these related initiatives are envisaged or assumed to interact with the Post 2025 review.

As an example, on a specific issue it may be envisioned that an output from a current review will formally form the assumed basis of the pre-2025 market design, or that an element of a current review is an interim first step, until the ESB review delivers higher level guidance and policy design on a question. This will assist in identifying where processes are assumed by the ESB to be 'leading' policy design, versus providing required inputs for the ESB's further consideration.

Energy Network Australia supports the Post 2025 review identifying both key challenges and priority areas within those challenges. The review is most likely to achieve a positive and enduring impact if

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focused on these, rather than a situation in which its resources are spread thinly across a wide range of potential emerging issues. A highly focused approach also minimises the potential for the Post 2025 review to conflict with the still pending final COAG Energy Council responses to a number of broader reviews, such as the Finkel inquiry and ACCC Retail Electricity Pricing Inquiry.

Similarly, in discussing scope issues, the Issues Paper refers in passing to the project needing to contribute to the COAG Energy Council Strategic Energy Plan Outcomes. It is noted that COAG EC has not yet released its agreed Strategic Energy Plan. This means that assessing whether this criterion is met will not be possible for a wide range of stakeholders. These circumstances mean that ensuring coordinated, transparent energy market policy setting should be a central consideration in the review.

3 Proposed analytic approach

3.1.1 Future scenarios and ensuring investability

AEMO's 2020 ISP scenarios provide a reasonable basis for commencing analysis of potential future worlds. The scenarios are the most complete analysis of possible whole-of-system futures for the National Energy Market. Although they are an appropriate base for analysis, the net benefits of electrification in some high demand scenarios will need to carefully take into account evidence around the potential value of decarbonising gas networks and greater use of hydrogen.

Energy Networks Australia supports the concept of looking at relevant financial markets as economic factors impact investability, which must be maintained if customers are to benefit from the transitioning energy sector. As an example, macro-economic and financial market developments such as historically low bond yields and lower inflation can interact in significant ways with the overall investability and performance of current regulatory frameworks.

Figure 1 - 10-year Australian Government Bond Yield

Source: RBA

3.1.2 Putting customer outcomes first

The Post-2025 Review is an opportunity for a balanced assessment of the role of competition and to ensure outcomes for all customers are the focus of reforms. The customer outcomes – what practical benefits the customer is likely to realise under any proposed reform - should be the critical consideration.

This is in line with the National Electricity Objective (NEO) which the Energy Security Board has identified it must satisfy and the National Gas Objective (NGO) which the ESB should equally satisfy. The Energy Security Board in its issues paper rightly notes some of the pro-competition measures undertaken in the past may not have served the majority of customers well.

Recent experience demonstrates the tendency for policymakers to presume that promoting competition is unquestionably the best way to serve the NEO (& NGO) has in many cases not served consumers well. For example, the Power of Choice reforms were regularly described as putting "consumers in the driving seat." It has become clear, however, that the vast majority of energy consumers do not want to be in the driving seat. Absent a significant proportion of active consumers, effective competition has not developed in several key markets and it is no surprise that customers' response has led to a wave of re-regulation.

Markets with truly effective competition are highly likely to deliver on the NEO, but markets with ineffective competition risk delivering far worse consumer outcomes than alternate regulated approaches. To this end, all policies which are introduced that depend on the development of effective competition to deliver customer outcomes should include a regular review process to ensure that effective competition is developing and the policies are meeting customer objectives. This review process should accurately capture customer objectives by undertaking consultation with real customers affected by the introduced policies.

3.1.3 Defining clear assessment criterion

Energy Networks Australia believes that the proposed assessment framework to evaluate market design options is too broad and may be hindered by its criteria. The twelve proposed factors comprise a potentially large amount of overlap and do not provide clarity to the relevance and distinguished importance of each factor.

Energy Networks Australia believes that the NEO and the NGO should be the apex considerations of the post-2025 market design process. The NEO and NGO appropriately and comprehensively represent customer interests and should sit above the twelve proposed factors as an overarching test.

Additionally, some proposed factors are already inherently captured within the considerations of the NEO and NGO and are potentially redundant. For example, allowing effective entry and exit of generating capacity should already be captured by dynamic efficiency. Similarly, the ESB Issues Paper does not make it clear what the role of capital efficiency is and how it is separate from traditional concepts of productive, allocative and dynamic efficiency. This will need to be defined carefully to ensure it does not overlap with traditional efficiency concepts and make assessments tractable.

Energy Networks Australia questions on what basis an assessment of 'robust to possible future government policy changes' could be reached. Although this might be a real consideration for market participants and investment decisions, the scope of such an assessment would be difficult to define. A better approach might be to instead specifically target narrower probable changes such as movements in emissions targets through the medium-term.

4 Energy transition and market design

4.1 Context

Distributed energy resources can be expected to play a role in providing support services to **both** the distribution and transmission systems. But in order to facilitate the provision of these services, regulatory arrangements need to be modified to support access.

There is also the issue of sharing the same distributed energy resource with multiple service purchasers, that is, it is conceivable that a single resource will contract to a DNSP, TNSP and AEMO (noting this may be a cost-efficient approach). In this situation, determining who has priority call on that asset will be critical to ensure security and reliability are maintained.

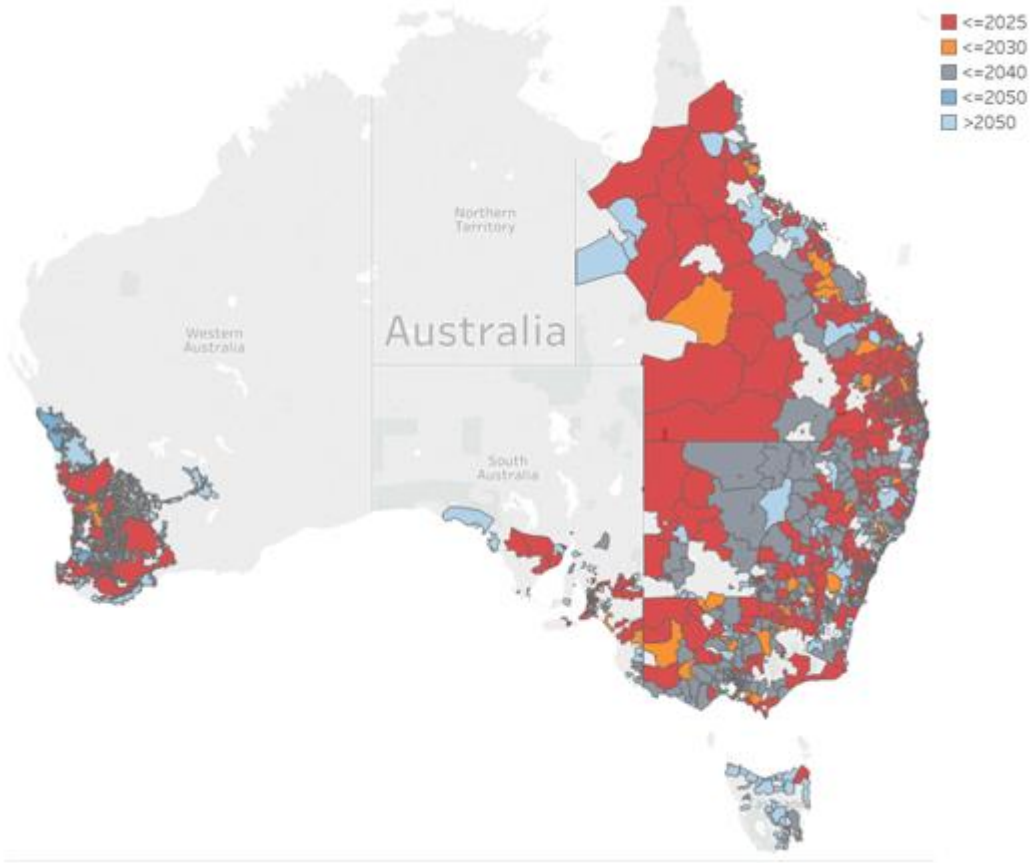
The review may find ENA UK work on shared services of interest in this regard.[1]

Initially, particularly at the distribution level, network services are likely to be via contacts (DNSP/DSO with provider) rather than a market. A market is not needed until there is sufficient volume of both supply and demand for services. This is the approach taken in the UK.

Distributed energy resources can be seen to compete with new generation and transmission, since they will reduce system demand. However, at least initially, distributed energy resources are going to be highly locational resulting in impacts on transmission and generation investment that will also be highly locational and DNSPs will need to share information regarding these impacts so they are integrated into the ISP.

[1] See: http://www.energynetworks.org/assets/files/news/consultation-responses/Consultation%20responses%202016/Demand%20Side%20Response%20Concept%20Paper_revised.pdf

Figure 2 - Projected decade in which zone substations will reach a threshold penetration of rooftop solar adoption (40%),



Source: Electricity Statement of Opportunities, Fast DER uptake scenario (Open Energy Networks 2019)

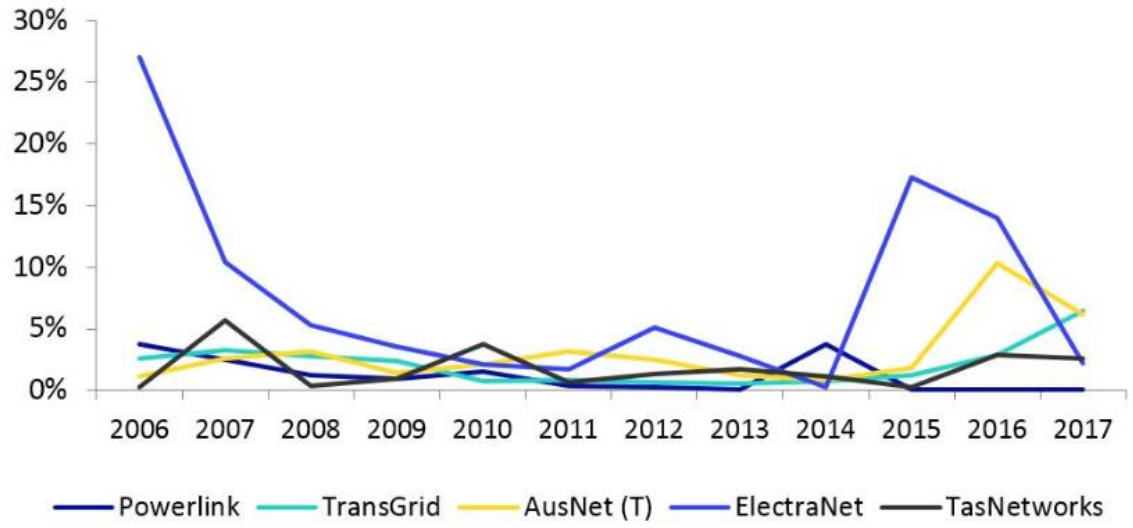
4.2 Investment signals to ensure reliability

Energy network businesses agree that there is a need to ensure that investment signals promote reliability outcomes valued by Australian household, commercial and industries customers.

4.2.1 Defining the need for reliability supporting investment signals

An immediate focus of the review appears to be wholesale or generation reliability. As the ESB's deep dives heard, however, millions of customers' reliability outcomes are dominated by impacts from network level reliability events. While many of these impacts are non-controllable and reflect external events, it is integral that the project also considers the link between the wholesale sector's capacity to deliver reliability and price outcomes and the transmission networks'.

Figure 3 - Percentage of transmission outages which caused NEM dispatch interval price increases of more than $10/MWh



Source: AER Transmission Performance Data 2006-2018

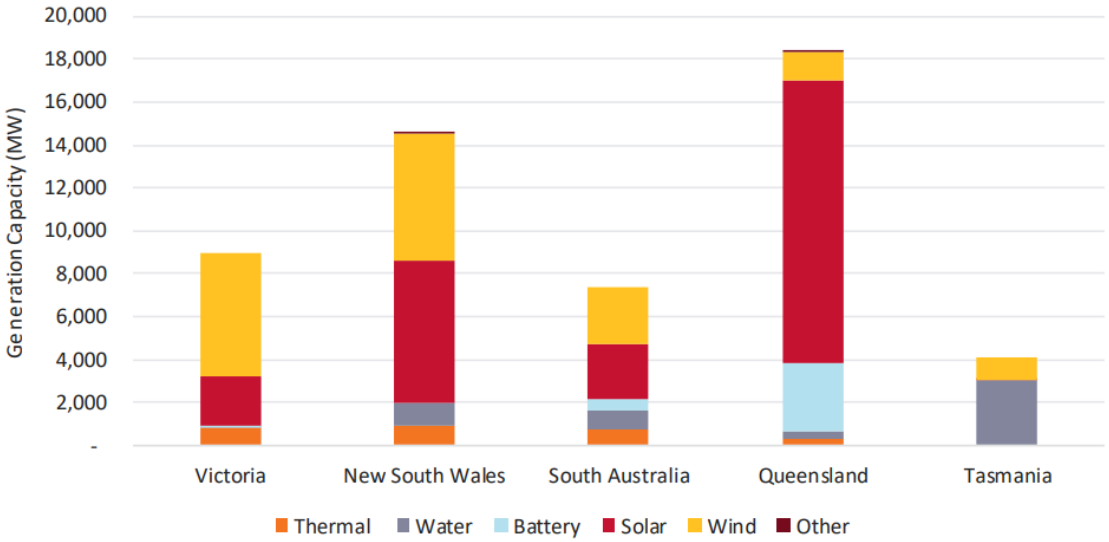
Transmission interconnection can make a material contribution to enhancing overall market reliability. It is important, therefore, that any post-2025 framework – particularly predicated on a growing DER uptake and greater need for connection and interconnection of renewable generators and markets – also considers the investability of the network regulatory framework that unpin these investments.

Currently a range of prescriptive approaches applied through a binding COAG EC rate of return framework are producing significant questions over the investability of major new interconnection investment. There does not appear to be any systematic measurement or consideration of the potential consequences of this position being sustained over time for the achievement of current or future market design benefits

4.2.2 Meeting the expected challenges ahead

This challenge is highlighted by the investment need of new energy sources. For every megawatt of exiting coal generation capacity, a significantly higher amount of renewable generation capacity needs to be connected, due to the lower capacity factor inherent in most renewable energy technologies.

Figure 4 - Proposed projects by type of generation and NEM region, beyond those already committed



Source: 2019 Electricity Statement of Opportunities, AEMO

In most cases, the replacement capacity is not being located close to the thermal generation transitioning out of the system. This investment in other areas of the transmission network can require augmentation to reduce constraints. Shifting locations of generation as part of a move to a lower emissions economy is now driving the need for transmission investment. There is a need to ensure this relocation is delivering the lowest overall whole of system outcome for consumers and not simply minimising costs/maximising returns for individual renewable energy generation firms.

Loads and generators are the basic building blocks of the existing market design and concepts such as market access and transmission use of system are based on these fundamental concepts.

However, the increasing prevalence of energy storage and embedded generation means that the concepts of load and generation are becoming increasingly blurred. Increasingly other characteristics, such as the extent to which a resource is scheduled/controllable are becoming a more fundamental differentiator. Additionally, it is increasingly common for multiple types of resources (load and generation, and differing degrees of controllability) to exist behind a single connection point.

Given these changes, it may be advantageous to consider different building blocks for a new market design to provide greater flexibility in dispatch and concepts such as market access and transmission use of system.

4.3 Integration of DER into electricity market

Energy Networks Australia welcomes the significant focus of the review on distributed energy resources.

Optimising the currently emerging and future resource of distributed energy technologies for the benefit of all customers is a significant challenge facing networks, energy market institutions and policy makers across a range of policy domains. As the Issues Paper notes, there is a significant range of current initiates and work around these issues which is ongoing. This includes the ENA-AEMO 'Open Energy Networks' project, and the Distributed Energy Integration Program being supported by ARENA.

The Issues Paper highlights a range of important issues in the integration of DER. Many of these have appropriate technical and market design components. The changing role and prevalence of DER, however, may imply a broader need for changes to the overarching network revenue pricing model which are not explored in the Issues Paper. Some of these have been identified as part of the ESB's Rocky Mountain Institute partnership.

Two specific additional regulatory design priorities for the Post 2025 framework should be:

1. **Trialling of new regulatory revenue setting models** - Development and trialling of network regulatory models such as TOTEX that better recognise the capital and operating trade-offs available in a high DER update future world, and promote efficient outcomes for network customers
2. **Exploring role for collaborative or negotiated settlements -** Ensuring development of innovative models of network customer partnerships, where network customers are able to engage in negotiated settlements under which regulatory determinations give effect to demonstrated customer priorities around expected current and future DER hosting capacity

Both of these initiatives have the potential to closely supplement movement to a high DER scenario, and so should be actively encouraged and progressed by direct recommendation of the Post 2025 review. This would recognise that while current regulatory frameworks may be sufficient in the short term at the commencement of expansion od DER, we should not expect these models to be static over the longer period under the focus in ESB's review process.

4.3.1 Ensuring a whole of system approach

Flexible resources embedded within the distribution network can impact upon and provide benefits to the network as well as the market. Given that network and market needs are not fully aligned, this gives rise to a tension regarding how such resources should operate, and a potential 'tug of war' between network and market pricing signals. An important aspect of minimising the overall cost of electricity supply to consumers will be ensuring that the various signals are balanced, so that embedded resources' finite capacity is operated in a fashion which will result in the greatest reduction in the overall cost of electricity.

The implications of price-sensitive but non-dispatched load should be carefully investigated. With developments in smart appliances and home automation, Powerlink considers that the potential for price-sensitive load could be significantly greater than is assumed in the ISP scenarios. The nature of much of this load means it may not be appropriate for centralised dispatch, but it may nevertheless modify its operation depending on market prices, most likely controlled by an automated process. The potential response of such load to a sudden price change (akin to a 'flash crash' on financial markets due to algorithmic trading), and the implications of this on the physical power system should be carefully considered. Cybersecurity considerations may also impact on how distributed resources can be integrated into the market, which could impact market design.

Given the context of declining generation controllability, an important consideration is how to securely maximise the flexibility of load, to enable the power system to remain balanced while minimising the need for energy storage. To this end, consideration should be given to how to facilitate and incentivise load to participate in the dispatch process. This could include measures to make market participation more customer-friendly such as enabling customers to pre-commit a response ahead of time to an

anticipated power system need with sufficient notice to mitigate the impact on their activities, or through providing a greater range of flexible dispatch options (e.g. partially-scheduled options where customers can operate freely within a scheduled limits, or options in which loads communicate their price sensitivity intentions to the system operator to inform the dispatch process but are not actually subject to dispatch). In any case, it would be beneficial to incorporate end-users and automation-technology vendors in the market design process. The Australian Energy Market Commission in its recent 'Economic Regulatory Framework Review – Integrating Distributed Energy Resources for the Grid of the Future' report affirms that such automated technology can enable customer participation in the market with significantly improved cost reflective network tariffs while bypassing consumers' risk-aversion to complex tariffs[2]

4.4 System security and resilience

System strength and frequency control will continue to be challenges and the services that can be provided by synchronous generators should be valued. The current rule change request (from AEMO, now with AEMC ERC0274) that seeks to make the provision of primary frequency control mandatory for generators does so without remuneration.

Where there are assets currently connected to the system that can deliver primary frequency response (and inertia) it is highly likely that it will be cost efficient that these assets do provide these services. There is a risk that if the services are not remunerated that incumbent providers may retire early and new providers (such as batteries), will not attract investment.

In other international jurisdictions variable renewable generation is required to provide frequency control (e.g. EU Requirements for Generators). The Generator Technical Requirements (GTS) for the NEM also require system support to be provided.

It is not clear how the proposed mandation of frequency control without remuneration will impact on new approached such as grid connected large-scale batteries. If the service is not valued, then the business case for deploying these technologies is reduced.

TNSPs are well placed to provide inertia and system strength services where it is economically efficient to do so, but care is needed to ensure that whatever approach is taken to delivering system security is appropriately valued and delivers benefits to consumers.

The environment in which our power system operates is changing. Climate change is already resulting in extreme weather events that have impacts on the operation of the system. Extreme heat increases peak demand to deliver cooling and while interconnection helps manage the demand, some extreme heats events will encompass multiple regions.

Cyclones are now more intense, with stronger winds and rainfall, and are moving more slowly resulting in greater damage to electricity network infrastructure. Cyclones are moving further from the equatorial regions, potentially impacting more major population centres.

There is work (e.g. the DOEE-funded AEMO-Bureau of Meteorology-CSIRO Energy Sector Climate Information (ESCI) project) that is exploring the impact of climate change on networks and the wider system. However, this work does not address the current AER determination process. Network assets are

[2] Australian Energy Market Commission, *Economic Regulatory Framework Review – Integrating Distributed Energy Resources for the Grid of the Future* (2019), p. 8.

long-lived. A transmission line built today will experience very different weather conditions in 10-15 years time, which is not even half-way through the projected life of the asset.

If the asset was to be built today to withstand the conditions that it will experience in future decades, then today's consumers may be paying for a benefit that they won't see. Plus the regulatory downward pressure on expenditure could also lead to less resilient assets being built and potentially taking less resilient approaches.

Being prepared and mitigating the risks has been shown to be more cost-effective than responding post an event ($1 spent on resilience replaces $4 on response and recovery)[3].

The AEMC is undertaking a review on mechanisms to enhance resilience in the power system and the AER is exploring High Impact Low Probability (HILP) events as part of the work on the Value of Customer Reliability (VCR). Any proposed changes to enhance the system security and resilience need to build on this work and need to be evaluated in a manner that is consistent to ensure that any costs are in the long-term interests of consumers.

4.5 Integration of variable renewable energy into the power system

The issues with integrating variable renewable generation relate to connections, congestion and system security.

System security has been addressed in Section 3.4.

Connections and congestion are a particular issue for newly connecting variable renewable generation and congestion, via Marginal Loss Factors, impacts all generators. The AEMC's COGATI 2019 project is exploring connections through new transmission investment and congestion but is unlikely to address losses. It is unclear how well the proposed financial hedges will address transmission investment to facilitate the connection of variable renewable generation since details are sparse.

Variable renewable generation needs to connect to replace retiring large thermal plant and needs to do so in a way that is least cost to consumers. There is no guarantee that the variable renewable generation will connect in locations that deliver best value to consumers. Coordination would be beneficial but may be commercially challenging for generators.

Retirement of large thermal plant potentially releases transmission infrastructure for reuse by variable renewable generation and while using these assets would be cost effective, most renewable generation is not located where this can occur.

The current model where generators rely on consumers to bear the full cost of transmission investment may need to change, but generators are rarely willing to contribute to the cost of transmission.

There is a significant mismatch between the timing of the investment and build for a variable renewable generation versus the timing and investment for new transmission.

[3] Cainey. J. M. (2019) Resilience and Reliability for Electricity Networks, p. 49. available from https://www.publish.csiro.au/RS/RS19005, Source reference: NIBS (National Institute of Building Sciences), 2017. Natural Hazard Mitigation Saves: 2017 Interim Report, Washington DC, USA, p. 344.