

## ClimateWorks Australia submission on issues paper for the Energy Security Board post-2025 market design project

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ClimateWorks Australia welcomes the Energy Security Board's proposed use of scenarios and a range of approaches to providing advice on a market framework for the National Electricity Market post-2025.

ClimateWorks recommends the Energy Security Board takes full consideration of the importance of emissions reductions in the electricity sector in meeting Australia's international and domestic obligations and the impact of this on market participant behaviour.

ClimateWorks Australia develops expert, independent solutions to assist the transition to net zero emissions for Australia, South-east Asia and the Pacific. A non-profit organisation, it was co-founded in 2009 by The Myer Foundation and Monash University and works within Monash Sustainable Development Institute.

### Electricity market reform has importance well beyond the electricity system

Australia has ratified the Paris Climate Agreement and as such the electricity sector will be required to play an appropriate role in reducing net greenhouse gas emissions in Australia to zero.

The drivers for electricity to reduce emissions come from multiple sources. Developed countries such as Australia will be expected to reach net zero emissions by 2050 (or before) to reach the collective goal of the Paris Agreement on climate. Australia has previously committed to developing a long-term emissions reduction strategy by 2020, to show how Australia will contribute to the Paris net zero emissions goal. All states and territories currently have goals for net zero emissions by, or before, 2050. Most of the jurisdictions in the National Energy Market also have midterm renewable electricity targets. Businesses and investors are also increasingly setting targets for how they will act on climate change and setting and meeting emissions reduction targets is becoming a consumer and stakeholder expectations.

The electricity sector is crucial for meeting economy-wide emissions reductions due to the importance of the emissions arising from electricity generation and the enabling role clean electricity can play, particularly in reducing transport and industry emissions. Australia's electricity being zero emissions would be essential for Australia to become a 'low carbon superpower' through green hydrogen exports and heavy industry.

ClimateWorks therefore recommends that the National Electricity Objective should include emissions reductions in electricity - consistent with the national energy system's role in reaching net zero emissions for Australia by 2050. Our modelling finds that an electricity system supplied from all renewable sources by 2035 underpins Australia's ability to meet its full international obligations.



ClimateWorks recognises that amendment of the National Electricity Objective is not part of the current process. However, the ability to reach deep emissions reductions consistent with our international and domestic commitments by the states and territories should be a key assessment for any proposed changes to the National Electricity Market.

**What scenarios and shocks should be used? How should these be used to test market design?  
How can market and economic modelling best be used to evaluate individual components of market design or the end-to-end market design?**

**Modelling and analysis should consider a range of scenarios that have a high chance of staying within a 2 degree and 1.5 degree carbon budgets for Australia, and explore rapid transition to a zero emissions electricity system under different demand profiles**

ClimateWorks considers scenarios and sensitivity analysis are best used to test robustness to major and rapid changes at this stage of the market design process, in order to bring out issues for market design that otherwise would not be visible. It will be important to ensure analysis for the design process fully recognises that the National Electricity Market has to meet requirements beyond the current National Energy Objective - given this does not yet include emissions reductions. The scenarios analysis will need to include emissions reductions compatible with the Paris Agreement and the policies of all states and territories in the National Electricity Market to reach net zero by 2050 or before. ClimateWorks suggests that scenarios include pathways with a high chance for staying within domestic carbon budgets for 1.5 degrees or well-below 2 degrees.

ClimateWorks' has previously found that cost-effective pathways to net zero emissions by 2050 have faster decarbonisation in the electricity sector than the economy-wide rate of emissions reductions (ClimateWorks Australia, ANU, CSIRO and CoPS 2014 *Pathways to Deep Decarbonisation in 2050: How Australia can prosper in a low carbon world: Technical report* and ClimateWorks Australia 2018 *Tracking progress to net zero emissions*). We recommend that this finding is recognised within the scenarios analysis for this project.

A variety of metrics for the electricity sector are provided from ClimateWorks' latest scenarios analysis in Appendix A - this is provided in confidence until the analysis is published. Appendix A can be made public once ClimateWorks has released the Decarbonisation Futures report (expected by the end of 2019).

We recommend that scenarios cover a range of future demand outlooks. A low demand scenario would reflect strong improvements in energy and material efficiency, a shift away from energy intensive materials and strong decentralisation of electricity supply. A high demand scenario would reflect strong growth of electricity in transport and industry including renewable powered exports, including hydrogen and heavy industry products such as green steel and aluminium. Exploration of impacts for connections beyond existing jurisdictions in the National Energy Market may also be useful.

We agree that techno-economic modelling such as that conducted by the AEMO Integrated System Plan is the best available method for determining least cost ways to co-invest in generation, transmission and storage under a carbon constraint. However they have limited merit in testing different market designs as they do not capture well the behaviour of human or corporate agents in making decisions. This remains the domain of behavioural and experimental economics. Monash University will be happy to help the Energy Security Board identify relevant specialists in Australia for this, including those based at Monash.

### Shifts in market design could assist the electricity sector to play an appropriate role in the decarbonisation of Australia's economy in a cost-effective manner

It is likely that the electricity market will require new rules and income generation mechanisms as variable renewable energy (wind and solar) becomes more prevalent. Scenarios should be used to test the viability of existing business models for existing and new generation assets.

The current energy market system is not considered to be providing appropriate incentives to make the transition to zero emissions electricity as effective or efficient as it could be. This includes failures to send the correct signals for investment and to properly incentivise demand side measures - including demand side response and demand reduction. For example, the potential benefit from energy efficiency is not being unlocked due to these market failures (as well as non-price barriers such as lack of awareness about products and services). There are initiatives underway to improve demand side measures, within the energy market and through additional measures (e.g. at the state level). However, ClimateWorks is of the view that the analysis looking at market design should consider how to create systemic benefits from demand reduction as well as demand response - beyond including market efficiency as a principle within the assessment framework.

Energy efficiency measures are often the least-cost way to reduce costs for the consumer for services provided by electricity (such as heating, cooling and cooking), to reduce the need for inefficient investment in new energy infrastructure and thus improving overall efficiency of the system.

We recommend the exploration of how the post-2025 market design can incentivise participants to improve Australia's performance in energy efficiency and productivity. And that the modelling and analysis considers different potential levels of these measures either through the scenarios, or through separate analysis.

Design features such as better use of time and location sensitive pricing at different levels within the electricity market are likely to be of particular interest and are already being discussed. The analysis could consider a range of options for how fast and effective the roll out of such pricing might be.

The Energy Security Board may be interested in exploring how current initiatives at Monash University to meet net zero emissions by 2030 could provide evidence on market design options - including being able to explore different scenarios for the operation of a micro-grid.

## ClimateWorks suggests the exploration of a wider range of potential shocks, given the scale of transition in the electricity system and the likely benefits

ClimateWorks supports the investigation of critical asset failure, resilience to climate and technology change as potential shocks and the investigation of extreme weather events as part of the analysis.

We would suggest some additional shocks are explored. These include the rapid change in consumer and investor preferences and how this affects their decision making. Alternatively this rapid change could be investigated as part of the work on key challenges.

Decision making by market participants (households, businesses and investors) is shifting away from previous patterns and goes well beyond a straightforward response to price signals. Market participants are placing a greater importance on social and environmental considerations and are responding to risks arising from policy uncertainty and rapid energy system transition. How this will play out will be complex, an example is the potential for grid defection on a substantial scale- especially in certain areas - as battery technologies allow consumers to be self-sufficient.

Further potential shocks the analysis should consider include dramatic increases in demand and flows through the electricity system from a range of drivers including: electrification of transport; green steel or metals production; development of a green hydrogen export market and transmission linkages to non-NEM jurisdictions or internationally. ClimateWorks notes that South Australia's Hydrogen Plan states the South Australian government will: *Identify any changes that might be needed to the National Energy Market Framework to ensure the efficient integration of hydrogen into energy systems.*

If Australia makes full use of its clean energy resources, it could also return to being a location of preference for heavy energy users due to a price premium for clean production or where high-emissions products are banned from important markets.

Some regions have seen rapid changes on the demand side which may be worth exploring as a potential shock. The issues paper already considers demand reduction through energy efficiency and demand response, however it may be worth considering the impact of rapid closure of facilities with major energy use (such as aluminium smelters) in addition to the impact of generator retirement.

**Is the assessment framework appropriate to evaluate the effectiveness of future market designs? What else should be considered for inclusion in the assessment framework?**

## ClimateWorks recommends emissions reductions are considered through the assessment framework, along with consumer and investor preferences

ClimateWorks Australia supports the assessment framework outlined in the issues paper - with the addition of explicit consideration of emissions reductions. We also suggest the framework includes broader consideration of consumer and investor preferences given the importance of factors outside of the National Electricity Market. In addition it may be useful to consider different aspects of reliability (such

as of the system reliability as opposed to the service reliability to the consumer) which may assist more efficient market outcomes and better exploration of the impact of the market reform.

As mentioned, effective transition of the electricity system underpins Australia's ability to meet its international and domestic commitments in emissions reduction in a cost-effective manner.

The overarching principle of the outcome of the assessment should therefore include emissions reductions from electricity consistent with the National Electricity Market's appropriate role in reaching net zero emissions for Australia by 2050.

In addition, the potential benefits for international competitiveness due to Australia's potential to be a major exporter of green energy and products because of its world-class clean energy resource should be part of the assessment of how outcomes affect competitiveness. There are now a number of initiatives that are exploring this role for Australia.

**Have we identified all of the potential challenges and risks to the current market? If not, what would you add?**

**Which of these challenges and risks will be most material when considering future market designs and why?**

**The transition in Australia's energy system, including this exploration of market design, creates a huge opportunity for a shift to clean energy and address climate risks.**

As is widely recognised, Australia's electricity system is changing rapidly due to a range of drivers such as ageing generation infrastructure, recognition of the importance of decarbonisation and declining costs of clean energy technologies. The speed and scale of change is creating challenges, but also the ability for Australia to address climate risks cost-effectively through the development of an electricity system fully powered by renewable energy. If developed effectively this could harness Australia's enormous potential in clean energy resources (principally solar and wind) for clean energy exports and for highly competitive heavy industry able to tap into demand for green supply chains.

ClimateWorks considers the biggest challenge for the design for the post-2025 national electricity market is the lack of coordination between Australia's international obligations to reach net zero emissions and energy policy. This is exemplified by the lack of an emissions reduction objective for the National Electricity Market despite its key role in delivering reductions cost-effectively.

Otherwise ClimateWorks broadly agrees with the challenges for electricity market design identified in the issues paper and the associated risks for market design, we would suggest the following additional challenges:

- ensuring effective price signals in a system where zero-cost fuels become dominant and there is an increasing shift away from pricing setting by the marginal cost of supply
- creating incentives throughout the market system to drive energy efficiency improvements

- recognising and responding to the increasing importance of consumer preferences not based on price
- recognising and responding to investor and business behaviour that addresses climate risk - physical and regulatory

Of the challenges mentioned in the issues paper, ClimateWorks notes that the integration of Distributed Energy Resources (particularly household solar and battery storage) into the market may create the greatest uncertainty for market operation, given the speed of change and the untested nature of the likely level of penetration.

As mentioned in the issues paper, South Australia is at the forefront of penetration of variable renewables and so will need to lead in designing a market that can function effectively with zero cost fuel and highly variable supply and demand.

The issues paper mentions the importance of developing different service offerings in the market - and we would highlight the importance of new business models linked to the potential proliferation of micro-grids and markets operating at the distribution level. With large numbers of distributed generators, which currently operate before the meter, the demand side becomes harder to forecast. We recommend exploration of how market design could incentivise market participants to use new business models and technologies that deliver a reliable, affordable and sustainable electricity system and consider supply and demand sides.

Arising from this, ClimateWorks recommends that this process should consider the coordination and optimisation of electricity markets on different levels, and the ability of different market designs to send efficient signals to network and generation investments at both transmission and distribution level. The potential for time and location specific pricing at different levels to improve market efficiency is likely to be an important consideration.