BLUEPRINT FOR ENERGY SECURITY IN THE NATIONAL ELECTRICITY MARKET: INDEPENDENT REVIEW

Submission by 350.org Australia
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WHO WE ARE

350 Australia is one part of a global movement taking action to halt the climate crisis. We work with a network of campaigners and local groups across the country to help coordinate online campaigns, grassroots organising, and mass public actions to keep fossil fuels in the ground and support a transition to a cleaner and fairer economy.

The number 350 means climate safety: to preserve a liveable planet, and to protect our own and future generations from dangerous climate change, scientists tell us we must reduce the amount of CO_2 in the atmosphere from its current level of 402 parts per million to below 350[1].

EXECUTIVE SUMMARY

The Interim Report of this Review highlights the "Energy Trilemma", with the need to combine and balance the objectives of lower carbon emissions, energy security, and affordability for consumers. Our submission addresses these three imperatives.

In our view, the need to reduce carbon emissions is paramount because of the need to provide security for current and future generations from the consequences of climate change, which include health impacts, sea level rise, more frequent heatwaves and more frequent natural disasters. To this end, we appeal for the national electricity objective (NEO) to be made more balanced, so that it includes a climate objective.

Consistent with this, we urge that the Blueprint delivered by this Review ensure that the National Electricity Market and its rules will deliver on Australia's 2030 emissions reduction targets, and desirably exceed them in order to be consistent with a maximum 2°C global warming.

We note that a price on carbon would have allowed the market to make sensible decisions aimed at meeting the climate imperative alongside the needs of the various stakeholders. We deplore the fact that this mechanism was taken off the table for political and ideological reasons.

We urge the Review to adopt a vision in which, by 2030, the Australian electricity generation system has no fossil fuel generators, but only renewable sources and storage (and balancing) facilities. We cite recent research which indicates that such a goal is achievable and affordable.

In terms of energy security, we cite research which demonstrates that storage facilities such as battery storage and pumped hydro are able to provide the security and stability required by a 100% renewable energy grid. We urge the Review to support the rapid development of such storage and balancing facilities, in order to accommodate the rapid expansion of renewable energy sources.

We note that the South Australian blackout of 28 September 2016 was caused by a transmission failure, and we cite the observation by the CEO of Australia's largest energy company, AGL, that a decentralised, renewables-based system would be inherently more secure, from a transmission perspective, than the current system.

In terms of affordability for consumers, we note that, under the existing NEM rules, companies are deliberately avoiding measures which would lower costs for consumers, in order to maximise their profits. We cite two examples to illustrate this. We urge the Review to examine how the NEM rules can be changed to ensure that affordability for consumers has

[1] James Hansen et al. Assessing dangerous climate change.
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081648

priority over increased profitability of the generators.

LIST OF RECOMMENDATIONS

[1] That the Blueprint delivered by this Review ensure that the National Electricity Market and its rules will deliver emissions consistent with a maximum of 2°C global warming

[2] That the national electricity objective (NEO) be modified to include a climate objective.

[3] That the Review support the re-introduction of a price on carbon, notwithstanding the political obstacles.

[4] That the electricity sector's baseline under the present Safeguard Mechanism be reduced so that it is below the current level of emissions from the sector.

[5] That the Review adopt a vision in which, by 2030, the Australian electricity generation system has no fossil fuel generators, but only renewable sources and storage (and balancing) facilities.

[6] That the Review support the rapid development of such storage and balancing facilities, in order to accommodate the rapid expansion of renewable energy sources.

[7] That the Review examine how the NEM rules can be changed to ensure that affordability for consumers has priority over increased profitability of generators.

INTRODUCTION

The Independent Review into the Future Security of the National Electricity Market (hereafter referred to as the Interim Report) has been tasked with developing a blueprint for the national electricity market which:

- delivers on Australia's emissions reduction commitments
- provides accessible and affordable electricity, and
- ensures a high level of security and reliability.

These three criteria - affordable, reliable and reducing emissions - have been described as an energy policy "trilemma."

THE CLIMATE IMPERATIVE

As climate change impacts intensify, the window in which to reduce carbon emissions and prevent further devastating climate impacts narrows. Transitioning Australia's electricity supply away from polluting sources like coal to 100% renewable energy is a critical step in this process.

The need for urgent climate action has never been so clear. The Bureau of Meteorology has documented the extreme heat experienced in southeast Australia during summer 2016–17, with the highest monthly mean temperatures on record for Sydney and Brisbane, and the highest daytime temperatures on record for Canberra [2]. In Sydney, which saw its hottest summer (for both days and nights) ever recorded, temperatures were 2.8°C above the long term average [3].

The surge in global temperatures experienced in 2015 and 2016 [4] had already generated serious consequences such as the massive bleaching event that damaged the northern half of the Great Barrier Reef so much so that Reef experts fear it may never recover [5].

Even prior to these clear signals of climate change, the Climate Council had reported [6] that:

- It is beyond doubt that human activities, primarily the emission of greenhouse gases from the combustion of fossil fuels like coal, oil and gas, are driving the dramatic changes of the climate system;
- Climate change is increasing the frequency and severity of many extreme weather events, including heatwaves and extreme bushfire conditions; and
- Hot days have doubled in the last 50 years, while heatwaves have become hotter, last

[2] Bureau of Meteorology. Special climate statement 61 - exceptional heat in Southeast Australia in early 2017. 24 February 2017.
http://www.bom.gov.au/climate/current/statements/scs61.pdf

[3] Bureau of Meteorology. Sydney in summer 2016-17: Warmest summer on record.
http://www.bom.gov.au/climate/current/season/nsw/sydney.shtml

[4] Andrea Thompson. Streak of record hot temps adds another month. Climate Central, 20 September 2016.
http://www.climatecentral.org/news/record-hot-temps-another-month-20715

[5] Peter Hannam. Sad truth: Great Barrier Reef may never rebound to previous health: scientists. Sydney Morning Herald, 30 May 2016.
http://www.smh.com.au/environment/climate-change/sad-truth-great-barrier-reef-may-never-rebound-to-previous-health-scientists-20160530-gp76wl.html

[6] Climate Council. Climate change 2015: growing risks, critical choices.
https://www.climatecouncil.org.au/climate-change-2015-growing-risks-critical-choices

longer and occur more often.

The increase in frequency of natural disasters provides another imperative. According to the Asian Development Bank, “in the last 4 decades the frequency of natural disasters recorded in the Emergency Events Database has increased almost three-fold” [7].

It is clear that to protect our climate, fossil fuel emissions must be urgently constrained. This conclusion flows from the landmark paper by leading climate scientist James Hansen (2013) and his colleagues. This paper states: “continuation of high fossil fuel emissions, given current knowledge of the consequences, would be an act of extraordinary witting intergenerational injustice.”

The Interim Report highlighted the "Energy Trilemma", with the objectives of energy security, affordability and lower emissions". Whatever else happens, we assert that Australia's Paris commitments must not be weakened. Rather, they should be strengthened as they are currently inadequate to deliver Australia's fair share of effort to prevent global warming exceeding to 2°C, let alone deliver the objective - which we continue to support - of limiting warming to 1.5°C. We note that Australia's fair share of the remaining carbon budget to limit warming to 1.5 degrees is 2.5 Gt of CO2 from 2015. At the current rate of emissions (0.4 Gt from fossil fuel combustion alone), this budget would be exhausted in merely six years [8].

There are other kinds of security beyond energy security, and one of these is security for the next generation (our grandchildren) and their right to be protected from heatwaves, natural disasters, sea level rise, health impacts and the other results of climate change. Indeed, the wellbeing and health of the current generation is already under threat from climate change.

Recommendation: That the Blueprint delivered by this Review ensure that the National Electricity Market and its rules will deliver emissions consistent with a maximum of 2°C global warming

Dr. Anne Kallies has observed that "not only is the current market framework in Australia perpetuating carbon-intensive patterns of electricity generation, its legal frameworks are designed and embedded in a way that makes change cumbersome and difficult to achieve". She notes that several commentators have argued for the inclusion of an environmental objective in the National Electricity Objective. She argues that "a large scale transition to renewable energy will require considerable electricity market reform" [9].

Therefore, the NEM must have, alongside its other mandates, a climate mandate. This would only be giving effect to what is already Government policy.

Recommendation: That the national electricity objective be modified to include a climate objective

Of course, a price on carbon would have allowed the market to make sensible decisions aimed at meeting the climate imperative alongside the needs of the various stakeholders. We deplore the fact that this mechanism was taken off the table for political and ideological reasons.

Recommendation: That the Review support the re-introduction of a price on carbon, notwithstanding the political obstacles.

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[7] Asian Development Bank. Global increase in climate-related disasters. https://www.adb.org/sites/default/files/publication/176899/ewp-466.pdf

[8] Sivan Kartha, Implications for Australia of a 1.5C Future, Stockholm Environment Institute Working Paper No. 2016-09, https://dbqvwi2zcv14h.cloudfront.net/images/SEI_Report_Final.pdf.

[9] Anne Kallies. A barrier for Australia's climate commitments? Law, the electricity market and transitioning the stationary electricity sector. http://www.unswlawjournal.unsw.edu.au/sites/default/files/394-12.pdf

The Interim Report points out that the electricity sector's baseline under the present Safeguard Mechanism is set 11% above the current level of emissions from the sector. This is an absurd state of affairs and it should be rectified urgently by reducing the baseline to below the current level of emissions.

Recommendation: That the electricity sector's baseline under the present Safeguard Mechanism be reduced so that it is below the current level of emissions from the sector.

EMISSIONS FROM THE ELECTRICITY SECTOR

Unfortunately, there has been no effective action to reduce Australia's greenhouse emissions during the past three years. Data recently released under the National Greenhouse & Energy Reporting (NGER) Scheme[10] shows that greenhouse emissions in Australia increased by 3.4% during the past year and by 7.5% since the carbon price was repealed in July 2014 [11].

The NGER data also shows that pollution from Australia's electricity sector, which is responsible for about 35 per cent of our climate pollution, went up 2.6% on the previous year and 5% since the carbon price was removed.

As the Interim Report of this review states: "current policy settings do not provide a clear pathway to the level of reduction required to meet Australia's Paris commitments" [12].

Australia continues to be powered by some of the most emissions intensive electricity on the planet. The characteristics of Australia's National Electricity Market were summarised in a recent report by the Institute for Energy Economics and Financial Analysis [13] which found that:

- Australia has the highest carbon intensity of any country with major sub-critical generating assets [i.e. assets with a carbon intensity greater than 880 kg of CO2 per MWh of energy output];
- The four Victorian brown-coal generators all significantly exceed the world mean emission intensity for sub-critical generators;
- There is considerable excess capacity (16%) in the electricity generating system, a significant impediment to further renewables uptake;
- The power generation fleet is ageing (there are five stations older than 35 years);
- Site rehabilitation costs are a significant barrier to exit; and
- Governments can address these risks by implementing "an orderly coal phase-out plan".

A recent article notes that Australia's National Electricity Market (NEM) emissions, about 800 grams of CO_2 per kilowatt hour of electricity produced, are almost double the OECD average

[10] 2015–16 national greenhouse and energy information is now available http://www.cleanenergyregulator.gov.au/NGER/Pages/News%20and%20updates/NewsItem.aspx?ListId=19b4efbb-6f5d-4637-94c4-121c1f96fcfe&ItemId=352

[11] Matthew Rose and Suzanne Harter. Renew Economy, 1 March 2017. http://reneweconomy.com.au/climate-pollution-rising-turnbull-frydenberg-failing-15377/

[12] Dr Alan Finkel et al, Independent Review into the Future Security of the National Electricity Market Preliminary Report, December 2016, 23.

[13] IEEFA, 2016. Sub-critical Australia: risks from market imbalance in the Australian national electricity market. IEEFA, May 2016. http://ieefa.org/wp-content/uploads/2016/05/Sub-Critical-Australia-Risks-From-Market-Imbalance-in-the-Australian-National-Electricity_May-2016.pdf

[14]. This figure will need to fall rapidly if Australia is to contribute its fair share towards limiting the global increase in temperatures to 2°C. We support the goal of reforming the NEM so that it is more resilient and capable of accommodating new energy sources. By 2030, it should be capable of supporting an Australian electricity generation system in which there are no coal, oil or gas electricity generators, but only renewable sources and storage facilities.

Recommendation: That the Review adopt a vision in which, by 2030, the Australian electricity generation system has no fossil fuel generators, but only renewable sources and storage (and balancing) facilities.

SECURITY, AFFORDABILITY AND EMISSIONS REDUCTION

100% RENEWABLES: 100% POSSIBLE, SECURE AND AFFORDABLE

Recent research from the ANU indicates that a goal of 100% renewable electricity is both achievable and affordable. The report found that a 100% renewable energy electricity grid (a mix of solar PV and wind, backed up by pumped hydro) would be a significantly cheaper future option than a coal or gas-fired network in Australia, even with integration costs taken into account. Allowing for the cost of balancing, the authors estimate a levelised cost of energy of around $75/MWh under this option. By contrast, the levelised cost of coal is estimated at $80/MWh, even ignoring the cost of finance risk or any future carbon price. In other words, when Australia's coal power stations retire over the next 15 years, it will be cheaper to replace them with renewable energy [15].

The same study found that less storage would be needed than might be expected. It finds that the optimum amount of pumped hydro is 15-25 GW of power capacity with 15-30 hours of energy storage. The study noted that a large fraction of the balancing costs relates to periods of several successive days of overcast and windless weather that occur once every few years.

The conclusion which can be drawn from this research is that energy security and renewable generation are absolutely compatible, in that storage facilities such as battery storage and pumped hydro are able to provide the security and stability required by a 100% renewable energy grid.

Recommendation: That the Review support the rapid development of such storage and balancing facilities, in order to accommodate the rapid expansion of renewable energy sources.

We assert that such a model is also affordable. A 2013 study by researchers at the University of New South Wales analysed least cost options for supplying the NEM with 100% renewable electricity using a variety of scenarios in which the NEM reliability standard was maintained. They found the lowest cost scenarios to be dominated by wind power, with smaller contributions from photovoltaics, solar thermal, hydro and gas turbines. They found that the annual cost of a simplified transmission network to balance supply and demand across NEM regions is a small proportion of the annual cost of the generating system [16].

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[14] Dylan McConnell. The Conversation, 24 February 2017
https://theconversation.com/our-power-grid-is-crying-out-for-capacity-but-should-we-open-the-gas-valves-72355

[15] Giles Parkinson (summarising research by Andrew Blakers). Renew Economy, 27 February 2017.
http://reneweconomy.com.au/anu-wind-solar-hydro-grid-cheapest-option-australia-87796/

[16] Ben Elliston, Iain MacGill and Mark Diesendorf. Least cost 100% renewable electricity scenarios in the Australian National Electricity Market.
http://www.ies.unsw.edu.au/sites/all/files/profile_file_attachments/LeastCostElectricityScenariosInPress2013.pdf

The mix of renewable energy systems in these scenarios easily supplies base-load demand despite its absence of base-load power stations. Instead, pumped hydro and biofuel turbines are used to meet supply peaks in demand on winter evenings following overcast days when the wind is low.

The authors concluded: "…only under a few, and seemingly unlikely, combinations of costs could any of the fossil fuel scenarios compete economically with 100% renewable electricity in a carbon constrained world."

Before these grid-scale storage facilities are in place, existing gas power stations could play a role in balancing the intermittency of renewable energy, but we are strongly opposed to the building of any new gas fired power stations because of the volume of emissions, including fugitive methane emissions, which would occur during the lengthy write-off timeframe.

The Interim Report of this Review (pages 31-33) discusses the South Australian blackout of 28 September 2016. That blackout was caused by a transmission failure, which in turn was caused by the destruction of transmission towers during an extreme weather event[17] [18]. Given that such events are certain to re-occur, and with increasing frequency due to the warming of the atmosphere, we presume that there has been an engineering investigation to identify solutions which might make these towers more robust and resilient.

Following this event, it was the CEO of AGL Energy (Andy Vesey) who pointed out that distributed renewable energy generated and consumed at the local level has the potential to strengthen the electricity grid, not weaken it. He told the All Energy conference in Melbourne "if you have a system that is distributed and ... generated at the point of consumption and stored and you didn't have much transmission lines you'd have a much more secure system" [19]. Other observers have commented on the potential for micro-grids to provide a less extended, more reliable and more affordable infrastructure [20]

AFFORDABILITY FOR CONSUMERS

We note that, under the existing NEM rules, companies appear to be deliberately avoiding measures which would lower costs for consumers, in order to maximise their profits. We cite two examples to illustrate this.

Example 1. There is a pumped hydro facility at Wivenhoe in Queensland. It has been running well below capacity, to the detriment of the Queensland consumer. The reason is that CS Energy, the owner of Wivenhoe, also owns significant coal generation. If CS Energy ran Wivenhoe at full capacity, it would depress prices in the afternoon peak, negatively impacting upon its coal profits. As a result, Queenslanders pay more for their power than they might, and during the summer of 2016-17 were paying more than 50% more than other states, including renewable-rich South Australia.

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[17] Article in the Sydney Morning Herald, reporting on emails with AEMO advice to the Prime Minister's office, from 7.20am, 29 September 2016 stating, "There has been unprecedented damage to the network (ie bigger than any other event in Australia), with 20+ steel transmission towers down in the north of the State due to wind damage (between Adelaide and Port Augusta). The electricity network was unable to cope with such a sudden and large loss of generation at once. AEMO's advice is that the generation mix (ie renewable or fossil fuel) was not to blame for yesterday's events – it was the loss of 1000 MW of power in such a short space of time as transmission lines fell over."
http://www.smh.com.au/federal-politics/political-news/pm-and-ministers-were-told-wind-not-to-blame-for-sa-blackout-20170212-guaxf0.html

[18] Interim report of this Review, page 32, para 3.

[19] AGL Energy CEO Andy Vesey says renewables are 'much more secure'. Australian Financial Review, 4 October 2016.
http://www.afr.com/news/agl-energy-ceo-andy-vesey-says-renewables-are-much-more-secure-20161003-gru8oi#ixzz4a8YUJ3fT

[20] Giles Parkinson. Australia's energy future could be a network of renewable microgrids.
http://reneweconomy.com.au/australias-energy-future-could-be-network-of-renewable-micro-grids-84534/

As the article describing this example states: "CS Energy, from its own point of view, is doing nothing more than profit maximising". The problem lies with the NEM rules that allow practices which are clearly not in the interests of consumers [21].

Example 2. In August 2015, the Australian Energy Market Commission decided not to ask the Australian Energy Regulator to enforce the introduction of its Demand Management Incentive Scheme. This scheme would have reduced electricity bills for consumers, but they were fiercely resisted by the coal generators who were opposed to any measures that would reduce consumption from the grid. The Commission had released a report in 2012 which estimated that demand management in the Australian electricity system could deliver savings of $4–$12 billion by 2023 - savings which, if passed on to electricity consumers, would result in bill reductions of between $120 and $500 [22].

We conclude from these examples that the market rules of the NEM must be changed to prevent companies from taking actions which disadvantage consumers by raising costs and prices for no purpose other than to increase the profits of the generators and to enable the perpetuation of a high-carbon grid.

Recommendation: That the Review examine how the NEM rules can be changed to ensure that affordability for consumers has priority over increased profitability of generators.

[21] David Leitch. Renew Economy, 23 February 2017.
http://reneweconomy.com.au/wivenhoe-pumped-hydro-big-little-plant-didnt-30606/
[22] Giles Parkinson. Renew Economy, 21 August 2015.
http://reneweconomy.com.au/regulators-delay-network-saving-proposals-for-another-5-years-44494/

RESPONSES TO QUESTIONS RAISED IN THE INTERIM REPORT

The following section addresses the interim report and questions posed therein, including a discussion of the transformations already underway within the energy sector (Chapter 1), consumer-driven change (Chapter 2), the transition towards a low-carbon economy that is already underway (Chapter 3), the integration of renewables into the grid (Chapter 4), market design for security and reliability (Chapter 5), electricity pricing (Chapter 6) and energy market governance (Chapter 7).

TECHNOLOGY IS TRANSFORMING THE ENERGY SECTOR (CHAPTER 1)

In generation, distribution and end use, technology is transforming the energy sector. This transformation is welcome because it involves low or zero emission electricity options, which are required to meet our international commitments and mitigate global warming.

RESPONSE TO DISCUSSION QUESTIONS

1.1 How do we anticipate the impacts, influences and limitations of new technologies on system operations, and address these ahead of time?

The best way to predict change is to make it. The Interim Report acknowledges the impacts, influences and limitations of the new technologies currently being adopted on the national energy supply and NEM. While it is difficult to predict technology that has yet to be developed, the impact, influences and limitations of the current technologies being adopted are known.. The policy and rules for national energy supply should be changed to account for these new technologies. As the Interim Report states, “The creation of the NEM – the longest geographical interconnected power system in the world – was a significant policy and engineering achievement but it was designed for a different world to the one it confronts today.”[23] The new world, with Variable Renewable Energy (VRE) and the advancement of energy technologies, requires a new system. It is possible that the best option for Australian energy supply in this new world would be to develop a plan from scratch with the new technologies in mind.

1.2 How can innovation in electricity generation, distribution and consumption improve services and reduce costs?

Innovation in renewable electricity generation provides a very welcome opportunity to reduce the forces that are driving climate change. Variable Renewable Energy (VRE) technology also offers improvements to service through improved security by allowing the distribution of energy through a distributed network of grids, or micro-grids [24]. We have already observed, and the Interim Report states, that networked micro-grids can offer resilience, since a disruption to one source or network need not bring down the entire grid. While innovation in distribution and consumption technology, such as digital meters, offer new services such as

[23] Interim report, page 8
[24] Giles Parkinson. Australia’s energy future could be a network of renewable microgrids. http://reneweconomy.com.au/australias-energy-future-could-be-network-of-renewable-micro-grids-84534/

peer-to-peer trading (*as noted in the Interim Report, page 17*) that could potentially reduce costs for some consumers while providing a source of income to others.

1.3 What other electricity innovations are you aware of that may impact the market in the future?

In relation to plug-in electric vehicles (EVs) we note the February 2016 forecasts of Bloomberg New Energy Finance [25]. Their analysis is that continuing reductions in battery prices will bring the total cost of ownership of EVs (on an unsubsidised basis) below that of conventional-fuel vehicles by 2025. They also forecast that annual sales of EVs will reach 35% of new light duty vehicle sales by 2040.

This forecast was made prior to the release of the 2017 Chevy Bolt which (given its range of 380 km and its price tag of US$37,495) has been acclaimed as a "game changer" for the EV market. In our view, the Bloomberg forecasts can already be regarded as too cautious.

These developments are likely to cause a significant shift away from oil consumption towards less emissions intensive electricity consumption. A parallel shift may occur as buildings shift from oil and gas to electricity for space heating.

CONSUMERS ARE DRIVING CHANGE (CHAPTER 2)

The NEM provides limited choice for consumers, and as a result consumers are driving the change to low emissions energy. The dropping prices and improved services through technological innovation will only accelerate this change, and the NEM should be reformed to embrace these changes.

RESPONSE TO DISCUSSION QUESTIONS

2.1 How do we ensure that consumers retain choice and control through the transition?

The current NEM is not designed for consumer choice. Similarly Energy Consumers Australia, created by COAG in 2015 to provide national advocacy for energy consumers, has been impotent compared to the power and rules of the natural monopoly NEM and market participants.

The 2015 report by the Energy Networks Association and the CSIRO [26] stressed the importance of designing the network around "the diverse human needs and aspirations that future electricity systems must serve".

And as the Interim Report states, the lack of choice for consumers in the NEM has resulted in them taking control into their own hands and choosing energy sources outside of the NEM,

[25] Tom Randall. Here's how electric cars will cause the next oil crisis
https://www.bloomberg.com/features/2016-ev-oil-crisis/
[26] Electricity network transformation roadmap.
http://www.energynetworks.com.au/sites/default/files/roadmap_interim_report_final.pdf

particularly rooftop solar PV where Australia has the highest penetration of rooftop solar PV in the world, with more than 1.5 million rooftop systems installed [27].

To ensure consumers retain choice, the NEM, policy and rules should be adapted for all available options by allowing individual residential consumers, communities and industrial suppliers the option of taking control of their electricity to become suppliers. It should also offer incentives for these new suppliers to connect to the grid. This would remove the burden for other grid users, and improve the security of the grid by offering localised networks and supply.

2.2 How do we best meet the needs of vulnerable and hardship consumers?

As the Interim Report notes, the lack of choice, or wrong incentives, may result in consumers disconnecting from the grid, resulting in more costs being passed on to vulnerable consumers who cannot afford their own energy supply [28]. To avoid this, incentives need to be offered for individual and small scale suppliers to connect with the grid. Another option, as outlined in the HomeGrown Power Plan, would be to create a public interest retailer for the people who need it most.[29]

2.3 How do we ensure the needs of large-scale industrial consumers are met?

Large-scale industrial consumers should have the same access to low, or zero, emissions energy as other consumers. Any barriers to industrial consumers producing their own low emission form of energy should be removed, and they should have access to zero emission energy from the grid when they do not have the option of producing their own.

2.4 How can price structures be made more equitable when consumers are making different demands on the grid according to their electricity use and their investments behind the meter?

The costs of the grid should be shared equitably among consumers, with a number of conditions. As the Interim Report states, “Australians should pay no more than necessary for a secure, reliable and low emissions electricity supply.” [30] When considering the costs of the grid, all zero emissions options should be considered, and the costs of each option should be made transparent, along with their reliability and security levels. Consumers should then be able to collectively choose which options they would prefer.

The Interim Report quotes the 2013 Inquiry Report by the Productivity Commission that recommends that “reliability standards should be set against an examination of the costs that consumers are willing to pay, rather than by prescriptive standards.”[31] We support the view from the AEMC review, as reported in the Interim Report, that “consumers should be given

[27] Interim Report, page 8
[28] Interim Report, page 18
[29] GetUp! and Solar Citizens, Homegrown Power Plan, 2016, p11, http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf
[30] Interim Report, page 41
[31] Productivity Commission, Electricity Network Regulatory Frameworks - Inquiry report, 2013, p.2. http://www.pc.gov.au/inquiries/completed/electricity/report/electricity-volume2.pdf

the choice to accept slightly lower reliability outcomes than the current NEM rules state, in return for cost savings that would result."[32]

2.5 How do we ensure data sharing benefits and privacy are appropriately balanced?

The benefits of big data are many, and should be utilised. To ensure privacy is appropriately balanced we recommend looking to the information technology sector and adopting best practices for data security and privacy, such as those set out in the Cloud Security Alliance's Big Data Security and Privacy Handbook [33]. With the appropriate privacy measures, there should be no barriers to utilising big data to improve energy services and security, and reduce costs.

THE TRANSITION TO A LOW EMISSIONS ECONOMY IS UNDERWAY (CHAPTER 3)

As the Interim Report states, "The transition to a lower emissions economy is underway and cannot be reversed,"[34] and there is no reason why it should be reversed. The shift to zero emission energy and a zero emissions economy provides numerous benefits. Not only does renewable energy offer one of the biggest reductions in greenhouse gas emissions (the electricity sector is responsible for 35% of Australian emissions [35]), but it offers co-benefits of cleaner air[36], better health[3738], lower health costs[39], more energy security with distributed networked grids[40], cleaner water, preserved natural environments, economic benefits[41] and more jobs.[42] Research by the Climate Council shows that even just 50% more renewables by 2030 would provide nearly 50% more jobs than business as usual.[43]

Energy and emissions cannot be separated, and we support the Interim Report[44] in stating that any policy on energy must incorporate emissions reduction and work in concert with emissions reduction policy to achieve zero emissions as soon as possible.

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[32] Interim Report, page 44 referencing page 44, referencing the 67. AEMC, *Review of distribution reliability outcomes and standards – NSW workstream*, 2012, pp.51-52

[33] Big data security and privacy handbook.
https://cloudsecurityalliance.org/download/big-data-security-and-privacy-handbook/

[34] Interim Report, page 19

[35] Climate Council. Australia's electricity sector: ageing, inefficient, and unprepared.
https://www.climatecouncil.org.au/australia-s-electricity-sector-ageing-inefficient-and-unprepared

[36] Climate Council Briefing paper: health effects of coal.
http://res.cloudinary.com/caha/image/upload/v1441165228/Climate-Council_HealthEffectsofCoal_WEB-PDF_gm3m4c.pdf

[37] The *Lancet* Countdown: tracking progress on health and climate change
http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32124-9/fulltext

[38] Climate and Health Alliance. Climate change is a health issue
http://res.cloudinary.com/caha/image/upload/v1441155391/CAHA-Briefing-Paper-1_Climate-change-is-a-health-issue1_wwmnyg.pdf

[39] Ben Machol and Sarah Rizk. 2013. Economic value of U.S. fossil fuel electricity health impacts. Environment International 52 75–80.
http://www.sciencedirect.com/science/article/pii/S0160412012000542

[40] Samantha Hepburn. South Australian blackout: renewables aren't a threat
https://theconversation.com/south-australian-blackout-renewables-arent-a-threat-to-energy-security-theyre-the-future-66405

[41] International Renewable Energy Agency. Renewable energy benefits: measuring the economics.
http://www.irena.org/DocumentDownloads/Publications/IRENA_Measuring-the-Economics_2016.pdf

[42] Australian Conservation Foundation and ACTU, 2016. Jobs in a clean energy future.
https://d3n8a8pro7vhmx.cloudfront.net/auscon/pages/1435/attachments/original/1477355385/ACF_Jobs_in_a_clean_energy_future.Web.pdf

[43] The Climate Council, 2016. Renewable Energy: Future Jobs and Growth. https://www.climatecouncil.org.au/renewablesreport

[44] interim report page 19

RESPONSE TO DISCUSSION QUESTIONS

3.1 What role should the electricity sector play in meeting Australia's greenhouse gas reduction targets?

As the largest single source of emissions, the electricity sector plays a vital role in reducing Australia's greenhouse gas emissions and provides the greatest opportunity for doing so. We support a goal of zero emissions from Australia's electricity sector as soon as possible, and by 2030 at the latest.

3.2 What is the role for natural gas in reducing greenhouse gas emissions in the electricity sector?

The Interim Report and the research we have reported on (Andrew Blakers[45], UNSW[46], BZE[47], HomeGrown Power Plan[48]) point out that complementary technologies are available that allow 100% renewables to power the grid and account for baseload, frequency, system inertia and system restart issues.[49] Gas, while having a lower emissions profile than coal, is not a zero emission source of electricity, and therefore has a limited future in the national energy supply, or in exports. Using a carbon budget approach as adopted by the Intergovernmental Panel on Climate Change (IPCC)[50], most of the world's fossil fuel reserves must be left in the ground, unburned, to keep global temperature rise to no more than 2°C in accordance with the Paris Agreement[51]. McGlade and Ekins[52] analysed the unburnable fossil fuels globally and for the OECD Pacific group (which consists mainly of Australia reserves):

- To have a 50% chance of meeting the 2°C warming limit, at least 52% of known global reserves of gas are unburnable, i.e. they must be left in the ground.
- To have a 75% chance of meeting the 2°C warming limit, at least 71% of known global reserves of gas are unburnable.

This analysis is based on a carbon budget from 2011 to 2050. Thus, results from this analysis will need to be reduced somewhat to account for the emissions from gas burned over the 2011-2016 period. Gas may have a small role to play in providing baseload supply while we transition to 100% renewables, but most of it must remain in the ground.

3.3 What are the barriers to investment in the electricity sector?

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[45] Andrew Blakers, Bin Lu and Matthew Stocks. 100% renewable electricity in Australia. [Research report received but not yet published].

[46] Ben Elliston, Iain MacGill and Mark Diesendorf. Least cost 100% renewable electricity scenarios in the Australian National Electricity Market.
http://www.ies.unsw.edu.au/sites/all/files/profile_file_attachments/LeastCostElectricityScenariosInPress2013.pdf

[47] Zero Carbon Australia. Stationary energy plan.
http://bze.org.au/stationary-energy-plan/

[48] HomeGrown Power Plan
http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf

[49] Interim Report, page 29.

[50] Intergovernmental Panel on Climate Change. Fifth Assessment Report.
https://www.ipcc.ch/report/ar5/
Note: The carbon budget is one method of tracking progress against the Paris Agreement 1.5-2°C target. The carbon budget is a simple, scientifically based method used to determine how much carbon humanity can "spend" (IPCC 2013).

[51] Climate Council. Unburnable carbon.
https://www.climatecouncil.org.au/unburnable-carbon-why-we-need-to-leave-fossil-fuels-in-the-ground

[52] McGlade C and Ekins P (2015) The geographical distribution of fossil fuels unused when limiting global warming to 2°C. Nature, 517(7533), 187-190.

The *World Energy Outlook 2016* report [53] suggests that the main barriers to transition are lack of consistent policy, a finding repeated by other observers. It's hard to ignore the consensus that consistent policy is the main barrier to investment in Australia, and despite that barrier, investment continues to grow [54].

The electricity sector is also absent a level playing field, with fossil fuel extractors being subsidised and not paying for the many external impacts (externalities) that their industry creates. To address this barrier, money should be shifted from polluters to problem solvers[55] by ending the subsidisation of fossil fuels, by charging fossil fuel companies for the external costs they incur, and by implementing a price on carbon - a suggestion that has been made by numerous sources over many years, and backed up by environmental and economic research.[56] [57] [58] [59] [60] [61] [62] [63] [64]

3.4 What are the key elements of an emissions reduction policy to support investor confidence and a transition to a low emissions system?

Policy consistency is paramount in ensuring investor confidence. This is highlighted in the *World Energy Outlook 2016* report by the International Energy Agency[65]. These policies and targets must be consistent with Australia's international commitments to limit global warming to less than 2 degrees. This demands a rapid phase-out of coal-fired power stations, including transition packages for workers and proper funding for rehabilitation, significant investment in large-scale renewable energy, which requires a strong and ambitious RET, supported by carbon pricing to deliver the emissions cuts in as smooth a way as possible.

3.5 What is the role for low emissions coal technologies, such as ultra-supercritical combustion?

Ultra-supercritical combustion does not offer the zero emission options required to deliver on Australia's 2 degree commitments, and is far more expensive when compared to renewables with storage. As such, we see it has no place in Australia's future energy mix and is in fact a distraction from the urgent investment that is required to help scale up renewable energy.

[53] International Energy Agency. World energy outlook 2016. http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html
[54] Global trends in renewable energy investment 2016 (page 11). http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf
[55] Home Grown Power Plan, p 14 http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf
[56] http://www.imf.org/external/pubs/ft/survey/so/2015/NEW070215A.htm
[57] https://d3n8a8pro7vhmx.cloudfront.net/auscon/pages/945/attachments/original/1466824397/SubsidisingBigCoal.pdf
[58] http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=357
[59] http://newsroom.unfccc.int/financial-flows/88bn-subsidies-for-fossil-fuel-explorations/
[60] http://www.worldenergyoutlook.org/resources/energysubsidies/
[61] http://www.oecd.org/environment/support-to-fossil-fuels-remains-high-and-the-time-is-ripe-for-change.htm
[62] http://www.theaustralian.com.au/business/business-spectator/putting-a-price-on-carbon-will-pay-off/news-story/92415fb095918c6c33ff1a89647bb9a0
[63] http://www.garnautreview.org.au/update-2011/update-papers/up6-carbon-pricing-and-reducing-australias-emissions.pdf
[64] http://www.nytimes.com/2016/03/02/business/does-a-carbon-tax-work-ask-british-columbia.html
[65] International Energy Agency. World energy outlook 2016. http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html

INTEGRATION OF VARIABLE RENEWABLE ELECTRICITY (CHAPTER 4)

To repeat a statement from the Interim Report, "The transition to a lower emissions economy is underway and cannot be reversed."[66] There is no reason to reverse the shift, because of the many co-benefits of renewables and climate mitigation already referenced, so we must plan for how to deliver variable renewable electricity (VRE) at a national level.

As mentioned in response to Chapter 3: The Transition to a Low Emissions Economy is Underway, the Interim Report and the research we have reported on (Andrew Blakers[67], UNSW[68], BZE[69], HomeGrown Power Plan[70], Climate Council[71]) point out that complementary technologies are available that allow 100% renewables to power the grid and account for baseload, frequency, system inertia and system restart issues.[72] There is no reason to avoid the use of VRE or the integration of VRE within the NEM. This, combined with the many benefits that VRE provides, is the reason why we support 100% renewable electricity by 2030 at the latest.

RESPONSE TO DISCUSSION QUESTIONS

4.1 What immediate actions could be taken to reduce the emerging risks around grid security and reliability with respect to frequency control, reduced system strength, or distributed energy resources?

With regards to integrated VRE into the grid, we believe action should be taken to reduce the risks to energy security and reliability. The actions taken should be transparent, to allow consumers the choice for accepting slightly lower reliability outcomes for cost saves, as per the Interim Report and AEMC review[73]. The actions should support the development of 100% VRE within the national supply. There is a large body of research that suggests that energy security and renewable generation are absolutely compatible, in that storage facilities are able to provide the security and stability required by a 100% renewable energy grid, including:

- Pumped hydro storage[74]
- Bio-fuel turbines[75]
- Hydroelectricity backup[76]

[66] Interim Report, page 19
[67] Andrew Blakers, Bin Lu and Matthew Stocks. 100% renewable electricity in Australia. [Research report received].
[68] Ben Elliston, Iain MacGill and Mark Diesendorf. Least cost 100% renewable electricity scenarios in the Australian National Electricity Market. http://www.ies.unsw.edu.au/sites/all/files/profile_file_attachments/LeastCostElectricityScenariosInPress2013.pdf
[69] BZE Stationary Energy Plan, http://media.bze.org.au/ZCA2020_Stationary_Energy_Report_v1.pdf
[70] Home Grown Power Plan, http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf
[71] Climate Council baseload?
[72] Interim Report, page
[73] Interim Report, page 44 referencing page 44, referencing the 67. AEMC, *Review of distribution reliability outcomes and standards – NSW workstream*, 2012, pp.51-52
[74] Blakers et al
[75] Elliston et al
[76] BZE Stationary Energy Plan, http://media.bze.org.au/ZCA2020_Stationary_Energy_Report_v1.pdf

Other options mentioned in the Interim Report would further provide action to reduce risks around frequency control and reduced system strength, including synchronous condensers, synthetic inertia, power conversion systems and fast interruption of loads.[77]

4.2 Should the level of variable renewable electricity generation be curtailed in each region until new measures to ensure grid security are implemented?

As the Interim Report pointed out in the case study of South Australia, and as AEMO reports [78], renewables were not to blame for the blackouts in South Australia.[79] The current level of VRE, while challenging, is not the cause of grid security issues. Considering this and fact that having a chance at meeting a 2°C warming limit requires leaving most fossil fuels in the ground, the level of VRE should not be curtailed in any region. Rather, the incentives and market rules should be in place to support the rapid development of storage and balancing facilities concurrently with the increase of VRE generation.

4.3 Is there a need to introduce new planning and technical frameworks to complement current market operations?

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question. Nevertheless, it seems that new planning and technical frameworks would be required to allow for appropriate integration of 100% VRE within the NEM.

4.3.1 Should there be new rules for generator connection and disconnections?

While an answer to this question is beyond the scope of our area of knowledge, considering the price spikes and blackouts in South Australia - and the reports that suggest these issues are to do with economic decisions[80], "market power abuse,"[81] transmission failure[82] , and gas generation[83] - it appears that there should be new rules for generator connection and disconnections.

4.3.2 Should all generators be required to provide system security services or should such services continue to be procured separately by the power system operator?

[77] Interim Report, page 29
[78] AEMO, *Update Report – Black System Event in South Australia on 19 October 2016*
[79] Interim report of this Review, page 32, para 3.
[80] Article on News.com.au
http://www.news.com.au/finance/business/cold-hard-economic-reality-of-power-supply-in-australia/news-story/e9518d5f8532b812881ba0f21c7511e5
[81] http://energy.unimelb.edu.au/__data/assets/pdf_file/0017/2054132/SA_PRICES_FINAL.pdf
[82] Article in the Sydney Morning Herald, reporting on emails with AEMO advice to the Prime Minister's office, from 7.20am, 29 September 2016 stating, "There has been unprecedented damage to the network (ie bigger than any other event in Australia), with 20+ steel transmission towers down in the north of the State due to wind damage (between Adelaide and Port Augusta). The electricity network was unable to cope with such a sudden and large loss of generation at once. AEMO's advice is that the generation mix (ie renewable or fossil fuel) was not to blame for yesterday's events – it was the loss of 1000 MW of power in such a short space of time as transmission lines fell over."
http://www.smh.com.au/federal-politics/political-news/pm-and-ministers-were-told-wind-not-to-blame-for-sa-blackout-20170212-guaxf0.html
[83] https://theconversation.com/south-australias-electricity-price-woes-are-more-due-to-gas-than-wind-62824

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question.

4.4 What role can new technologies located on consumers' premises have in improving energy security and reliability outcomes?

New technologies on consumers' premises can provide more sources of low, or zero, emissions electricity supply. The localised nature of supply engenders the opportunity for micro-grids which can provide more security for local networks, and the grid as a whole. It was the CEO of AGL Energy (Andy Vesey) who pointed out, after the SA blackout in September 2016, that distributed renewable energy generated and consumed at the local level has the potential to strengthen the electricity grid, not weaken it. He told the All Energy conference in Melbourne "if you have a system that is distributed and ... generated at the point of consumption and stored and you didn't have much transmission lines you'd have a much more secure system"[84]. Other observers have commented on the potential for micro-grids to provide a less extended, more reliable and more affordable infrastructure [85]

4.4.1 How can the regulatory framework best enable and incentivise the efficient orchestration of distributed energy resources?

The regulatory framework can best enable efficient orchestration of distributed energy resources by providing incentives for distributed suppliers to remain connected to the grid. A thorough incentive program will need to be considered to do this. The Homegrown Power Plan, suggests a fair national feed-in tariff.[86]

4.5 What other non-market focus areas, such as cybersecurity, are priorities for power system security?

In light of the "Energy Trilemma" and climate change, the clear non-market focus area for system security is the extreme weather and storm risk that is exacerbated as the climate warms. This will cause security risks to the physical infrastructure and transmission capabilities, as well as potential political risk as geopolitical tensions rise because of resource scarcity and weather impacts on people rise.

4.6 How could high speed communications and sensor technology be deployed to better detect and mitigate grid problems?

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question, but it seems that this technology could provide better real time monitoring and information about a more exact location of problems. This would allow for quicker response times to grid problems.

4.7 Should the rules for AEMO to elevate a situation from non-credible to credible be revised?

[84] AGL Energy CEO Andy Vesey says renewables are 'much more secure'. Australian Financial Review, 4 October 2016. http://www.afr.com/news/agl-energy-ceo-andy-vesey-says-renewables-are-much-more-secure-20161003-gru8oi#ixzz4a8YUJ3fT
[85] Giles Parkinson. Australia's energy future could be a network of renewable microgrids. http://reneweconomy.com.au/australias-energy-future-could-be-network-of-renewable-micro-grids-84534/
[86] Home Grown Power Plan, p7 http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf

A technical response to this question is beyond the scope of our knowledge and submission, but considering the SA case study, it seems that the rules should be reviewed to determine whether they are fit for purpose in a changing energy market.

MARKET DESIGN TO SUPPORT SECURITY AND RELIABILITY (CHAPTER 5)

As previously stated, the NEM, " was designed for a different world to the one it confronts today."[87] The price signals are not bringing forward the appropriate investments, and are not aligned with emissions reduction policy.

RESPONSE TO DISCUSSION QUESTIONS

5.1 Are the reliability settings in the NEM adequate?

The Interim Report quotes the 2013 Inquiry Report by the Productivity Commission that recommends that "reliability standards should be set against an examination of the costs that consumers are willing to pay, rather than by prescriptive standards."[88] We support the view from the AEMC review, as reported in the Interim Report, that "consumers should be given the choice to accept slightly lower reliability outcomes than the current NEM rules state, in return for cost savings that would result."[89]

Questions 5.2 - 5.6

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question.

PRICES HAVE RISEN SUBSTANTIALLY (CHAPTER 6)

The Interim Report notes that electricity prices in Australia have risen substantially over the last 5 to 10 years, and that "Increased network charges were the main driver of recent electricity price rises.[90]"

RESPONSE TO DISCUSSION QUESTIONS

6.1 What additional mechanisms, if any, could be implemented to improve the supply of natural gas for electricity generation?

While policy, regulation or additional mechanisms could be implemented to improve the supply of natural gas for electricity generation, considering the climate impacts of gas and the carbon budget available to limit warming, and the already low and dropping cost of renewables, the best option to improve electricity prices and security would be to shift to

[87] Interim Report, page 8
[88] Productivity Commission, Electricity Network Regulatory Frameworks - Inquiry report, 2013, p.2. http://www.pc.gov.au/inquiries/completed/electricity/report/electricity-volume2.pdf
[89] Interim Report, page 44, referencing note 67. AEMC, *Review of distribution reliability outcomes and standards – NSW workstream*, 2012, pp.51-52
[90] Interim Report, p 43 referencing Australian Energy Regulator (AER), *State of the Energy Market 2015*, p.133

100% VRE with storage as soon as possible. See response to Question 3.2 above for additional information.

6.2 What are the alternatives to building network infrastructure to service peak demand?

As outlined above local supply, P2P trading and micro-grids could help service peak demand. However, an alternative to infrastructure to service peak demand would be to manage peak demand. This could be done by information sharing and consumer agreement to reduce demand in peak periods or accept lower reliability standards and disruptions to supply. This could also be done with cost reflective pricing that would help reduce demand in peak periods, as mentioned in the Interim Report.[91]

6.3 What are the benefits of cost reflective prices, and could the benefits be achieved by other means?

Cost reflective prices could serve to mitigate and dampen demand, particularly in peak periods. Other means are likely available to achieve the same benefits, such as regulation, limits to use/supply (consumer approved), or incentives for installing more storage. As the Interim Report states, "It is possible that this consumer-initiated action will reduce the size of the peak network demand irrespective of cost reflective pricing[92]." Extra research and information is beyond the scope of our knowledge, or may need to be completed to determine the benefits to each option.

6.4 How can we ensure that competitive retail markets are working?

As the Interim Report notes, "There is very little public information available about retailer operating costs and margins across the industry or how much they contribute to retail prices.[93]" To ensure competitive retail markets are working, the market should have full transparency, an industry watchdog, and regulated incentives and penalties for behaviour that is antithesis to the NEO, and the objectives of access and affordability, security and reliability, and a reduction in emissions to zero.

6.4.1 What outcomes of competition should we monitor?

The NEO and energy objectives dictate what should be monitored for competition:

- access and affordability, particularly looking for market power abuse, price gouging and discriminatory access,
- reliability and security,
- reduction in emissions to zero.

ENERGY MARKET GOVERNANCE IS CRITICAL (CHAPTER 7)

Considering the scale of the transition underway, governance of the energy market is critical.

[91] Interim Report, p 44
[92] Interim Report, p 44
[93] Interim Report, p 45

Governance will ensure that the transition happens smoothly and in the interests of all Australians. Governance is also required to connect the energy and emissions reductions policies for Australia to meet the commitments made in the Paris Agreement to limit warming to 2°C, let alone deliver the objective - which we continue to support - of limiting warming to 1.5°C.

RESPONSE TO DISCUSSION QUESTIONS

7.1 Is there a need for greater whole-of-system advice and planning in Australia's energy markets?

While the division of responsibilities between rule-maker, operator and regulator has a sound rationale, the lack of a whole-of-system perspective means that challenges to the system may not be recognised or addressed efficiently or effectively. A whole-of-system approach would offer problem solving benefits.

> *7.1.1 If so, what are the most appropriate governance arrangement to support whole-of-system advice and planning?*
>
> Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question. Nevertheless, it appears that whole-of-system accountability could cut across all governance bodies, and/or be the responsibility of a specific body or group that is held accountable for holding a whole-of-system perspective.
>
> *7.1.2 Do the roles of ministers and energy market institutions need further clarification?*
>
> Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question.

Questions 7.2 - 5.4

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question.

7.5 What governance measures are required to support the integration of energy and emissions reduction policies?

> *7.5.1 Should the AEMA be amended?*
>
> Given the scale of the transition underway to low emissions energy sources, and the technological upheaval the AEMA may need to be reviewed. Without further research showing how the AEMA has impacted on the objectives of energy access and affordability, security and reliability, and emissions reductions, it is difficult to say whether or how the AEMA should be amended.

7.5.2 Should the NEO be amended?

The objective should reference the need to meet Australia's electricity needs in a manner that is consistent with a safe climate, given that dangerous climate change threatens the short, medium and long term interests of electricity consumers, for example upward pressure on prices, infrastructure damage, reduced security as non-renewable energy sources are depleted.

As such, the NEO should be amended to include a climate mandate.

Dr. Anne Kallies has observed that "not only is the current market framework in Australia perpetuating carbon-intensive patterns of electricity generation, its legal frameworks are designed and embedded in a way that makes change cumbersome and difficult to achieve". She notes that several commentators have argued for the inclusion of an environmental objective in the National Electricity Objective. She argues that "a large scale transition to renewable energy will require considerable electricity market reform" [94].

Kallies has also commented on the energy transition in Germany [95], and we suggest that the governance changes in Germany be examined for their possible application to Australia.

Therefore, the NEM must have, alongside its other mandates, a climate mandate. This would only be giving effect to what is already Government policy. One example of how to update the NEO is provided by GetUp! and Solar Citizens, "Deliver an affordable, efficient, reliable, safe and fair electricity system that is powered by 100% renewable energy."[96]

7.6 How can decision-making be appropriately expedited to keep up with the pace of change?

Given our focus on climate change imperatives, we consider that other stakeholders are better placed to respond to this question.

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[94] Anne Kallies. A barrier for Australia's climate commitments? Law, the electricity market and transitioning the stationary electricity sector.
http://www.unswlawjournal.unsw.edu.au/sites/default/files/394-12.pdf

[95] What can Australia learn from Germany's remarkable energy transition?
https://theconversation.com/what-can-australia-learn-from-germanys-remarkable-energy-transition-69648

[96] GetUp! and Solar Citizens, Homegrown Power Plan, 2016, p6,
http://cdn.getup.org.au/1499-Homegrown_Power_Plan_-Full_Report.pdf