CLIMATE COUNCIL

CLEAN & RELIABLE POWER: ROADMAP TO A RENEWABLE FUTURE

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Preface

Considering that the electricity sector is Australia's biggest polluter, any credible climate and energy policy needs to ensure the electricity sector achieves substantial greenhouse gas pollution cuts. This means ramping up renewable energy and storage, providing the right combination of new power plants to meet each region's reliability requirements, and ensuring consistency with state and territory commitments to net zero emissions by 2050.

Australia is already experiencing the many consequences of a changing climate, from worsening heatwaves, droughts and bushfires, to devastating coral reef bleaching, and most of our population centres being exposed to sea-level rise.

Quick, decisive national action is required by Australia to tackle climate change effectively.

This report establishes key policy principles for assessing the merits or flaws of any climate and energy policy. The report also provides a critique of the proposed National Energy Guarantee (NEG) based on these policy principles.

Policies which play a role in determining the future of Australia's electricity system - whether it is clean or polluting; expensive or affordable; reliable or fallible - will impact directly on the lives of every Australian for decades to come. It is critical that any new policy seeking to address electricity sector pollution passes these basic policy tests.

The Climate Council thanks our reviewers Tim Buckley (Director of Energy Finance Studies, IEEFA), Simon Holmes à Court (Senior Advisor to the Energy Transition Hub at Melbourne University), energy expert Dr Hugh Saddler, Oliver Yates (Member Smart Energy Council) and an anonymous reviewer for their insightful and very helpful feedback.

Andrew Stock
Climate Councillor

Petra Stock
Senior Energy and Climate Solutions Analyst

Greg Bourne
Climate Councillor

Louis Brailsford
Researcher

Key Findings

1

The Federal Government's proposed National Energy Guarantee (NEG) risks de-railing Australia's booming renewable energy and storage sector.

- The NEG proposes a limit of 28 to 36% renewable energy in 2030.
- The NEG risks stifling clean energy investment and jobs. The proposal could actually result in less jobs in renewable energy than the current 'business as usual' approach.
- There are serious concerns about the impact of the proposed NEG on competition in the electricity market.
- The NEG is not an integrated solution to improving reliability or tackling climate change.
- The NEG is made up of two separate, disconnected policy mechanisms that are each implemented differently based on geographic application, timeframes, exclusion or inclusion of emissions intensive trade exposed industries and method of implementation.

2

- **The NEG will not do enough to reduce Australia's rising greenhouse gas emissions and tackle climate change.**
- The NEG would result in just 26% emissions reduction in the electricity sector by 2030.
- The NEG proposes inadequate and weak greenhouse gas pollution cuts, and implies no further reductions beyond 2030.
- The NEG risks winding back greenhouse gas pollution cuts and renewable targets already committed to by state and territory governments.
- Australia's electricity sector is the nation's biggest polluter generating 34% of our emissions. The electricity sector also has the greatest opportunity to reduce pollution, while maintaining reliability and electricity prices simultaneously.

3

The NEG has misdiagnosed a reliability problem for the national energy grid, Australia's power supply is highly reliable.

- The NEG's proposed solution is to continue dependence on centralised coal and gas power plants, when the recent track record of these fossil fuel plants is anything but reliable.
- The Australian Energy Market Operator already has measures in place to ensure there is sufficient electricity supply to meet demand, and more reliability measures are on the way as adopted from the Finkel Review.
- Future reliability of supply requires forward planning to replace ageing, inflexible coal and gas plants with distributed renewable power and storage.
- Ageing and inefficient coal power stations are the key threat to reliability of electricity supply. These power plants struggle to operate in extreme weather conditions, including extended heatwaves. These plants have tripped over 40 times during the 2017-18 summer.

4

Australia's transition to a future powered by clean, affordable and reliable renewable energy and storage is underway, driven by the Renewable Energy Target and state and territory policies.

- Supported by state and territory policies and the Federal Renewable Energy Target, Australia's clean energy industry has made record investments in wind, solar and other forms of renewable energy throughout the year.
- The majority of states and territories in the National Electricity Market (NEM) (the electricity grid covering all states and territories except the Northern Territory and Western Australia) have adopted policies broadly in line with a goal of reaching 50% renewable energy by 2030.
- All states and territories in the NEM have committed to net zero emissions in the electricity sector (and economy wide) by 2050. The current design of the proposed NEG will hamper states and territories in being able to achieve their articulated targets.

HOW DOES THE NATIONAL ENERGY GUARANTEE MEASURE UP?

EMISSIONS

Policy Principle	How does the NEG measure up?	
Cut greenhouse gas pollution in the electricity sector by at least 60% (below 2005 levels) by 2030	Inadequate emissions target for the electricity sector of 26% (below 2005 levels) by 2030	✗
Reach zero emissions in the electricity sector well before 2050	-	✗
No international offsets	Offsets may be allowed	✗

RENEWABLE ENERGY

Policy Principle	How does the NEG measure up?	
Achieve at least 50 to 70% renewable energy by 2030	28 to 36% renewable energy by 2030	✗
Meet or exceed the total of state and territory renewable energy targets	State and territory policies can contribute to but not exceed the set level under the NEG	✗

RELIABILITY

Policy Principle	How does the NEG measure up?	
Address unreliability of ageing, inefficient coal and gas generators, especially during heatwaves	Ageing coal and gas generators may qualify	✗
Encourage new investment in zero pollution renewable energy and storage technologies when and where needed well in advance of coal closures	No zero pollution requirement for dispatchable power	✗

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Australia needs a fresh approach to cutting greenhouse gas pollution from the electricity sector. These are key policy principles for any credible climate and energy policies at the federal and state level.

Policy Principle 1

Accept the need for deep greenhouse gas pollution cuts overall and proportionally more and sooner from the electricity sector to tackle climate change in line with limiting global temperature rise below 1.5 to 2°C.

Policy Principle 2

Accept the independent advice (e.g., ClimateWorks 2017) that to achieve Principle 1, greenhouse gas pollution from the electricity sector must be reduced by over 60% by 2030 (on 2005 levels).

Holding electricity sector emissions reductions at 26% by 2030 (below 2005 levels) for a decade, implies other areas such as industry, stationary energy, transport and agriculture will need to do more to cut greenhouse gas pollution just to achieve Australia's woefully inadequate 2030 emissions reduction targets. Cutting pollution in these other sectors is more challenging and costly. There are as yet limited or no policies (either in place or planned) from the Federal Government addressing greenhouse gas pollution in these other sectors.

Policy Principle 3

To meet NEM state and territory commitments, the electricity sector should have plans in place to reach net zero emissions well before 2050. Industry governance bodies (such as the Energy Security Board, the Australian Energy Market Commission, Australian Energy Market Operator and the Australian Energy Regulator) should act in a manner which enables state and territory commitments to be achieved, as a minimum. The NEM states and territory commitments to zero net emissions by 2050 should be reflected in the National Electricity Objective.

Policy Principle 4

Any emissions target must act as a floor, not a ceiling on greenhouse gas pollution cuts. Efforts to cut greenhouse gas pollution must be able to be ratcheted up (but not down) overtime as needed.

Policy Principle 5

Achieve a minimum of 50 - 70% renewable energy across Australia by 2030, consistent with Policy Principles 2 and 3.

Policy Principle 6

Ensure any NEM wide emissions target and/or renewable energy target for 2030 and beyond (if adopted), must at least:

- Achieve the required level of greenhouse gas pollution cuts for the electricity sector to ensure Australia does its fair share on climate change (and taking into account reducing pollution is more challenging (and potentially more costly) for other areas of the economy like agriculture and transport).

- Meet or exceed the aggregate of state and territory targets.

A NEM wide Federally imposed emissions target which is inconsistent with action required on climate change and below that delivered by the aggregate of state and territory renewable energy targets will result in additional bureacratic red tape for the electricity sector and serve no useful or practical purpose.

Policy Principle 7

Australia needs to transition its ageing, inefficient coal and gas fleet. This requires policies which drive investment in new power sources in Australia - where and when needed - well in advance of coal closures to deliver real emissions reductions in Australia. International offsets will not achieve or contribute materially to the electricity industry transition.

Policy Principle 8

Any policy or mechanism designed to cut greenhouse gas pollution, should be underpinned by straightforward, regular and transparent tracking and reporting of emissions.

Any new policy for the electricity sector must be workable, with procurement price outcomes transparent to customers and with sensible incentives and penalties in place.

To minimise red tape, any new policy would ideally make use of existing reporting structures, such as already exist under the Renewable Energy Target, and National Greenhouse and Energy Reporting Scheme. This is preferable to inventing a new and overly complex method of calculating emissions for retail contracts as proposed under the NEG, a process which would lack transparency for the general public and be difficult to effectively administer and oversee.

Renewable energy reverse auctions could be one workable alternative to the proposed approach under the NEG, ensuring low costs, price transparency and a tailored approach taking into consideration the different circumstances of each state and territory.

Policy Principle 9

As supply reliability issues are most likely to occur in hot weather, any "Reliability Guarantee" must only credit value to power generation that is proven to perform reliably in high temperatures. Operating records show ageing coal and gas plants do not meet this test.

Policy Principle 10

Reliability mechanisms should be limited to new capacity, focused on zero emissions solutions.

Policy Principle 11

A credible integrated climate and energy policy needs to encourage investment in new clean power supply - when and where needed - well in advance of coal closures.

Additional reliability measures should be focused primarily on ensuring timely investment in new renewable energy and storage technologies.

The need for additional policies addressing reliability of supply should be carefully considered in light of existing and planned further measures tackling reliability, such as adopted Finkel Review recommendations and the significant amount of renewable energy and storage projects in the pipeline.

Policy Principle 12

Policies seeking to address reliability of supply must be in the common interest. Policies should meet criteria such as first demonstrating the need for the policy and considering any alternatives, be proportional to the issue and avoiding undue effects on competition and trade. Policies should favour zero greenhouse gas pollution solutions such as renewable energy and storage technologies.

1. Introduction

Last year - 2017 - saw an unprecedented public focus on energy in Australia. This focus was initially triggered by a one-in-50 year severe weather event in South Australia on 28 September 2016, which toppled 23 transmission towers and set in motion a chain of events that led to a statewide black out.

The weather event itself involved "supercell" thunderstorms and "an exceptional number of tornadoes" with wind speeds reaching 270 kilometres per hour (Bureau of Meteorology 2016) - faster than those recorded during Cyclone Tracy (Australian Government Publishing Service 1977). The South Australian black out became highly politicised, with the Federal Government and certain politicians opportunistically focusing the attention (and incorrectly blaming) state-based renewable energy targets (The Guardian 2016).

Yet the storm which hit South Australia occurred in a wetter and warmer atmosphere, and it is likely that these conditions are escalating the intensity of our storms. These wetter and warmer conditions are being driven by climate change. Australia's climate has warmed by about 1°C from 1910, with most warming occurring since 1950 (CSIRO and BoM 2016). As a result, Australia is experiencing the many consequences of a changing climate, from worsening heatwaves, droughts and bushfires, to devastating coral reef bleaching, and most of our population centres being exposed to sea-level rise. The burning of fossil fuels - coal, oil and gas - is the primary cause of temperature increases. If we don't seek to rapidly reduce our greenhouse gas emissions and limit the extent of climate change, the severity and frequency of extreme weather events and other climate impacts will only get worse.

In 2017, the Federal Government focused on fossil fuels, as states and territories stepped up efforts on renewable energy and storage.

Throughout 2017, energy discussion centered on various aspects of the electricity system, for example: extreme heat tested the limits of power supply; the Hazelwood coal power station closed; gas exports drove up domestic gas and power prices; and the Australian Competition and Consumer Commission investigated the effect on prices from lack of competition in the electricity and gas markets. New renewable energy and storage projects rolled out across many parts of the country.

The Federal Government proposed solutions which involved continued or greater reliance on coal and gas such as: supporting the building of new coal power stations with subsidised public financing (RenewEconomy 2017a); proposing the Clean Energy Finance Corporation invest in carbon capture and storage technology (Australian Government 2017); arguing to extend the life of the ageing Liddell Power Station (ABC 2017a); and allocating $90 million of the federal budget to fund gas exploration and development (Saddler et at 2017). The Federal Government also emphasised the role of large-scale pumped hydro energy storage, for example through its support for "Snowy 2.0", a project with the stated intent of supporting 'the economics of existing coal-fired generation' (Snowy Hydro Limited 2018).

Figure 1: Hazelwood Power Station closed in March 2017.

In contrast, state and territory governments proposed solutions to fast track the transition away from fossil fuels to renewable power. Examples included setting new renewable energy targets (in Queensland, Victoria, Northern Territory and Tasmania), and implementing a range of programs to support the construction of new wind, solar and storage projects (Climate Council 2017a). The South Australian government contracted the world's most powerful lithium-ion battery and the world's largest, cheapest-to-date solar thermal power plant with storage. Queensland and Victoria initiated large-scale auctions designed to contract lowest cost renewable energy towards meeting state targets.

Figure 2: Chief Scientist Alan Finkel led a comprehensive review into the future of the NEM.

Meanwhile, industry made record investments in wind, solar and other forms of renewable energy throughout 2017. This record investment has set Australia on track to meeting its 2020 Renewable Energy Target of 33,000 gigawatt-hours of renewable energy (equivalent to about 23.5% of Australia's electricity generation) (Clean Energy Regulator 2018). The fulfillment of the Renewable Energy Target is expected to drive a sharp reduction in wholesale electricity prices between 2018 and 2022 (COAG Energy Council 2017a).

The Finkel Review into the future of the NEM - led by Chief Scientist Dr Alan Finkel (Figure 2) - undertook a substantial public consultation and planning process to inform its final report issued in June 2017. The report outlined 50 recommendations for the electricity sector to increase security, ensure future reliability, address energy prices; and reduce greenhouse gas pollution (Finkel 2017). The report stressed the importance of system planning and action to ensure the right combination of new power supply is delivered in each region, in a timely way to achieve an orderly industry transition.

Federal, state and territory energy ministers agreed to 49 out of the 50 Finkel Review recommendations (COAG Energy Council 2017b). The one outstanding recommendation - for a Clean Energy Target - was not adopted due to opposition by the Federal Government (ABC 2017b). The recommendation of the Clean Energy Target mechanism was intended to encourage new

With Finkel Review recommendations on security, reliability, and affordability adopted, reducing pollution from the electricity sector remains the outstanding issue.

The 26% emissions reduction by 2030 proposed under the NEG is a woefully inadequate response to climate change.

low emissions generation after the RET is met in 2020, thereby overcoming significant investor uncertainty about the future direction of energy and emissions reduction policies (Finkel 2017).

With 49 Finkel Review recommendations addressing security, reliability and affordability now adopted; one outstanding issue remains. Australia continues to lack an enduring, credible, national policy to reduce greenhouse gas pollution overall and particularly from the electricity sector. The ongoing absence of an integrated climate and energy policy remains the 'primary cause of uncertainty' for investors (Parliament of the Commonwealth of Australia 2017) and is now seen as a 'necessary pre-condition to achieving energy affordability and security' and delivering on Australia's emissions reduction commitments (IEA 2018). However, in contrast to the lack of credible policy from the Federal Government, all states and territories (except Western Australia) now have in place renewable energy and/or zero emissions targets (Climate Council 2017a).

In October 2017, the Federal Government announced its proposed "National Energy Guarantee" (NEG). The NEG comprises a reliability component ("Reliability Guarantee") and an emissions component ("Emissions Guarantee") (Box 1). According to the Energy Security Board's advice (2017) and subsequent discussion paper (2018a), the NEG proposal could result in less renewable energy in 2030 than if the Federal Government were to do nothing.

The Federal Government's NEG announcement was based on an eight-page letter from the newly established Energy Security Board (2017). In a recent consultation paper (Energy Security Board 2018a), the Federal Government proposed the NEG cut emissions in the electricity sector to 26% by 2030 (on 2005 levels). Furthermore, the national emissions goal under the NEG would be set in place through to 2030, and require five years notice for any future changes beyond 2030. This goal is completely inadequate in terms of greenhouse gas pollution cuts required to tackle climate change, and limits the ability to ratchet up pollution cuts (as described in Chapter 2). The proposed NEG would also restrict renewable energy policies by state and territory governments, with the Federal Government stating these policies would be able to contribute to, but not exceed the NEG emissions target (AFR 2018). The NEG also layers additional reliability requirements on electricity retailers, despite numerous Finkel Review recommendations on reliability already approved by the COAG Energy Council for implementation.

The NEG is expected to lead to between 28 and 36% renewable energy by 2030 (Energy Security Board 2018a). At the lower end of the expected renewable energy range the NEG would result in a lower level of renewable energy than the Finkel Review projected under "business as usual conditions" (35% in 2030) (Finkel 2017).

The NEG will do little or nothing to reduce emissions across the NEM for over a decade, nor drive extra investment in renewable energy. A fresh approach to cutting electricity greenhouse gas pollution is needed.

This report outlines the key policy principles that must apply to any credible national climate and energy policy. Chapter 2 sets out minimum standards for reducing greenhouse gas pollution from the electricity sector. While Chapter 3 addresses the question of reliability, and whether further measures are needed in addition to Finkel Review recommendations. Chapters 2 and 3 also outline key policy principles, and assess the NEG proposal against each of these criteria. Chapter 4 discusses electricity price considerations for policy design. Lastly, Chapter 5 outlines the importance of public engagement and due process in determining electricity policy.

This report focuses on the NEM. The NEM covers the electricity grid connecting all states and territories except the Northern Territory and Western Australia. Nevertheless many of the principles outlined can also be applied to Western Australia and the Northern Territory.

This report focuses on greenhouse gas pollution from electricity and the reliability of electricity supply. Reliability means ensuring that there is enough electricity supply and network capacity available to meet consumer demand at all times, with some reserve capacity available as a buffer.

This report primarily addresses electricity pollution and reliability. It does not go into detail about power system security which differs from reliability. Security refers to whether the system can operate within defined technical limits. Security was covered in depth by the Finkel Review and its recommendations and is not addressed by the proposed NEG. However, it is worth noting that research indicates power systems can reach around 75% of wind and solar photovoltaic power without becoming an issue for security (University of Melbourne 2017).

For a detailed discussion of how an electricity grid powered by diverse renewable energy and storage can provide secure, reliable, clean and affordable power for Australians, see the Climate Council's (2017b) report:

Powering a 21st Century Economy: Secure, Clean, Affordable Electricity

The NEG will do little or nothing to reduce emissions across the NEM for over a decade, nor drive extra investment in renewable energy. A fresh approach to cutting electricity pollution is needed.

BOX 1: WHAT IS THE NATIONAL ENERGY GUARANTEE?

There remains limited detail available about the Federal Government's NEG proposal, and how it would be implemented. What little is known about the proposal is outlined in an eight-page letter of advice from the Energy Security Board (2017); in initial modeling undertaken for the COAG Energy Council (2017) and from a Draft Design Consultation Paper (Energy Security Board 2018a). The NEG comprises two separate additional requirements for electricity retailers: an "Emissions Guarantee" and a "Reliability Guarantee".

The Emissions Guarantee requires retailers to meet a set level of emissions per unit of power provided to retail customers. Retailers are expected to demonstrate their compliance through retail contracts which 'could, but need not, specify the generation source or emissions per MWh' (Energy Security Board 2018a). This approach would require retailers to make complex calculations as some contracts specify a generation source (e.g. power purchase agreement), while other contracts (e.g. swaps and caps) do not specify the source of electricity and would require the application of default emissions factors. The proposed NEG would require the development of new reporting systems and databases by energy retailers and regulators. Given the complexity of calculations and the proposed lack of public transparency in reporting (Energy Security Board 2018a), it is likely to be difficult for regulators and the broader community to verify whether retailers are meeting their obligations.

The NEG is expected to result in 28% to 36% renewable energy in 2030, limiting the overall share of wind and solar PV to 18% to 24% (Energy Security Board 2017). This is woefully inadequate to reduce our emissions and protect Australians from worsening climate impacts.

Adding further complexity to the system, the proposed NEG could allow retailers to defer a proportion of their compliance (up to 20% is proposed by the Energy Security Board) to later years, or potentially use offsets. Such flexibility would increase the difficulty of overseeing whether the electricity system is meeting required greenhouse gas pollution cuts in any given year. Retailers may also be able to trade amongst themselves (for example, between a retailer that over-achieves and one that under-achieves) and would need to account for the proposed exemption of emissions intensive trade exposed industries (Energy Security Board 2018a).

Tracking compliance by retailers is acknowledged by the Energy Security Board (2018a) to be a 'complex task', requiring the development of a new registry that matches actual physical generation from power stations with every retailer contract and convoluted yet approximate calculations of emissions levels.

The NEG proposes an overly complicated approach to emissions by placing the emissions requirement with retailers to be met through retail contracts. Alternative approaches would be more straightforward to implement. For example, alternative proposals such as the Finkel Review's

The NEG is expected to result in 28% to 36% renewable energy in 2030.

BOX 1: CONTINUED

Clean Energy Target or an Emissions Intensity Scheme (which both place the emissions requirement on electricity generators) could be implemented utilising existing reporting systems (for example, the National Greenhouse and Energy Reporting Scheme and reporting under the Renewable Energy Target).

The Reliability Guarantee establishes a process in which the Australian Energy Market Operator forecasts potential future reliability gaps; at some point in time, a requirement for retailers to fill the gap by contracting (or building) new generation is then triggered and the market encourages retailers to respond; any remaining gap is then allocated to retailers who would be required to meet a set percentage of "dispatchable" capacity for the power they purchase and sell on to customers. If retailers fail to meet their requirement, the Australian Energy Market Operator would then meet any remaining gap.

While technologies qualifying as "dispatchable" have not yet been defined, information available about the NEG implies that solar photovoltaic and wind power would be excluded, while coal, gas and hydro would be included (Energy Security Board 2017; 2018a).

While the NEG is described as 'the creation of a dual reliability and emissions guarantee' (Energy Security Board 2017), the way these mechanisms would operate suggests there is no direct link between the two components, with each having differing timeframes and methods of implementation. The reliability component would start 'no later than 2019' whereas the emissions component is deferred to start in 2020. Further, while the emissions intensive trade exposed industries are exempt from the emissions component, these industries are included in the reliability component. While the emissions component is to be a (geographically) one-size-fits-all approach for the whole NEM, the reliability component will be tailored to different states (Energy Security Board 2018a).

Contrary to the implied intent from various public comments by advocates of the NEG, it is not designed to protect the "security" of the electricity system, that is, it is not designed to stop consumer blackouts occurring because of generation, transmission and distribution failures.

The NEG's proposed approach of linking the emissions requirement to retail contracts is an unnecessarily complex approach.

2. Climate Change: Australia Needs to Move Rapidly Away From Coal and Gas to Renewable Energy

This chapter outlines key principles for cutting greenhouse gas pollution from Australia's electricity sector by accelerating the shift to renewable power and storage and doing so in an orderly manner. In order to drive investment in new renewable energy, any credible policy needs to achieve substantial greenhouse gas pollution cuts. This means ramping up renewable energy and storage, providing the right combination of new power plants to meet each region's reliability requirements, and ensuring consistency with state and territory commitments to net zero emissions by 2050.

2.1 Tackling Climate Change is Urgent

The world experienced its hottest five-year period on record between 2013 and 2017, continuing a strong, long-term upswing in global temperatures (Climate Council 2018a). Increasing global heat, driven primarily by the burning of fossil fuels like coal and gas, is exacerbating extreme weather events around the globe and in Australia.

Temperature records were broken across Australia throughout 2017, and seven of the ten hottest years on record in Australia have happened since 2005 (Climate Council 2018a). 2018 started with more climate disruption. On 7 January, Sydney's suburb of Penrith reached 47.3°C, recorded as the hottest place on earth over a 24-hour period (SMH 2018). The high temperatures experienced in Sydney caused the deaths of hundreds of flying foxes and impacted on the functioning of the city's public transport system (News.com.au 2018a). Extreme heat in Melbourne and Adelaide during January placed the health of Australian Open tennis players and Tour Down Under cyclists at risk (News.com.au 2018b).

On 7 January, Sydney's suburb of Penrith was recorded as the hottest place on earth, reaching 47.3°C.

Figure 3: Adelaide's Tour Down Under cyclists sweltered in temperatures above 40°C.

Tackling climate change is urgent. There is no time to lose if we are to limit global temperature rise to 1.5 to 2°C (above pre-industrial levels), and prevent worsening extreme weather and other escalating risks of climate change.

> '[Australia has] *ratified the Paris Agreement, which contains a commitment to limit global warming to 2 degrees Celsius above pre-industrial levels and ideally 1.5 degrees Celsius, as well as a commitment to zero net emissions in the second half of this century, with significant implications for the electricity sector... There is currently no clear mechanism to achieve long-term emissions reduction in the sector.*'
>
> - Parliament of the Commonwealth of Australia 2017

Limiting global temperature rise to 1.5 to 2°C, requires global greenhouse gas pollution to peak by 2020 and to reach net-zero emissions within about 25 years (Figueres et al. 2017; Rockström et al. 2017). Australia must do its fair share to cut greenhouse gas pollution and tackle climate change.

Australia has no credible, long-term, national plan to cut pollution in the electricity sector.

2.2 Deep Pollution Cuts are Required for the Electricity Sector

Greenhouse gas pollution from Australia's electricity sector (measured in carbon dioxide emissions per unit of power) is the highest among developed countries (IEA 2018). Australia's ageing, inefficient coal and gas power plants are responsible for over a third of greenhouse gas pollution in Australia (Department of Environment and Energy 2017a). Accelerating the closure of these coal and gas plants presents a unique opportunity for Australia to rapidly cut greenhouse gas pollution and move to a modern, clean 21st Century electricity system - one powered by diverse renewable energy sources and storage technologies.

The electricity sector is Australia's biggest polluter. It is also the sector with the greatest opportunities to both cut greenhouse gas pollution (ClimateWorks 2017; IEA 2018) and reduce electricity prices at the same time (CSIRO 2016). Clean renewable energy and storage technologies are proven, commercially viable and rapidly deployable at scale. For example, the CSIRO (2016) found Australia could transition to zero emissions electricity by 2050 and in doing so, deliver significant cost savings to households and businesses. Numerous studies have consistently found there are no technical barriers to Australia achieving secure, reliable power from a very high proportion (up to 100%) of renewable electricity (AECOM 2012; AEMO 2013; Elliston et al 2013; Lenzen et al 2016; Teske et al 2016; CSIRO 2016; Finkel 2017; Stocks et al 2017; University of Melbourne 2017).

Renewable energy and storage technologies (eg. Figure 4) are proven, cost effective and available now to clean up the electricity sector. Reducing greenhouse gas pollution in other areas, such as agriculture and transport is more challenging and potentially costlier (ClimateWorks 2017). Importantly, cutting emissions in the electricity sector is also a prerequisite to being able to cut emissions in other major polluting sectors which are currently reliant on fossil fuels, e.g. transport.

The inevitable closure of ageing coal plants presents an opportunity for Australia to move to a clean, 21st Century electricity system.

Moving away from coal and gas power stations can cut pollution and electricity prices at the same time.

Australia needs to cut greenhouse gas pollution across the board. A low target for the electricity sector implies other areas such as industry, stationary energy, transport and agriculture will need to do more to cut pollution. Cutting greenhouse gas pollution in these other sectors is more challenging and costly. There are as yet limited or no policies (either in place or planned) from the Federal Government addressing greenhouse gas pollution in these other sectors (Department of Environment and Energy 2017b).

In order for Australia to contribute its fair share to limit global temperature rise, independent advice by the Climate Change Authority (2015) recommended Australia cut its greenhouse gas pollution by 45 to 65% below 2005 levels by 2030. This is the bare minimum required to be in line with the science. For the electricity sector - which can and should do more - this means reducing greenhouse gas pollution by over 60% by 2030 (ClimateWorks 2017).

In the longer term, Australia needs to be on a pathway to net zero emissions well before 2050. Notably, every state and territory in the NEM is already committed to reaching economy-wide zero net emissions targets by 2050 (Box 2). By contrast, the Federal Government has no national target beyond 2030, and even the 2030 target is not legislated.

Figure 4: The Hornsdale Wind Farm set a record low price for wind in 2016, wind prices have since fallen even lower (RenewEconomy 2017b).

BOX 2: NEM STATES AND TERRITORIES ARE COMMITTED TO REACHING NET ZERO EMISSIONS BY 2050

The NSW Government has committed to an aspirational objective of achieving net-zero emissions by 2050.

- NSW Government 2016

The Queensland Government has set a state target to reach zero net emissions by 2050.

- Queensland Government 2017

The long-term emissions reduction target for the State [Victoria] is an amount of net zero greenhouse gas emissions by the year 2050.

- Climate Change Act 2017 (Vic)

The principal target is to reduce greenhouse gas emissions in the ACT to achieve zero net emissions by 30 June 2050.

- Climate Change and Greenhouse Gas Reduction Act 2010 (ACT)

Taking action to meet a legislated target of zero net emissions by 2050.

- Tasmanian Government 2017a

South Australia will achieve net zero emissions by 2050.

- Government of South Australia 2017

Sources: Climate Change Act 2017 (Vic); Climate Change and Greenhouse Gas Reduction Act 2010 (ACT); Government of South Australia 2017; NSW Government 2016; Queensland Government 2017; Tasmanian Government 2017a.

All NEM states and territories are committed to reaching net zero greenhouse gas pollution by 2050.

To reduce greenhouse gas pollution from the electricity sector in line with effective action on climate change, policies at the federal and state level need to:

Policy Principle 1

Accept the need for deep greenhouse gas pollution cuts overall and proportionally more and sooner from the electricity sector to tackle climate change in line with limiting global temperature rise below 1.5 to 2°C and meeting Australia's international commitments.

Policy Principle 2

Accept the independent advice (e.g., ClimateWorks 2017) that to achieve Principle 1, greenhouse gas pollution from the electricity sector must be reduced by over 60% by 2030 (on 2005 levels).

Holding electricity sector emissions reductions at 26% by 2030 (below 2005 levels) for a decade, implies other areas such as industry, stationary energy, transport and agriculture will need to do more to cut greenhouse gas pollution just to achieve Australia's woefully inadequate 2030 emissions reduction targets. Cutting pollution in these other sectors is more challenging and costly. There are as yet limited or no policies (either in place or planned) from the Federal Government addressing greenhouse gas pollution in these other sectors.

Policy Principle 3

To meet NEM state and territory commitments, the electricity sector should have plans in place to reach net zero emissions well before 2050. Industry governance bodies (such as the Energy Security Board, the Australian Energy Market Commission, Australian Energy Market Operator and the Australian Energy Regulator) should act in a manner which enables state and territory commitments to be achieved, as a minimum. The NEM states and territory commitments to zero net emissions by 2050 should be reflected in the National Electricity Objective.

The greenhouse gas pollution cuts proposed under the NEG are a completely inadequate response to climate change, placing Australians at risk from intensifying climate impacts. The NEG would result in only 26% emissions reduction in the electricity sector by 2030, with no long term targets in place (Energy Security Board 2018a). After 2030, the current Federal Government required modelling of the NEG to achieve a "constant target post 2030" implying no further greenhouse gas pollution cuts beyond 2030 (Minister for the Environment and Energy 2017).

The proposed future target setting process under the NEG would ensure that **no** Federal Government could increase the emissions reduction target for the electricity industry earlier than 2030. Beyond that, any future targets would be set 10 years in advance every 5 years, with the earliest being for 2035 to be set in 2025) (Energy Security Board 2018a). In essence, the NEG would lock in the electricity sector to an inadequate 26% target until 2030, and ensure the continued operation of nearly all polluting coal and gas power plants for at least two decades.

This "lock in" emissions framework indicates the Federal Government's intent with the NEG is:

- to support the fossil fuel industry by locking in a low NEG emissions target for over a decade, and
- to ensure future Federal governments are prevented from making any impact on electricity sector emissions targets until 2035 at the earliest.

In an industry where disruptive clean technologies are developing rapidly and coming down in cost dramatically, a scheme clearly designed to lock the Australian economy into old fossil fuel power generators for almost two decades is clearly nonsensical.

Australia, together with 196 countries worldwide has signed the near universal Paris Climate Agreement (UNFCCC 2018). In addition to commitments made to limit global temperature rise to 1.5°C to 2°C, countries including Australia agreed to a 5-year review and strengthening mechanism. This means that countries will be expected to increase greenhouse gas pollution cuts overtime.

Policy Principle 4

Any emissions target must act as a floor, not a ceiling on greenhouse gas pollution cuts. Efforts to cut greenhouse gas pollution must be able to be ratcheted up (but not down) overtime as needed.

With the proposed NEG locking in a low emissions target for over a decade for the electricity sector, other sectors of the Australian economy will need to dramatically ramp up greenhouse gas pollution cuts. Meanwhile, the electricity sector - which can both cut pollution and prices at the same time - is effectively prevented from going further.

Low greenhouse gas pollution reduction targets for the electricity sector mean other areas of the economy, where pollution cuts are more challenging and costly, will have to ramp up efforts.

2.3 How Much Renewable Energy and By When?

Limiting global temperature rise below 1.5 to 2°C, requires a minimum of 50 to 70% renewable electricity by 2030, and to be on a pathway towards zero net emissions well before 2050 (ClimateWorks 2017). Despite having world-class renewable energy resources, Australia has one of the lowest levels of renewable energy (as a proportion of total energy) among developed countries (IEA 2018).

States and territories are already taking steps to move away from polluting coal and gas power stations to clean renewable power sources. The majority of states and territories in the NEM have adopted policies broadly in line with a goal of 50% renewable energy by 2030, and all have committed to zero emissions in the electricity sector well before 2050 (Table 1).

Table 1: Emissions Targets, and current Renewable Electricity Targets across states and Territories in the NEM.

	SA	TAS	VIC	NSW	ACT	QLD
Net zero emissions targets	Net zero emissions by 2050	Net zero emissions by 2050	Net zero emissions by 2050	Net zero emissions by 2050	Net zero emissions by 2050	Net zero emissions by 2050
Renewable electricity targets	50% by 2025	100% by 2022	25% by 2020 40% by 2025	-	100% by 2020	50% by 2030

Source: ACT Government 2015; ACT Government 2017; Climate Council 2017a; Government of South Australia 2015a; Government of South Australia 2015b; Office of Environment and Heritage 2016; Tasmanian Government 2017a; Tasmanian Government 2017b; Victoria State Government 2017.

Note: The South Australian Government has committed to a renewable energy target of 75% by 2025, and a 25% renewable storage target if re-elected (The Guardian 2018). The Tasmanian Labor opposition has committed to reaching 120% renewable energy within five years if elected (RenewEconomy 2018).

States and territories are already taking steps towards reaching these targets:

- South Australia has achieved 57% wind and solar generation (in the nine months to March 2017) (Australian Energy Regulator 2017).
- The ACT has contracted enough large-scale renewable energy to meet its 100% renewable electricity target by 2020 (Climate Council 2016; RenewEconomy 2016).
- Victoria and Queensland have established a first round of renewable energy auctions and a range of other policies designed to meet their renewable energy targets (Queensland Government 2018; Victorian Government 2018).
- Tasmania is already at 92% (Australian Government 2017; Figure 5) renewable energy and two new wind projects - Cattle Hill and Granville Harbour - are set to begin construction (Climate Council 2017a).
- New South Wales had the greatest capacity of new renewable energy under construction in 2017 (Climate Council 2017a) though it is yet to adopt an electricity policy or target to deliver on its 2050 net zero emissions target.

Figure 5: Tasmania has significant hydro and wind power resources.

Australia could reach 52% renewable energy by 2030 if the current pace of renewable energy uptake continues.

Under the NEG, state and territory renewable energy targets and policies would be able to contribute to, but not exceed the NEG emissions target (AFR 2018). However some policies, like the ACT Government's 100% renewable energy target were specifically designed to be additional to national action. It is unclear how the NEG would account for such policies.

Record levels of investment in renewable energy - driven by the Renewable Energy Target and state and territory action - saw more than 1,000MW of new wind and solar projects start generating in 2017 (Clean Energy Regulator 2018). The Clean Energy Regulator (2018) anticipates 2018 and 2019 will see even more renewable energy come online in these years - more than doubling the amount in 2017. Modelling by Bloomberg New Energy Finance has shown 52% renewable energy could be achieved by 2030 if the current pace of renewable energy uptake by the states and territories continues through the 2020's (BNEF 2017).

Policies at the federal and state level must complement each other and need to:

Policy Principle 5

Achieve a minimum of 50 - 70% renewable energy across Australia by 2030, consistent with Policy Principles 2 and 3.

Policy Principle 6

Ensure any NEM wide emissions target and/or renewable energy target for 2030 and beyond (if adopted), must at least:

- Achieve the required level of greenhouse gas pollution cuts for the electricity sector to ensure Australia does its fair share on climate change (and taking into account reducing pollution is more challenging (and potentially more costly) for other areas of the economy like agriculture, and transport), and
- Meet or exceed the aggregate of state and territory targets.

Figure 6: Workers at Lakeland Solar and Storage Project.

A NEM wide Federally imposed emissions target which is inconsistent with action required on climate change and below that delivered by the aggregate of state and territory renewable energy targets will result in additional bureaucratic red tape for the electricity sector and serve no useful or practical purpose.

The proposed NEG, as a NEM wide proposition, fails to meet these essential policy requisites. It is expected to result in only 26% emissions reduction by the electricity sector by 2030; and as little as 28 - 36% renewable energy in 2030 (Energy Security Board 2017; 2018a). In the absence of credible Federal and state plans and pathways for the other sectors to achieve their proportionate emission reductions, the NEG proposal lacks credibility and ensures Australia will not meet its international greenhouse gas pollution reduction commitments. The shortfalls are clear. The lower end of this renewable range (28% in 2030) would see less renewable energy by 2030 than the Finkel Review projected under "business as usual conditions" (35% in 2030) (Finkel 2017). The proposed NEG could slow the current pace of renewable energy rollout in the NEM (BNEF 2017) resulting in up to 20,000 less net jobs in 2030 (compared with a policy for 50% renewable energy; e.g. Figure 6) (Climate Council and EY 2017).

The proposed NEG suggests a NEM wide emissions target which is inconsistent with action required on climate change and below the aggregate of state and territory renewable energy targets. The NEG could potentially result in additional bureaucratic red tape for the electricity sector and serve no useful or practical purpose.

2.4 Offsets

The NEG (Energy Security Board 2018a) and the Federal Government (Department of Environment and Energy 2017b) may allow electricity retailers to purchase international carbon credits to "offset" their emissions requirements under the NEG. International carbon credits support emissions reduction initiatives overseas rather than domestically. Credits purchased from overseas and paid for by Australian power consumers will see jobs and investment going to other countries. Meanwhile, low NEG emissions targets would mean Australians in the renewable energy and storage industries will lose their jobs, and leave Australian consumers reliant on dirty old unreliable coal and gas power stations.

The low emissions reduction target for the electricity sector under the NEG will also mean that other sectors (such as agriculture and transport) will have to contribute much more to reducing greenhouse gas pollution to ensure Australia meets its its international commitment to limiting temperature rise to no more than 2°C. This in turn may lead to an even greater reliance on international carbon credits from these other sectors to meet their emissions targets, as these industries face higher abatement costs and may struggle to reduce emissions domestically (RepuTex Carbon 2017).

Investments overseas supported by international carbon credits will modernise overseas economies, in preference to fostering the investment in Australia critical to transitioning Australia's electricity system to modern low emissions technologies.

Policy Principle 7

Australia needs to transition its ageing, inefficient coal and gas fleet. This requires policies which drive investment in new power sources in Australia - where and when needed - well in advance of coal closures to deliver real emissions reductions in Australia. International offsets will not achieve or contribute materially to the Australian electricity industry transition.

2.5 Designing a Workable Policy for Reducing Emissions

The NEM comprises a complex regulatory regime to administer a complex industrial machine – the electricity supply system. This industry and the market structures are there for one purpose – to serve the interests of electricity consumers. It is critical that the design of the system best reflects consumer interests, both shorter and longer term.

Poll after poll shows that consumers expect to receive reliable, competitively priced power that comes without greenhouse gas pollution. As power retailers are the primary interface between the traditional industry and its customers, it would not be unreasonable to place the obligation for clean power procurement with them provided the market operated as a pure market with low entry and exit barriers and high levels of competition. Unfortunately, that is not the case.

The electricity market is highly concentrated in every NEM state. Three (or fewer) companies control around three quarters or more of the total generation capacity in every state (ACCC 2017). The big three electricity companies (AGL, Origin and Energy Australia) that own both generation and retail companies supply around 70% of all retail electricity customers and own around 48% of generation capacity (with an even greater share of the market in New South Wales, Victoria and South Australia). The market share and vertical integration (companies owning both generation and retail businesses) of these companies can impact on the ability of smaller, standalone retailers to compete.

Furthermore, the benefit of the buying power the big retailers possess does not flow through to customers, particularly when it comes to their renewable purchase obligations. Big renewable power projects (wind and solar farms) are now routinely contracted via non-transparent bi-lateral contracts at combined prices for certificates and power in the $50's to $60's per MWh (RenewEconomy 2017b). However household and business customers are not seeing the benefit from these low renewable energy prices. This is because the big retailers pass on these certificate costs to consumers at prices reflecting the spot price (ACCC 2017), which is artificially high because the retailers are in a position to create a net shortage of projects and certificates, and thus high spot clearing prices. This means retailers are able to pass on inflated prices for renewable energy, pushing up customers' power bills, while pocketing the difference (RenewEconomy 2017c).

The Energy Security Board acknowledges that market power and competition are issues for the electricity industry in the NEM. In its latest consultation paper, the Energy Security Board (2018a) provides no detail on how the design of the NEG will avoid further entrenching market power and barriers to entry for smaller players. In fact, it proposes to defer any further consideration on these issues 'until the design of the Guarantee is further developed'. The timetable proposed by the Energy Security Board would see the design of the NEG put to COAG Energy Council by early April (that is, in little more than a month). It remains unclear when Australian electricity consumers, who are currently paying the price of uncompetitive markets, will be able to review and comment on how the NEG proposes to address competition and power prices.

BOX 3: RENEWABLE ENERGY AUCTIONS: AN ALTERNATIVE APPROACH TO ENSURING LOW COST RENEWABLE ENERGY

One option to break the nexus between retailer market power, lack of transparency, and excessive margins for retailers, (given high retail electricity market concentration), as well as foster new entrants and competition, could be for a central government body (such as the Australian Energy Market Operator or state and territory governments) to centrally procure renewable power (complemented by storage if needed) under a reverse auction method. A reverse auction is an auction where electricity companies bid to provide power and the lowest cost projects bid win the contracts. Auctions can be designed to achieve desired outcomes, for example an auction could call for bids of "dispatchable" renewable power requirements (thereby satisfying both emissions and reliability requirements).

The reverse auction method has proved very successful in overseas markets and in the Australian Capital Territory (with reverse auctions for renewable energy also now underway in Queensland and Victoria). Reverse auctions for renewable energy are fast becoming the preferred approach globally, with 67 countries adopting renewable energy auctions in 2016 (IRENA 2017). Reverse auctions in India, South Africa, France and Morocco have seen the price of solar fall dramatically (IRENA 2017).

Figure 7: Morocco's Noor-Ouarzazate Solar complex.

BOX 3: CONTINUED

Renewable energy auctions within clear policy frameworks are becoming increasingly popular worldwide because they:

- improve competition;
- increase scale and lower power costs;
- provide transparency on price;
- achieve greenhouse gas pollution cuts and broader economic benefits;
- integrate into a broad range of energy market designs;
- attract global capital markets as well as global firms with deep experience and management capacity; and
- provide a means of creating certainty for investors (through long term contracts with strong credit support) regardless of political, policy or institutional changes (IRENA 2017).

These features ensure renewable energy reverse auctions have been a key driving force behind rapidly falling electricity prices overseas and in some parts of Australia, like the Australian Capital Territory.

Once centrally procured, low emission/ renewable power could be allocated to retailers at cost in proportion with their market Emissions Guarantee obligations. There is an added benefit from adopting reverse auctions for renewable energy capacity. The Finkel Review (Finkel 2017) recommended that AEMO assess each region's requirements separately for reliability reasons. If power is centrally procured, this allows the technology type (wind, solar photovoltaic, solar thermal, and storage) and placement to be specified and procured to meet regional reliability obligations as well as emission requirements in the least cost manner.

On the other hand, the NEG proposes each retailer can procure electricity generation wherever and whenever it suits their own purposes, which is likely to result in a suboptimal outcome for the overall electricity system and hence consumers. Renewable energy auctions could instead be used to encourage the optimal type and lowest cost of investment needed in the location required (IRENA 2017).

Another important aspect is that costs of the industry transition to low/zero emissions should be transparent to consumers, who are ultimately paying for the electricity. This is particularly in light of the over-investment in grid capacity that has occurred over the last decade at material ongoing cost to the public (see Chapter 4). In overseas markets and in the ACT where reverse auctions are the primary procurement method, the prices and terms for successful renewable energy projects are made public, so consumers not only see which projects are being selected in

A reverse auction is an auction where electricity companies bid to provide power and the lowest cost projects win the contracts.

BOX 3: CONTINUED

the regions or states where they live (that's where the investment and jobs are created), but also the prices of those projects. This transparency has demonstrated the low cost of renewable energy and counters the margin capture that otherwise can occur in a highly concentrated retail market with retailers buying through non-transparent bi-lateral agreements.

Importantly, central procurement would also enable a tailored approach to each region, given each NEM region has differing renewable and storage resources available to it, different starting emissions intensities, and differing reliability exposures (due to differing levels of renewable penetration, types of renewable energy and varying age profile of existing fossil fuelled plants). The NEG proposes retailers can meet their emissions obligations across the NEM as a whole, meaning that investment decisions will be made by retailers and may not result in new investment in the locations where it is needed (for example in a state where large coal plants are expected to close).

An added benefit of the central procurement approach would be that the higher credit ratings (ranging from "AA" to "AAA") for the Australian Energy Market Operator or state governments (Business Insider Australia 2017), compared to electricity retailers such as Origin Energy (SMH 2017) and EnergyAustralia (CLP Group 2017), or smaller "tier 2" or "tier 3" retailers, would enable lower interest rates on debt for new projects tendered, thereby reducing consumer power prices further. Government bodies (such as the Australian Energy Market Operator or state governments) can contract for longer terms, enabling longer debt repayment periods and access to lower interest rates as re-financing risk is reduced.

This effect is similar to banks charging higher interest rates for home loans where the home buyer has a poorer credit rating, or for shorter term loans. Higher credit ratings generally mean lower interest rates, which ultimately means lower cost renewable energy. The NEG effectively interposes retailers' poorer credit rating onto the cost of renewable energy, which will likely increase interest rates, and result in higher costs (which are ultimately passed on to electricity customers).

Finally, central procurement and allocation to retailers avoids the prospect of retailers defaulting on their Emissions Guarantee obligations and ensures that in other events of retailer default, their power agreements (and embedded emissions obligations) are readily transferrable to remaining other retailers.

Central procurement and allocation of emissions obligations according to retail market volume shares completely avoids the complexity of reporting and tracking compliance under the proposed NEG. The NEG regime proposed by the Energy Security Board (2018a) would require every retailer contract and every generator contract to be disclosed to the central regulatory agency, raising all manner of commercial disclosure risks, information security risks, as well as administrative complexity. Central procurement could be undertaken by state and territory governments (as is now occurring under schemes already underway in Australian Capital Territory, Queensland, Victoria and South Australia), or, if needed, by the Australian Energy Market Operator.

Policy Principle 8

Any policy or mechanism designed to cut greenhouse gas pollution, should be underpinned by straightforward, regular and transparent tracking and reporting of emissions.

Any new policy for the electricity sector must be workable, with procurement price outcomes transparent to customers and with sensible incentives and penalties in place.

To minimise red tape, any new policy would ideally make use of existing reporting structures, such as already exist under the Renewable Energy Target, and National Greenhouse and Energy Reporting Scheme. This is preferable to inventing a new and overly complex method of calculating emissions for retail contracts as proposed under the NEG, a process which would lack transparency for the general public and be difficult to effectively administer and oversee.

Renewable energy reverse auctions could be one workable alternative to the proposed approach under the NEG, ensuring low costs, price transparency and a tailored approach taking into consideration the different circumstances of each state and territory.

Interposing retailer credit ratings onto the cost of renewable energy could result in higher costs being passed on to consumers.

3. Reliability: Keeping the Lights On While Avoiding Unnecessary Red Tape

This Chapter highlights that Australia's electricity grid is highly reliable. Where interruptions or outages occur, the vast majority are caused by issues affecting power lines. The contribution of electricity supply (or lack of supply) from power generators to outages experienced by electricity users is negligible.

The vast majority of outages are caused by issues affecting power lines.

BOX 4: RELIABILITY VERSUS SECURITY

"Reliability" means ensuring there is enough electricity supply and network capacity available to meet consumer demand at all times, with some reserve capacity available as a buffer. On the other hand, "security" and "system security" means the system is able to operate within defined technical limits, even if there is a loss of a major transmission line or generator. (Energy Security Board 2018a). Many of the recommendations made by the Finkel Review deal with addressing reliability and security issues and have already been adopted by COAG for implementation. The NEG only deals with reliability.

The key reliability issues for electricity supply are due to Australia's ageing, inefficient coal power plants (AEMO 2017). These large central ageing plants struggle to operate in extreme weather events, such as extended heat waves. They can under perform or trip unexpectedly, removing hundreds of MW of power supply from the grid in an instant. Reliability issues (such as a large central power station instantly failing) can also threaten system security by causing rapid changes in frequency or other technical characteristics of the system. Unexpected trips of large central power plants have happened at least 40 times during summer 2017/18 (The Australia Institute 2018). Although Finkel's recommendation of a minimum 3 years notice of closure for old plants has been adopted, policies are also needed to ensure new renewable power and energy storage capacity of the right type are built and come online in advance of coal closures to avoid supply risks and consumer price shocks.

The Energy Security Board's proposal that the NEG place the Reliability Guarantee with retailers (dominated by the big three energy companies) to deliver on is risky. They are conflicted as most already are highly vertically integrated with old fossil fuel generators of their own. They are the primary beneficiaries of higher prices caused by outages, as they can push the high wholesale power costs their plant outages helped create through to even higher retail prices, and capture higher margins in the process. They are also less likely to contract new capacity in a timely manner, thereby increasing a tight supply-demand balance and higher prices in the wholesale power market. This pushes up consumer prices and retail margins, which they benefit from at both wholesale level (through their generation and trading positions) and retail level (via retail margins).

Analysis of all of the approximately 10,000 MW of new dispatchable thermal capacity built under the NEM since inception in the early 1990's shows that over 70% was built, bought or is now controlled by the five largest energy companies owning both retail and generation assets. This occurred as the NEM evolved from a time when retail and generation was separately owned and controlled, to the high levels of vertical integration we see today. Looking forward, placing the NEG Reliability Guarantee with these big retailers (who own most of the generation already) is likely to see market concentration increase even further.

The design of the NEG's reliability component is based on a series of false premises.

The issues with the NEG design for reliability are even deeper than this as they are based on three false premises:

- The NEG's focus on electricity supply only deals with 0.24% outages, equivalent to under two seconds a year of interruption.
- The NEG's reliability approach may involve relying on services from large centralised coal and gas power plants, when the recent track record of these fossil fuel plants is anything but reliable.
- The NEG places faith in the ability of a financial market based system, already controlled by a few large energy companies, to bring forward new capacity of the optimal type, where and when needed, to deliver the required transformation of Australia's electricity infrastructure and act in the interests of consumers and the environment. There is little evidence from other power systems globally to support this premise.

3.1 Australia's Electricity System is Extremely Reliable. Powerlines are the Main Source of Power Outages

A reliable power system is one which supplies electricity, as needed, to meet the needs of customers (industry, businesses and households). Australia's NEM is highly reliable. Electricity is supplied at the wholesale market level to meet customers' needs 99.998% of the time (AEMO 2017) a standard which is set by the AEMC Reliability Panel, chaired by the AEMC and comprised of industry and consumer representatives, and AEMO. This is equivalent to customers (on average) losing power for 11 minutes a year (in other words, for 364 days, 23 hours and 49 minutes power needs were met).

The reliability of our electricity system has actually improved in the last ten years:

> *Excluding impacts following floods and cyclones, customers who previously experienced an average of two interruptions a year now experience one interruption each year.*
>
> - Parliament of the Commonwealth of Australia 2017

A review of reliability standards and settings found no changes to regulation or reliability settings are required to continue to deliver reliable electricity supply out to 2023/24 (Reliability Panel AEMC 2017).

Furthermore, the vast majority - 98% - of all interruptions to power supply are caused by events affecting distribution or transmission lines, not due to lack of sufficient generation from power plants (AEMO 2017; Figure 8). This means, out of 11 minutes of interrupted power supply; 10 minutes and 47 seconds was likely due to issues affecting distribution or transmission failures, with the majority of the balance being load shedding to manage frequency.

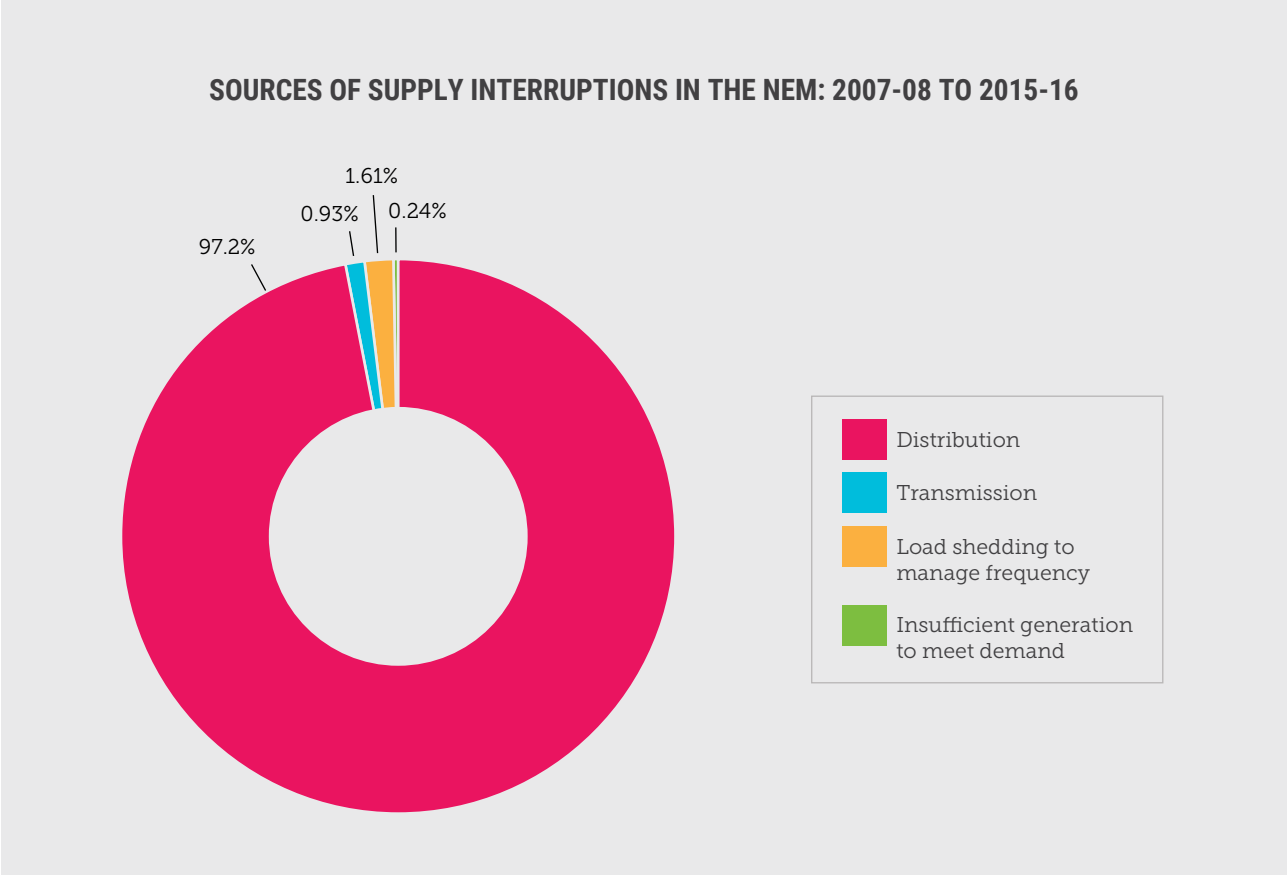
Electricity wholesale supply issues - relating to not having enough supply from power plants - contribute to 0.24% of power outages (Reliability Panel AEMC 2017), or a little less than 2 seconds a year on average. However, when these supply related outages occur, they are commonly caused by the unreliability of ageing, inefficient coal and gas plants (Climate Council 2017b).

Australia's electricity system is highly reliable.

However, despite electricity supply from generation (or the lack of it) being a negligible source of power interruptions, this issue has received significant attention by politicians and policy makers over the past year. Both the Finkel Review and the Federal Government (through the NEG) focused on reliability from the point of view of having sufficient generating capacity (from fossil fuelled and renewable energy plants) to meet demand, despite this only representing a negligible 0.2% of power outages. However, the Finkel Review also addressed the longer term need for a credible integrated climate and energy policy to manage the transition from fossil fuelled power to renewable energy (through the recommended, but not adopted Clean Energy Target).

Reliability in the context of power supply means having enough power supply available to meet demand, with sufficient back up (reserves) (AEMC 2017). Reliability can be achieved through a range of approaches such as building new flexible, dispatchable power plants, demand management (where electricity users adjust their demand for electricity), adding energy storage (storing excess energy for use later) and via transmission lines (enabling excess power in one region to be transferred to another).

Figure 8: Sources of supply interruptions in the NEM



Source: Chart adapted from Reliability Panel AEMC 2017.

3.2 Reliability Issues Generally Occur in Hot Weather, Associated With Ageing Coal and Gas Power Plants

By 2040, 70% of coal power stations in the NEM will be 50 years or older (AEMO 2018a). By the time coal power stations reach this age they are technically obsolete, unreliable and costly to maintain and subject to unplanned, permanent failures (for example, the 2014 failure of the recently refurbished Muja coal power plant in Western Australia) (ABC 2014). Faced with increasingly extreme weather events in the decades to 2040, many of these coal power plants may well unexpectedly fail, heightening the risk of blackouts. There have been over 40 such operating failures in the 2017/18 summer period alone, and almost all have occurred with no warning, each instantly removing hundreds of megawatts of capacity from power supplies (The Australia Institute 2018).

> *The Australia's coal-fired generation fleet is aging and parts of it are becoming increasingly unreliable, especially during heatwaves. Even some gas-fired generation has proved unreliable at hot temperatures.*
>
> - Parliament of the Commonwealth of Australia 2017

Two critical issues for reliability of supply both relate to the old age of many coal and gas power stations in the NEM. Firstly, there is a need to ensure new power supply comes online in advance of coal power stations permanently closing. Secondly, the risk of outages at coal power stations particularly in extreme weather events is particularly acute (AEMO 2017; e.g. Figure 9).

Figure 9: Australia's ageing and inefficient coal plants pose a threat to reliability.

The one outstanding Finkel Review recommendation - the Clean Energy Target - was designed to ensure enough new supply would be brought online in advance of inevitable coal closures.

Policy Principle 9

As supply reliability issues are most likely to occur in hot weather, any "Reliability Guarantee" must only credit value to power generation that is proven to perform reliably over extended periods in high temperatures. Operating records show ageing coal and gas plants do not meet this test.

Policy Principle 10

Reliability mechanisms should be limited to new capacity, focused on zero emissions solutions.

Policy Principle 10

A credible integrated climate and energy policy needs to encourage investment in new clean power supply - when and where needed - well in advance of coal closures.

Additional reliability measures should be focussed primarily on ensuring timely investment in new renewable energy and storage technologies.

The need for additional policies addressing reliability of supply should be carefully considered in light of existing and planned further measures tackling reliability, such as adopted Finkel Review recommendations and the significant amount of renewable energy and storage projects in the pipeline.

In order to set Australia on a pathway towards net zero emissions by 2050 - in line with existing commitments by state and territory governments - new investment is needed in new renewable energy, energy storage and other forms of zero greenhouse gas pollution dispatchable power.

Ageing coal and gas plants pose two critical risks to reliable supply - risk of outages in extreme weather and ensuring new supply comes online in advance of power station closures.

There are a broad range of zero greenhouse gas pollution sources of dispatchable renewable and storage capacity, including:

- existing hydro
- new solar thermal power plants with storage
- biomass power plants
- energy storage technologies (such as grid scale batteries, pumped hydro)
- wind with dispatchable capacity (such as the Hornsdale Wind Farm and Power Reserve)
- new interconnectors
- demand response management.

For a detailed discussion of dispatchable renewable energy, see the Climate Council's (2017b) report "Powering a 21st Century Economy: Secure, Clean, Affordable Electricity".

The reliability aspect of the proposed NEG design suggests that the Reliability Guarantee could support the continued operation of ageing coal power stations. The NEG Draft Design Consultation Paper even refers to "dispatchable coal-fired generation" indicating that coal would qualify under the NEG's reliability component. However, coal power is slow and inflexible, and does not meet the usual definition of dispatchable power - fast responding, flexible, able to be turned on and off, or ramped up and down quickly (Quiggan 2017).

Further the NEG proposal does not consider the clear risk that coal power plants in particular pose to reliability of electricity supply in extended heatwaves. Numerous reports have identified coal's unreliability in heatwaves and extreme weather, including: forward plans by the Australian Energy Market Operator (AEMO 2017); a consensus report by a cross-party parliamentary committee (Parliament of the Commonwealth of Australia 2017); and a report on energy security for New South Wales (New South Wales Chief Scientist and Engineer 2017).

Recent, concrete examples of coal's unreliability are numerous. In February 2017, during heatwaves which affected the entire east coast of Australia and South Australia, collectively around 4,000MW of coal and gas fired power plants were not available as expected as these plants under-performed in high temperatures, failed to start, or tripped (Climate Council 2017b).

3.3 Many Supply Reliability Measures are Already in Place with More in the Pipeline

Considering the negligible proportion of interruptions due to lack of supply, there are already significant reliability measures in place, and more are on the way.

The Australian Energy Market Operator already has measures in place to ensure there is enough supply from power plants to meet demand (Box 5).

BOX 5: AEMO RELIABILITY MEASURES

The Australian Energy Market Operator already has measures in place to ensure there is enough time for market players to invest in new capacity if needed, and failing that, for AEMO to intervene and take steps to maintain a secure system able to meet demand. These include the Electricity Statement of Opportunities, short and medium term Projected Assessment of System Adequacy, the reliability standard and the Reliability and Emergency Reserve Trader processes.

The Electricity Statement of Opportunities provides a 10-year outlook of the supply adequacy of the NEM to guide the decisions of market participants and investors. The report is updated annually and addresses the impact of increasing renewable energy generation and the effect of potential outages on the grid. It also includes an estimation of the likelihood that the reliability standard will be met (AEMO 2017).

The short and medium term Projected Assessment of System Adequacy provides supply-demand forecasts over the coming two hours to two years, highlighting any shortfalls in supply so that industry may respond by rescheduling maintenance outages, recontract fuel supplies or rapidly install new power plants (AEMO 2018b).

The reliability standard is the amount of time that AEMO is required to provide an uninterrupted supply of electricity. The NEM has a reliability standard of 99.998%. This means that demand can only exceed supply for 0.002% of the year (AEMO 2017).

The Reliability and Emergency Reserve Trader process is used by AEMO to maintain power system reliability and security if the industry fails to respond to forecasted shortfalls in supply. Through this process, participants are contracted to generate power from their own generators or reduce their electricity demand (demand management). This occurs outside of the wholesale electricity market and is only used when the wholesale market fails to offer enough generation to cover demand (AEMO Energy Live 2018). It was implemented for summer 2017/18 and has operated on only limited occasions, ensuring reliable wholesale power supply. On the other hand, severe storms have caused numerous consumer power interruptions due to transmission and distribution failures over the 2017/18 summer.

Sources: AEMO 2017; 2018.

In addition, the Finkel Review proposed a number of additional measures directed towards reliability of electricity supply. All of these measures have been accepted for implementation by the COAG Energy Council (Table 2; Finkel 2017). The most recent information from the Energy Security Board (2018b) indicates that the reliability component of the NEG would effectively replace the Finkel Review's recommendation of a Generator Reliability Obligation.

Table 2: Finkel Review recommendations addressing reliability in terms of sufficient generation.

Number	Finkel Review Recommendation
1.1	By end-September 2017, the Australian Energy Market Operator should publish an independent third party review of its: › Short-term demand forecast methodology. › FY2018 summer forecast. › Preparedness for the FY2018 summer.
2.6	The COAG Energy Council, in addition to its project on energy storage systems, should develop a data collection framework (or other mechanism) to provide static and real-time data for all forms of distributed energy resources at a suitable level of aggregation. The project should be completed by mid-2018.
2.11	In recognition of the increased severity of extreme weather, by end-2018 the COAG Energy Council should develop a strategy to improve the integrity of energy infrastructure and the accuracy of supply and demand forecasting.
3.3	To complement the orderly transition policy package, by mid-2018 the Australian Energy Market Commission and the Australian Energy Market Operator should develop and implement a Generator Reliability Obligation. The Generator Reliability Obligation should include undertaking a forward looking regional reliability assessment, taking into account emerging system needs, to inform requirements on new generators to ensure adequate dispatchable capacity is present in each region. Note: The reliability component of the NEG is proposed to meet the objective of the Generator Reliability Obligation via a different approach (Energy Security Board 2018b).
3.4	By mid-2018, the Australian Energy Market Operator and the Australian Energy Market Commission should assess: › The need for a Strategic Reserve to act as a safety net in exceptional circumstances as an enhancement or replacement to the existing Reliability and Emergency Reserve Trader mechanism. › The effectiveness of the new licensing arrangements being developed for generators in South Australia and whether they should be applied in other National Electricity Market regions. › The suitability of a 'day-ahead' market to assist in maintaining system reliability.
4.1	By end-2017, the Australian Energy Market Operator should require generators to provide information on their fuel resource adequacy and fuel supply contracts, to enable it to better assess fuel availability.
4.2	By mid-2018, the Australian Energy Market Operator should be given a last resort power to procure or enter into commercial arrangements to have gas-fired generators available to maintain reliability of electricity supply in emergency situations.

Sources: Finkel 2017; Energy Security Board 2018b.

Renewable energy and storage technologies can provide clean, reliable power 24/7.

In addition to record levels of investment in renewable energy in 2017 (Clean Energy Regulator 2018), Australia is on the cusp of an energy storage boom driven by currently supportive state policies and falling costs (Climate Council 2018b). Energy storage technologies, like batteries, solar thermal and pumped hydro, can be used to build greater reliability and flexibility into Australia's electricity grid. These technologies can store wind and solar power to provide electricity 24/7. Importantly, credible climate and energy policies are needed beyond 2020 to ensure sufficient continued investment in both renewable energy and storage in advance of coal closures.

South Australia is already home to the world's most powerful (100MW/129MWh) lithium-ion battery, which is already benefiting the power grid by helping meet peak demand, and responding rapidly to coal plant outages. By 2020 the state will also have a 150MW solar thermal plant with heat storage. In addition, Victoria, Queensland and the Northern Territory are also investing in grid scale battery storage technology, while the Federal, South Australian, Queensland and Tasmanian governments are considering a range of large and distributed pumped hydro projects (Climate Council 2018a). Combined with enhanced interstate grid connectivity, carefully located and distributed energy storage can reduce the need for investment in network and transmission lines.

Australia is on the cusp of a storage boom, with energy storage projects underway in every state and territory.

3.4 Designing a Workable Policy for Reliability

The European Parliament (2017) has established six criteria for mechanisms that address the ability of electricity supply to meet peak demand. These criteria provide a useful benchmark for assessing supply reliability measures such as the Reliability Guarantee. The criteria are:

1. The measure must be in the common interest and designed to solve a short- or long-term generation adequacy problem.

2. The need for the measure must be demonstrated, including an identification of the underlying causes of the existing problems (such as market failures and regulatory barriers). Alternatives should be considered.

3. The capacity mechanism should be technology-neutral and should not discriminate between existing players and investors. The evolution of interconnections must also be taken into account.

4. The measure must be proportional.

5. The measure must have an incentive effect, that is, it should not cover costs that would normally be paid by the beneficiary, or standard commercial risks.

6. The mechanism should avoid undue negative effects on competition and trade. It should therefore not deter investment in interconnections or impede the functioning of market coupling. It should be open to all and not reinforce dominant positions. However, it should favour zero pollution technologies (such as renewable energy and storage technologies).

Policy Principle 12

Policies seeking to address reliability of supply must be in the common interest. Policies should meet criteria such as first demonstrating the need for the policy and considering any alternatives, be proportional to the issue and avoiding undue effects on competition and trade. Policies should favour zero greenhouse gas pollution solutions such as renewable energy and storage technologies.

As discussed in the preceding sections, Australia's power supply is highly reliable. When interruptions occur, these mainly relate to issues involving power lines and the distribution network.

The key issues that need to be addressed regarding reliability of supply relate to the unreliability of ageing coal and gas plants and the need to plan ahead to ensure sufficient new zero emission capacity (renewable power stations and storage) comes online in advance of inevitable coal and gas plant closures.

Given the NEG design allows for existing coal and gas power plants to meet the reliability gap, there is the risk that this may not result in improved reliability for consumers at all (particularly during heatwaves and other extreme weather events). In fact, given the poor performance of these old plants, there exists a very real prospect that the NEG may create a false sense of security, and expose consumers to greater risks than would have been the case if a more realistic approach to the reliability of ageing plants had been adopted.

By relying on ageing coal plants, the NEG could create a false sense of security, while exposing consumers to greater risks.

There are also serious concerns about the impact of the proposed NEG on competition in the electricity market (see Chapter 4). There is no restriction, requirement or even aspiration that the reliability component of the NEG be met by low greenhouse gas pollution technologies (e.g., Figure 10).

Figure 10: The Kidston Project in North Queensland combines solar power with pumped hydro energy storage utilising an abandoned Gold Mine.

4. Affordability Considerations for Energy Policy

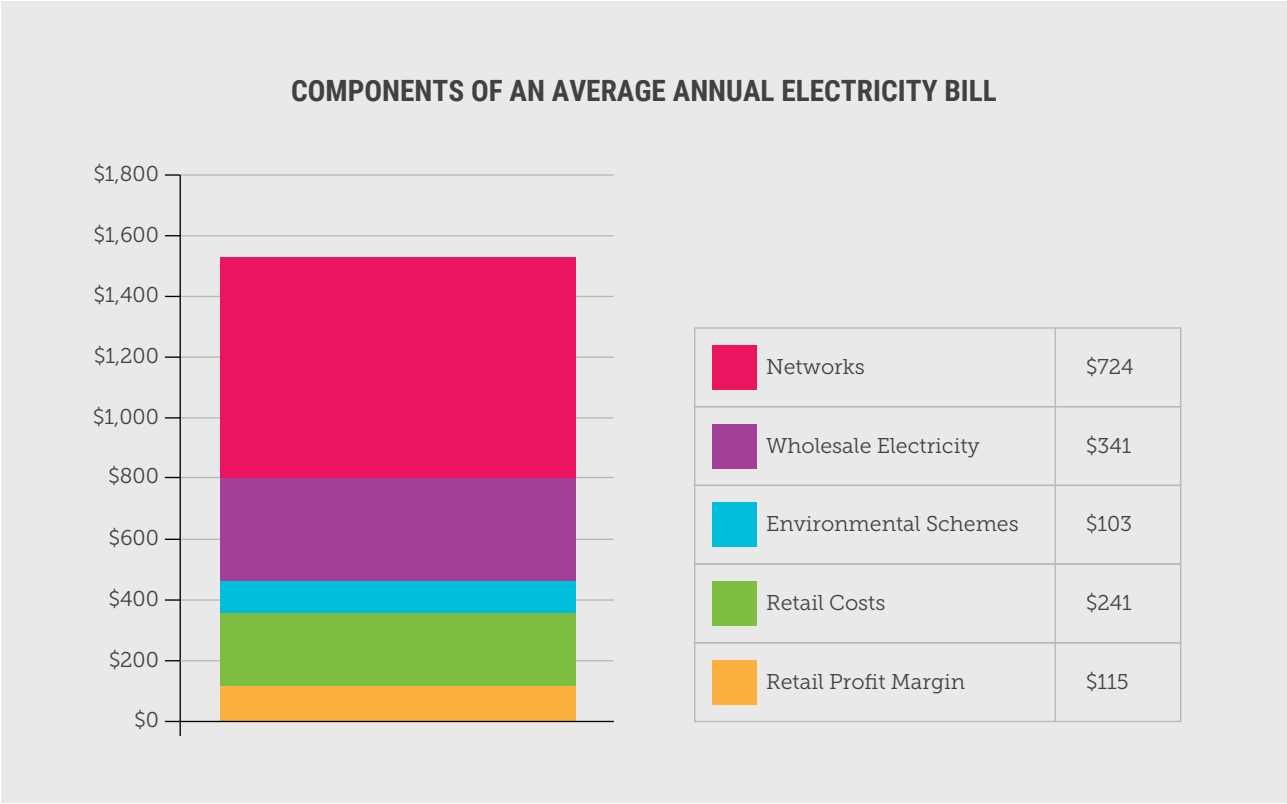
In addition to Finkel Review recommendations addressing energy affordability, the Australian Competition and Consumer Commission (ACCC 2017) is now undertaking an inquiry into retail electricity pricing.

> *There is a severe electricity affordability problem across the NEM and the price increases over the past ten years are putting Australian businesses and consumers under [un]acceptable pressure.*
>
> - Australian Competition and Consumer Commission 2017

The Australian Competition and Consumer Commission has identified the following drivers of high electricity prices as:

- Higher network (poles and wires) costs. Network costs make up by far the largest component of the average electricity bill (Figure 11 provides a snapshot of the components of an average electricity bill). and have contributed the most to cost increases over the last decade.
- To a lesser extent, retailer costs and profit margin and environmental scheme costs have contributed to cost increases over the past decade.
- Wholesale electricity costs have declined over the past decade. However this component of the electricity bill has increased since 2016, primarily due to escalating domestic gas prices caused by the unrestrained expansion of Liquefied Natural Gas export capacity in Gladstone, Queensland.

Figure 11: Components of an average annual electricity bill.



Source: Adapted from ACCC 2017.

The preliminary report from the Australian Competition and Consumer Commission has identified the following solutions to reduce the cost of electricity including:

- Improving competition among retailers and electricity generators by encouraging new players, addressing the market dominance of large energy companies (owning both generation and retail companies).
- Improving the affordability of gas.
- Encouraging investment in large-scale renewable energy to reduce costs and diversify ownership in the wholesale electricity market.
- Supporting consumers of energy to form buying groups to encourage new generation.

The Australian Competition and Consumer Commission inquiry is looking at a wide range of measures to address energy affordability.

The key consideration for any new policies designed to cut greenhouse gas pollution from the electricity sector, is that these policies should not exacerbate the problem of already high electricity prices. Where possible, new policies should have no impact on prices or a positive impact (that is to reduce electricity prices).

To date, no reports, modeling or papers available about the NEG (Energy Security Board 2017; Energy security Board 2018a; COAG Energy Council 2017b) have offered any realistic solution/s to concerns that the NEG could further concentrate the already substantial market power of a few large energy companies. Significant concerns have been raised that the NEG could "have a seriously detrimental effect on the competitiveness of wholesale and retail electricity markets" (Carbon and Energy Markets 2018). The NEG could provide a competitive advantage to the large energy companies owning both generation and retail assets; disadvantage new or smaller retailers and "merchant generators" competing on the spot market; could result in a less competitive energy market; and shield coal power from competition from renewable energy and storage technologies (Carbon and Energy Markets 2018).

5. The Importance of Public Engagement and Due Process in Determining Electricity Policy

Policies which play a role in determining the future of our electricity system - whether it is clean or polluting; expensive or affordable; reliable or vulnerable - will impact directly on the lives of every Australian. As power consumers, Australians pay for and rely on the electricity system, and as such will benefit from or pay the costs resulting from policy choices. It is therefore vitally important that such policies are informed by evidence and due process, particularly allowing for sufficient public engagement.

> *The community deserves assurance that policies are designed and implemented to produce the outcomes it seeks in a cost-effective way.*
>
> - Productivity Commission 2010

In developing its final recommendations, the Finkel Review (Finkel 2017) undertook extensive research, and held consultations in every state and territory of the National Electricity Market, including over 120 individual meetings. The general public and key stakeholders had nearly three months to respond to the Finkel Review's preliminary report (Finkel 2016). As a result, the review received over 390 written submissions.

While the Finkel Review (2017) undertook extensive domestic and international research and broad public engagement to inform its recommendations and final report, the same cannot be said for the proposed NEG.

The original NEG announcement was informed by an eight-page letter from the newly established Energy Security Board (2017). The proposed NEG deviated significantly from the design, purpose and operation of the Clean Energy Target - the Finkel Review recommendation it was intended to replace or respond to. State and territory governments were not informed or engaged in the design of the policy prior to its announcement (The Guardian 2017), despite the Energy Security Board, the Australian Energy Market Commission and the Australian Energy Market Operator being responsible to and reporting to state governments as well as the Federal Government. Very little information has been made available to the public on the proposed NEG design in the four months since it was proposed.

Until the release of the NEG Draft Design Consultation Paper on 15 February 2018, there had been negligible public engagement process to inform the development of the NEG. One "webinar" was held on 6 November 2017. The public and key stakeholders have now been presented with a broad ranging 58-page Discussion Paper, with over 70 stakeholder questions, and have been given a very short timeframe to respond - 15 working days. A single stakeholder forum was held in Sydney on 26 February 2018. Furthermore, the Finkel Review allowed for three months to respond to the preliminary report, while there is only a three week window of opportunity for responses to the NEG discussion paper.

Despite the release of the consultation paper, there is still little information available about key design elements such as which technologies would qualify under the reliability component. No coherent case has been made as to why the proposed NEG is preferable to a Clean Energy Target, an Emissions Intensity Scheme or other climate and energy policy options.

> *Transparent public processes are important to ensure that necessary judgments by advisers and decision-makers can be adequately scrutinised and tested, particularly by those who will be affected.*
>
> - Productivity Commission 2010

The future of Australia's electricity system is too important to rush into a hastily prepared, significantly flawed, politically driven policy proposal such as the NEG.

The public deserves a further proper public engagement process, informed by more details about the central policy problem - the lack of a credible climate and energy policy - as well as further information on the operation of the proposed NEG, and a comparison with alternative policies and approaches such as the Clean Energy Target, an Emissions Intensity Scheme as well as successful operating schemes in international electricity markets.

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