

The Senate

Environment and Communications
References Committee

Retirement of coal fired power stations

Final report

March 2017

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List of recommendations

Recommendation 1

5.16 The committee recommends that the Australian Government adopt a comprehensive energy transition plan, including reform of the National Electricity Market rules.

Recommendation 2

5.17 The committee recommends that the Australian Government, in consultation with industry, community, union and other stakeholders, develop a mechanism for the orderly retirement of coal fired power stations to be presented to the COAG Energy Council.

Recommendation 3

5.18 The committee recommends that the Australian Government, through representation on the COAG Energy Council, put in place a pollution reduction objective consistent with Australia's obligations under the Paris Agreement in the National Electricity Objectives.

Recommendation 4

5.19 The committee recommends that the Australian Government establish an energy transition authority with sufficient powers and resources to plan and coordinate the transition in the energy sector, including a Just Transition for workers and communities.

Recommendation 5

5.24 The committee recommends:

- That the Australian Government commission a comprehensive and independent assessment of the health impacts of coal fired power stations.
- That the Australian Government develop a load-based licencing arrangement for coal fired power stations for adoption at COAG based on the New South Wales Load-Based Licencing scheme, with fees that reflect the health impacts and other externalities of power station emissions.
- That the Australian Government take additional measures to ensure compliance with the standards set in the National Environmental Protection (Air Quality) Measure and - in the case of sulphur dioxide and nitrogen dioxide - international best practice standards. In regions where these standards are exceeded such as the Hunter and Latrobe Valleys, coal fired power stations must be compelled to reduce emissions to levels below the NEPM standards.

- That the Australian Government ensure a more rigorous assessment of power station emissions through an independent audit of reports provided through the National Pollutant Inventory.

Recommendation 6

5.27 The committee recommends that the Commonwealth and state energy ministers should undertake a national audit of likely rehabilitation costs for existing coal mines and power stations and assess these costs against the current provisions or bond arrangements.

5.28 The committee recommends that the Commonwealth and state energy ministers should also work to develop a common approach to setting rehabilitation bonds to ensure that rehabilitation costs are properly provisioned for.

Recommendation 7

5.34 The committee recommends that the Australian Government continue and expand the Renewable Energy Target beyond 2020 and consider adopting renewable energy reverse auctions such as adopted by the ACT to bring more new generation into the national electricity market.

5.35 The committee also recommends that the Australian Government support the continuing deployment grid level battery storage and of household solar and battery storage technologies, including making the necessary regulatory changes, such as aligning the settlement and bidding time periods in the National Electricity Market, to encourage the utilisation of products that promote decentralisation of electricity production while enhancing the stability of the grid.

Recommendation 8

5.40 The committee recommends that the Australian Government commit to not provide any direct funding, subsidies or other support for the construction of new coal fired power stations in Australia.

Recommendation 9

5.43 The committee recommends that the Australian Government reverse its ideological opposition to the introduction of a scheme for managing the transition in the electricity sector such as an Emissions Intensity Scheme or the setting of pollution intensity standards and commit to considering fairly all policy options presented by the forthcoming final report of the Finkel Review.

Chapter 1

Referral and conduct of the inquiry

Referral

1.1 On 13 October 2016, the Senate referred the following matter to the Environment and Communications References Committee for inquiry and interim report by 28 November 2016 and final report by 1 February 2017:

- (a) the experience of closures of electricity generators and other large industrial assets on workers and communities, both in Australia and overseas;
- (b) the role that alternative mechanisms can play in alleviating and minimising the economic, social and community costs of large electricity generation and other industrial asset closures, drawing on experiences in Australia and overseas;
- (c) policy mechanisms to encourage the retirement of coal fired power stations from the National Electricity Market, having regard to:
 - (i) the 'Paris Agreement' to keep global warming below 2 degrees celsius, and ideally below 1.5 degrees celsius,
 - (ii) the state and expected life span of Australia's coal fired power plants,
 - (iii) the increasing amount of electricity generated by renewable energy and likely future electricity demand,
 - (iv) maintenance of electricity supply, affordability and security, and
 - (v) any other relevant matters;
- (d) policy mechanisms to give effect to a just transition for affected workers and communities likely impacted by generator closures, as agreed in the 'Paris Agreement', including:
 - (i) mechanisms to ensure minimal community and individual impact from closures, and
 - (ii) mechanisms to attract new investment and jobs in affected regions and communities;
- (e) the appropriate role for the Federal Government in respect of the above; and
- (f) any other relevant matters.¹

1 *Journals of the Senate*, 2016, No. 11 (13 October 2016), p. 329.

1.2 The Senate subsequently extended the reporting date to 29 March 2017.²

Conduct of the inquiry

1.3 In accordance with its usual practice, the committee advertised the inquiry on its website and wrote to relevant individuals and organisations inviting submissions by 10 November 2016. The committee continued to accept submissions after this date.

1.4 The committee received 139 submissions, which are listed at Appendix 1. The public submissions are also available on the committee's website at www.aph.gov.au/senate/ec.

1.5 The committee held public hearings for this inquiry in Canberra on 9 November 2016 and in Melbourne on 17 November 2016. Since the tabling of the interim report, the committee held an additional two public hearings for this inquiry, in Sydney on 22 February 2017 and in Perth on 23 February 2017. A list of witnesses who appeared at all hearings is at Appendix 2.

Note on references

1.6 In this report, references to the committee *Hansard* transcripts are to the proof transcripts. Page numbers may vary between proof and official *Hansard* transcripts.

Acknowledgement

1.7 The committee thanks all of the individuals and organisations that contributed to the inquiry.

Structure of the report

1.8 This final report encompasses the interim report, and comprises five chapters. The matters covered in the remaining chapters of the report are outlined below:

- Chapter 2 outlines the electricity market in Australia, the contribution of coal fired power stations in electricity generation and the role of coal fired power stations in meeting emissions targets;
- Chapter 3 discusses potential mechanisms for the retirement of coal fired power stations;
- Chapter 4 discusses the role of 'just transition' policies and options for transition management; and
- Chapter 5 sets out the committee view and recommendations.

2 *Journals of the Senate*, 2016, No. 23 (1 December 2016), p. 753.

Chapter 2

Electricity markets and the role of coal fired power stations

Introduction

2.1 This chapter provides an overview of electricity markets in Australia and the contribution of coal fired power stations to electricity generation. The chapter then looks at Australia's obligations under the Paris Agreement and the role that retiring coal fired power stations can play in meeting these commitments.

Electricity markets in Australia

2.2 The National Electricity Market (NEM) and Western Australia's South-West Interconnected System (SWIS) are the largest electricity markets in Australia.¹ The NEM covers Australia's eastern and south-eastern coasts and comprises five states: Queensland, New South Wales (including the Australian Capital Territory), South Australia, Victoria and Tasmania.² The SWIS covers south-west Western Australia.³

2.3 The NEM and the SWIS cover 86 per cent and eight per cent, respectively, of Australia's electricity demand.⁴

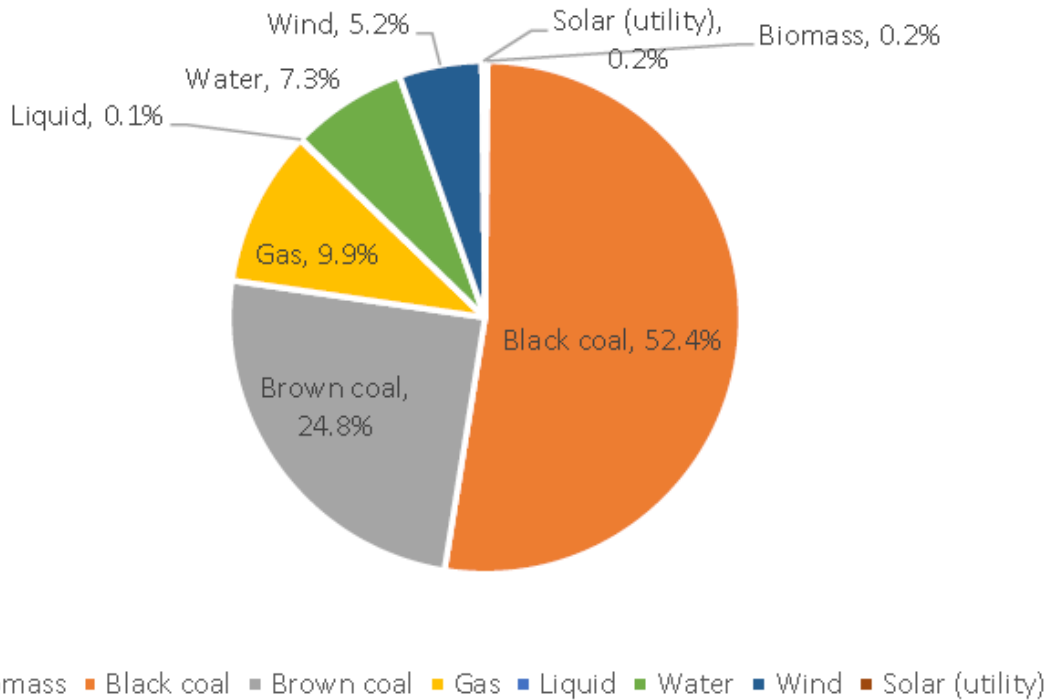
2.4 Currently, coal fired generation (both brown and black coal) makes up 78 per cent of electricity generation across the NEM. This is followed by gas, which accounts for 9.9 per cent. Figures 2.1 and 2.2 depict Australia's electricity generation mix.

1 Climate Change Authority, *Policy options for Australia's electricity supply sector: Special review research report*, August 2016, p. 24.

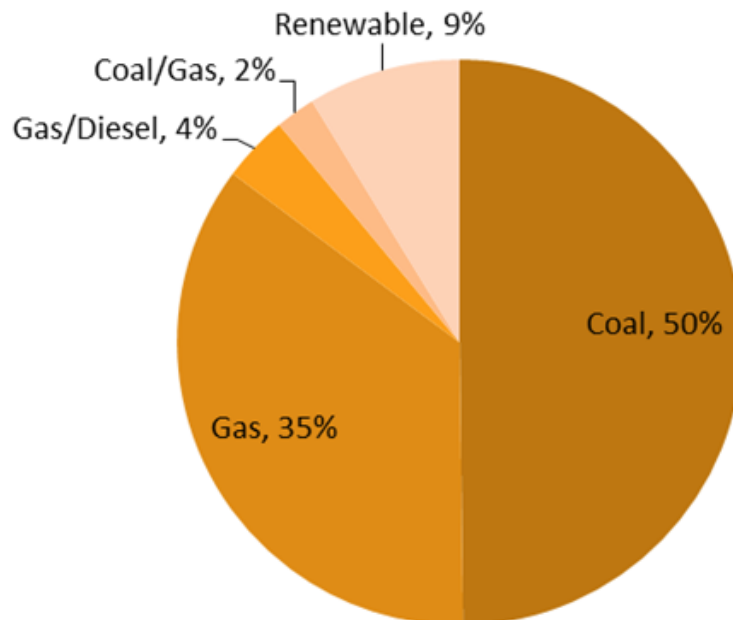
2 Australian Energy Market Operator (AEMO), *Fact Sheet: The National Electricity Market*, p. 1. Available at: <https://www.aemo.com.au/-/media/Files/PDF/National-Electricity-Market-Fact-Sheet.pdf> (accessed 6 November 2016).

3 Climate Change Authority, *Policy options for Australia's electricity supply sector: Special review research report*, August 2016, p. 24.

4 Climate Change Authority, *Policy options for Australia's electricity supply sector: Special review research report*, August 2016, p. 24.

Figure 2.1 Electricity generation mix in the NEM

Source: Australian Energy Council, *Submission 44*, p. 2.

Figure 2.2 Electricity generation mix in the SWIS (2011)

Source: Australian Renewable Energy Agency, *Australia's off-grid clean energy market: Research Paper*, 8 October 2014, prepared by AECOM Australia, p. 13.

Coal fired power stations in Australia

2.5 Currently there are 24 coal fired power stations operating in Australia. The age and capacity of the stations is varied as shown in Table 2.1.

Table 2.1 Australia's operating coal fired power stations

Coal Fired Power Stations (Operating)						
State	Power station	Primary fuel type	Year of commissioning	Announced year of decommissioning	Age (years)	Capacity (MW)
NSW	Eraring	Black coal	1982-84		32-34	2,880.0
NSW	Bayswater	Black coal	1982-84	2035	32-34	2,640.0
NSW	Liddell	Black coal	1971-73	2022	43-45	2,000.0
NSW	Mt Piper	Black coal	1993		23	1,400.0
NSW	Vales Point B	Black coal	1978		38	1,320.0
VIC	Loy Yang A	Brown coal	1984-87	2048	29-32	2,210.0
VIC	Hazelwood	Brown coal	1964-71	March 2017	45-52	1,760.0
VIC	Yallourn W	Brown coal	1975, 1982		34-41	1,480.0
VIC	Loy Yang B	Brown coal	1993-96		20-23	1,026.0
QLD	Gladstone	Black coal	1976-82		34-40	1,680.0
QLD	Tarong	Black coal	1984-86		30-32	1,400.0
QLD	Stanwell	Black coal	1993-96		20-23	1,460.0
QLD	Callide C	Black coal	2001		15	810.0
QLD	Millmerran	Black coal	2002		14	851.0
QLD	Kogan Creek	Black coal	2007		9	750.0
QLD	Callide B	Black coal	1989		27	700.0
QLD	Tarong North	Black coal	2002		14	443.0
QLD	Yabulu (Coal)	Black coal	1974		42	37.5
QLD	Gladstone QAL	Black coal	1973		43	25.0
WA	Muja	Black coal	1981, 1986		30-35	1,070.0
WA	Collie	Black coal	1999		17	340.0
WA	Bluwaters 1	Black coal	2009		7	208.0
WA	Bluwaters 2	Black coal	2010		6	208.0
WA	Worsley (Alumina)	Black coal	1982-00		16-34	135.0

Source: Australian Energy Council, Submission 44, p. 5.

2.6 Table 2.2 lists the nine coal fired power stations which closed between 2010 - 2016 across four Australian states.

Table 2.2 Australia's decommissioned coal fired power stations

Coal Fired Power Stations (Closed)							
State	Power station	Primary fuel type	Year of commissioning	Date of closure	Age (Years)	Capacity (MW)	
NSW	Munmorah	Black coal	1969	Jul-12	43	600.0	
NSW	Redbank	Black coal	2001	Aug-14	13	143.8	
NSW	Wallerawang C	Black coal	1976-80	Nov-14	38	1,000.0	
VIC	Morwell	Brown coal	1958-62	Aug-14	52-56	189.0	
VIC	Anglesea	Brown coal	1969	Aug-15	46	160.0	
QLD	Collinsville	Black coal	1968-98	Dec-12	14-44	180.0	
QLD	Swanbank B	Black coal	1970-73	May-12	42	500.0	
SA	Northern	Brown coal	1985	May-16	31	546.0	
SA	Playford	Brown coal	1960	May-16	56	240.0	

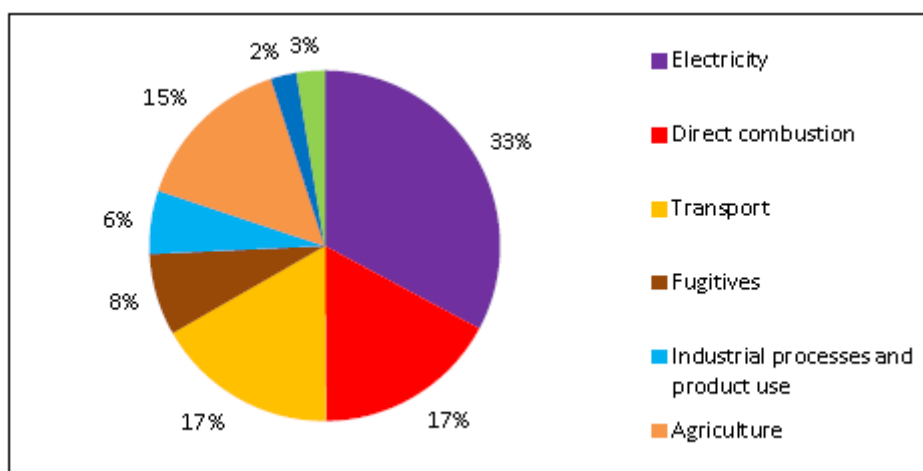
Source: Australian Energy Council, Submission 44, p. 6.

Emissions from electricity generation

2.7 The Clean Energy Council noted that the electricity sector contributes approximately one-third of Australia's emissions and that this trend is expected to continue:

Australia's electricity system was founded on centralised, carbon-intensive coal-fired generation. The sector is the single largest contributor to greenhouse gas emissions, and contributes approximately a third of our country's total emissions. This trend is expected to continue out to 2020 and beyond.⁵

Figure 2.3 Australia's domestic emissions by share, 1990-2014



Source: Clean Energy Council, *Submission 13*, p. 2 from Department of Environment, *Australia's emission projections 2014-15*, March 2015, p. 9.

2.8 The Climate Change Authority (CCA), in its August 2016 *Policy Options for Australia's electricity supply sector: Special review research report* (CCA's Special review research report), noted that of all the sources of electricity generation, coal contributed 88 per cent of emissions:

Of the generation sources that produce emissions, brown coal is the most emissions-intensive—that is, it produces the most greenhouse gas emissions per unit of generation—followed by black coal and gas...The total emissions from each fuel depend on the emissions intensity of the fuel itself and what share of total generation it makes up...Coal produces around 88 per cent of generation emissions, 35 per cent from brown coal and 53 per cent from black coal.⁶

5 Clean Energy Council, *Submission 13*, p. 2.

6 Climate Change Authority, *Policy Options for Australia's electricity supply sector: Special review research report*, August 2016, p. 15. Available at: <http://www.climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/files/SR%20Electricity%20research%20report/Electricity%20research%20report%20-%20for%20publication.pdf> (accessed 3 November 2016).

2.9 Ageing coal fired power stations are recognised as very high producers of pollution. The Climate Council stated:

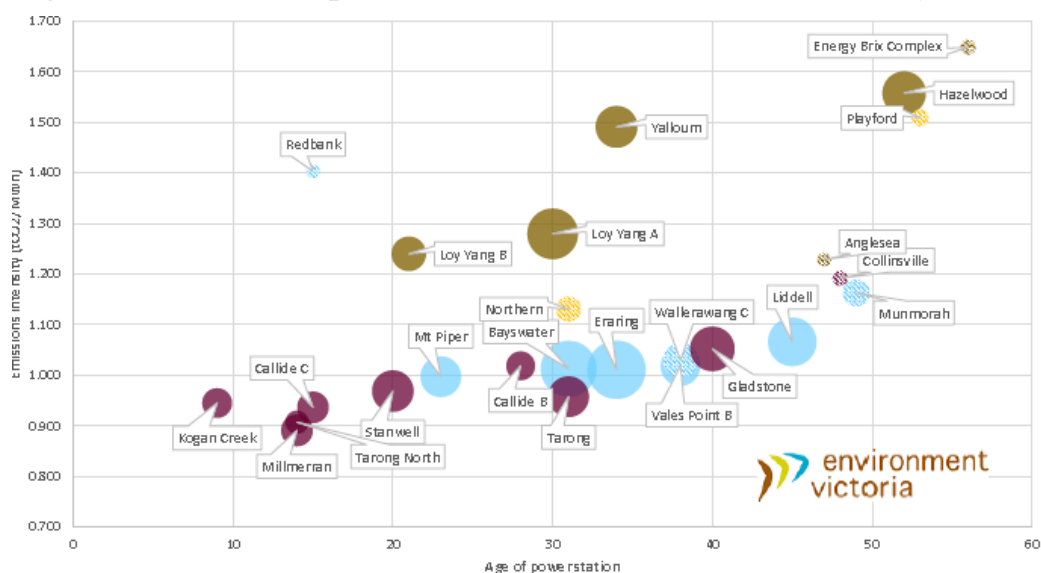
The majority of Australia's coal fired power stations are old, inefficient and unlikely to be able to be retrofitted with [carbon capture and storage (CCS)] technologies. Within a decade, around half of Australia's coal fuelled generation fleet will be over 40 years old, with some currently operating stations approaching 60 years, all using obsolete sub critical coal technology. These older plants will likely be too outdated, inefficient and carbon intensive to be candidates for retrofitting CCS technology.⁷

2.10 A number of submitters also noted that power stations using brown coal were the highest emitters of carbon dioxide. For example, Environment Victoria stated:

Black coal generators in NSW and Queensland are roughly 30-40% less polluting than Victoria's brown coal generators.⁸

2.11 Figure 2.4 graphs the operating and recently decommissioned coal fired power stations in the NEM by age and emissions.

Figure 2.4 Coal fired power stations in the National Electricity Market



Source: Environment Victoria, *Submission 16*, p. 5.⁹

7 Climate Council, *Australia's Electricity Sector: aging, inefficient and unprepared*, 2014, p. 70. Available at: <http://www.climatecouncil.org.au/uploads/f9ba30356f697f238d0ae54e913b3faf.pdf> (accessed 6 November 2016).

8 *Submission 16*, p. 6. See also Associate Professor Frank Jotzo, *Proof Committee Hansard*, 9 November 2016, p. 13; 350.org, *Submission 19*, pp. 7–8; La Trobe Valley Sustainability Group, *Submission 56*, p. 3.

9 The size of each circle represents the capacity of each generator. Victorian generators = brown circles; NSW = blue circles; QLD = maroon circles; SA = gold circles. Power stations that have closed in the past two years are represented by the diagonal lines through the circles. The graph only shows power stations in the NEM, not power stations in Western Australia which are part of the SWIS.

2.12 The Hazelwood power station, in Victoria's Latrobe Valley, for example, is the most intense in carbon emission in Australia. It is a brown coal power station and generates emissions at 1.52 tonnes of carbon dioxide (CO₂) for each megawatt hour (MWh) of electricity produced.¹⁰ This amounts to 15 million tonnes of CO₂ emissions per year, which accounts for approximately 2.8 per cent of Australia's total emissions.¹¹ Its high level of emissions is in part due to its age; Hazelwood has eight units that were constructed between 1964 and 1971, making it the oldest coal fired generator operating in Victoria.¹² Once Hazelwood closes in March 2017, Yallourn power station, also in the Latrobe Valley, will have the highest emission intensity in Australia.

Health impacts of coal fired power stations

2.13 Some submitters to the inquiry commented that pollution from coal fired power stations causes ongoing environmental damage and health problems for nearby communities. For example, Doctors for the Environment Australia (Doctors for the Environment) submitted:

Coal-fired power plants are substantial sources of air pollutants which cause significant health problems. The three main pollutants are sulphur dioxide, SO₂, a mix of nitrogen oxides referred to as NOx, and particulate matter in the PM₁₀ or PM_{2.5} size range. SO₂ and NOx are both powerful respiratory irritants, causing asthma, chronic lung disease, and restricted lung growth in children. Fine particle pollution causes similar respiratory problems but is also associated with ischaemic heart disease, lung cancer, and increased mortality.

The pollutants can travel long distances, so even though power stations are located outside cities they are contributing to major city pollution as well as having higher impacts on the local towns. This has been illustrated in Sydney where research by CSIRO and the Australian Nuclear Science Technology Organisation (ANSTO) showed that half of the sulphate particles at Richmond in western Sydney could be traced back to one of the coal-fired power stations despite these being located 70, 90 and 140 Km away.

...While the climate change effects of coal-fired power are distant and delayed, the air pollution effects are regional and immediate, so should be taken into consideration in planning the transition of power generation

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- 10 Roger Dargaville, *The case for shutting down Hazelwood power station – some facts and figures*, 5 July 2012, Available at: <https://theconversation.com/the-case-for-shutting-down-hazelwood-power-station-some-facts-and-figures-7940> (accessed 3 November 2016).
- 11 Dylan McConnell, *Closing Victoria's Hazelwood power station is no threat to electricity supply*, 26 September 2016. Available at: <https://theconversation.com/closing-victorias-hazelwood-power-station-is-no-threat-to-electricity-supply-66024> (accessed 7 November 2016).
- 12 Roger Dargaville, *The case for shutting down Hazelwood power station – some facts and figures*, 5 July 2012.

away from fossil fuels. The best estimate of the dollar value of the health harm from coal-fired power in Australia is AUD \$13 per MWh...¹³

2.14 The Australian Conservation Foundation (ACF) argued that coal fired generators impose significant external costs to human health, the environment, and public infrastructure, which typically falls disproportionately on coal-dependent communities.¹⁴ The ACF noted that estimated costs of health damages associated with coal combustion for electricity in Australia amount to \$2.6 billion per annum.¹⁵

2.15 Dr Ben Ewald, member of Doctors for the Environment, noted that these health impacts can contribute to premature death:

[Studies] estimated 430 premature deaths per year from the current exposure to these fine particles. A 20 per cent decrease in that fine particle exposure, which could be achieved by removing the coal fired power contribution, would lead to 130 fewer premature deaths per year and 140 fewer respiratory and cardiac hospital admissions per year.¹⁶

2.16 Ms Daisy Barham of the Nature Conservation Council of New South Wales (Nature Conservation Council) stated:

The health impacts of coal-fired power station[s] are little considered. It is particularly concerning due to the health impacts of many of the common pollutants from the power stations, such as mercury, arsenic, sulphur dioxide and fine particle pollution. This is particularly so when we consider that the coal fired power stations here in New South Wales are close to hundreds of thousands of residents who live near the power stations.¹⁷

2.17 The Latrobe Valley Sustainability Group argued that community health benefits would result from the closure of coal fired power stations, and noted:

The Latrobe Valley has had and continues to have higher than normal instances of cardiovascular, cancer and lung diseases and this is consistent with studies from around the world which have linked particulate pollution and pollution from NOx and SOx gases with higher occurrence of these diseases.¹⁸

2.18 Additionally, health impacts from ash dams were put forward by witnesses as a key consideration for any plan to retire coal fired power stations. Dr Bradley Smith from the Nature Conservation Council stated:

13 *Submission 53*, pp 11–12. See also CEN, *Submission 34*, p. 2; The Australia Institute, *Submission 73*, Attachment 1, p. 3; Ms Daisy Barham, Nature Conservation Council of New South Wales, *Committee Hansard*, 22 February 2017, p. 3, Dr Ben Ewald, Doctors for the Environment, *Committee Hansard*, 22 February 2017, p. 4.

14 *Submission 69*, pp 3–4.

15 *Submission 69*, p. 4.

16 *Committee Hansard*, 22 February 2017, p. 18.

17 *Committee Hansard*, 22 February 2017, p. 3.

18 *Submission 56*, p. 4.

That is certainly an issue that we think needs to be dealt with in a transition plan; so assessing what are these liabilities and how are they being managed. Ash is a huge liability. If you [go] up to the Central Coast you will notice there are ash dams dotted all over the place, and they are quite large in area. Finding a way to manage those in the long term is a difficult problem, and we are concerned that the liability for that problem is going to fall on New South Wales taxpayers.¹⁹

Addressing health concerns

2.19 Numerous witnesses noted that few Australian studies have been conducted in relation to the health effects caused by coal fired power stations.²⁰ However, witnesses argued that the limited evidence available in Australia indicates that the harm is similar to that experienced by other jurisdictions and that there is no evidence to suggest that the effects experienced elsewhere would be different in Australia.²¹ In order to address the data gap, the Nature Conservation Council recommended that an independent assessment of the health impacts caused by every coal fired power station in Australia be conducted in order to fully understand and address the health impacts to communities near power stations.²²

2.20 The Nature Conservation Council also suggested that increased regulation and licencing were potential tools in reducing harmful emissions. They suggested that jurisdictions overseas such as the United States have increased accountability from coal producers and improved public health by establishing a licencing scheme which placed limits on toxic emissions. Dr Smith, Nature Conservation Council, stated:

In New South Wales there is no regulation of the intensity of the emissions that these power stations are emitting. In other jurisdictions, like in the US, they have limits per megawatt hour on how much mercury and how much sulphur dioxide they can emit. The power stations in New South Wales exceeded those limits by many times—for example, over three times for mercury. My understanding is that the power stations are licensed to make those emissions, so they do not see that they have liability.²³

2.21 Environmental Justice Australia also recommended the use of Australian Government power to enforce state compliance with air pollution standards. They suggested that if state governments were unwilling to act on high levels of pollution, the Australian Government should step in armed with a range of powers to ensure

19 *Committee Hansard*, 22 February 2017, p. 4.

20 *Committee Hansard*, 22 February 2017, pp 20-21.

21 See, for example: Mr Michael Campbell OAM, *Committee Hansard*, 22 February 2017, p. 21.

22 Ms Daisy Barham, Nature Conservation Council of New South Wales, *Committee Hansard*, 22 February 2017, p. 3.

23 *Committee Hansard*, 22 February 2017, p. 3.

compliance with national standards, similar to the powers of the United States' Environmental Protection Agency.²⁴

Environmental harm caused by coal fired power stations

2.22 Submissions and witnesses told the committee that climate change is being intensified by the continued operation of coal fired power stations due to their high carbon emissions, and that delaying the closure of coal fired power stations would result in further environmental and societal damage.²⁵

2.23 In addition to concerns about the impacts of climate change, the committee heard evidence in relation to other forms of environmental damage caused directly by coal fired power stations. Mr Piers Verstegen of the Conservation Council of Western Australia detailed the impacts of the Collie coal fired power station on the local environment:

The coal measures in Collie are below the water table and constant dewatering is required to safely mine that coal. That means there is a huge regional impact with the drying of rivers, streams and water courses. For years locals have been documenting the drying out of their fishing and swimming spots on the Collie River, and the irrigation agriculture that was once possible in the region is now gone.²⁶

2.24 Mr Verstegen further noted that the damage caused to the local environment had a significant impact on the local community, particularly in relation to marine and agricultural areas:

There are regular health warnings about eating the fish from the Collie River as they contain elevated levels of mercury and other toxic by-products of coal burning. This fallout is occurring across a large agricultural and natural area, is poisoning the soil groundwater, air and surface water. Many of these substances are persistent and bio accumulate through the food chain. Conservation council citizen science sampling of marine invertebrates has identified elevated levels of selenium and mercury in WA's marine waters that are likely to be associated with coal burning in the region.²⁷

2.25 Port Augusta City Council noted that it faces significant problems in relation to environmental damage, air pollution and emissions of ash and coal dust as a result

24 Dr James Whelan, Environmental Justice Australia, *Committee Hansard*, 22 February 2017, p. 3.

25 See: Ms Blair Palese, 350.org Australia, *Committee Hansard*, 22 February 2017, pp 1-2; Ms Daisy Barham, Nature Conservation Council of New South Wales, *Committee Hansard*, 22 February 2017, pp 2-3; Mr Piers Verstegen, Conservation Council of Western Australia, *Committee Hansard*, pp 3-4.

26 *Committee Hansard*, 23 February 2017, pp 3-4.

27 *Committee Hansard*, 23 February 2017, p. 4.

of the Northern Power station's closure in 2016 without adequate environmental mitigation planning.²⁸

2.26 The Port Augusta City Council specifically referred to damage to the Augusta Lakes due the cessation of water flow from the Augusta Power Stations, which has resulted in the drying out of the lakes and disrupting the local habitats of birds and insects.²⁹

2.27 Mr Keith Muir of the Colong Foundation for Wilderness provided evidence to the committee regarding the discharge of mine water in the Lithgow area into Sydney's water supplies.³⁰ Mr Muir also noted that mining was 'foreclosing on alternative visions for the region', namely, the ecotourism potential of the area:

I draw an analogy between Lithgow and Katoomba in this regard. Katoomba used to be a coal town. Now it is a tourism town—depending upon, and thriving as a result of, its tourism. Lithgow could go this way as well. In fact we have been working very hard towards that end and towards offering a compromise involving protecting the nationally significant values and the internationally significant pagoda landscapes while still doing the mining. That compromise could generate an outcome where the future is not foreclosed upon. That has not been implemented, leading to the tragic consequence of the loss of those heritage values.³¹

Meeting our Paris Agreement obligations

2.28 On 22 April 2016, Australia signed the Paris Agreement, which is designed to strengthen the United Nations Framework Convention of Climate Change (UNFCCC). Pursuant to the Paris Agreement signatory countries, must use specific measures in order to address climate change, such as:

- (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
- (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
- (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.³²

28 *Submission 62*, p. 3.

29 *Submission 62*, p. 2.

30 *Committee Hansard*, 22 February 2017, pp 28-29.

31 *Committee Hansard*, 22 February 2017, p. 28.

32 United Nations Framework Convention on Climate Change, Paris Agreement, 12 December 2015, Article 2. As of 22 November 2016, there are 197 signatories of the Agreement and 112 parties who have ratified it domestically.

2.29 On 10 November 2016, the Australian Government ratified the Paris Agreement alongside the Doha Amendment to the Kyoto Protocol after the Joint Standing Committee on Treaties recommended that Australia ratify both treaties. The two Agreements together formalise Australia's 2030 and 2020 emissions reduction targets.³³

2.30 Countries that are signatories to the Paris Agreement have also utilised the importance of accelerated and planned closures of coal fired generators in meeting their climate goals. To date the United Kingdom, France, Canada, Austria, Denmark and the Netherlands have all commenced the implementation of coal closures in their electricity markets.³⁴

Australian Government climate policy

2.31 In line with its obligations under the Paris Agreement, the Australian Government has committed to reduce emissions to 26–28 per cent below 2005 levels by 2030.³⁵ The Department of the Environment and Energy (the Department) states that:

This target represents a 50–52 per cent reduction in emissions per capita and a 64–65 per cent reduction in the emissions intensity of the economy between 2005 and 2030.³⁶

2.32 The Department contends that this reduction, when considered per person and emissions intensity basis, will exceed other countries such as the United States, Japan, the European Union, Korea and Canada.³⁷ However, a number of submissions outlined that Australia's current commitments will not be adequate to meet our obligation to keep global warming below two degrees. Submitters also outlined that current climate and energy policies would not be adequate to meet current commitments let alone an adequate contribution to keeping global warming below two degrees. The ACF stated:

33 Minister for Foreign Affairs, the Hon Julie Bishop MP, 'Ratification of the Paris Agreement on Climate Change and the Doha Amendment to the Kyoto Protocol', *Media release*, 10 November 2016. Available at: http://foreignminister.gov.au/releases/Pages/2016/jb_mr_161110a.aspx?w=tb1CaGpkPX%2FIS0K%2Bg9ZKEg%3D%3D (accessed 18 November 2016). Pursuant to the Kyoto Protocol, Australia has agreed to reduce its greenhouse gas emissions by five per cent compared with 2000 levels by 2020.

34 See: Rob Gillies, *Associated Press*, 'Canada to phase out coal-fired electricity by 2030', 21 November 2016. Available at http://hosted2.ap.org/APDEFAULT/cae69a7523db45408eeb2b3a98c0c9c5/Article_2016-11-21-CN--Canada-Coal%20Phase%20Out/id-ed19c7d510034c66a42e64902df91a43 (accessed 22 November 2016).

35 Department of the Environment and Energy, *Australia's 2030 climate change target*, 2015. Available at: <https://www.environment.gov.au/climate-change/publications/factsheet-australias-2030-climate-change-target> (accessed 7 November 2016).

36 Department of the Environment and Energy, *Australia's 2030 climate change target*, 2015.

37 Department of the Environment and Energy, *Australia's 2030 climate change target*, 2015.

According to the Climate Action Tracker, to meet the federal government's Paris targets, emissions must fall 1.9 per cent annually on average. Instead, they are rising about 1.2 per cent a year. This is a clear indication that current climate policy is failing to achieve required pollution reduction.

Australia's initial target of 26-28 per cent pollution reduction on 2005 levels by 2030 is inadequate compared to other similar economies and compared to the actual goal of keeping global warming to 1.5-2°C. If other countries followed Australia's ambition it would lead to 3-4°C of warming above preindustrial levels.³⁸

2.33 Environment Victoria highlighted that even a conservative assessment of the global emission reductions required suggests there is very little time to accommodate significant reductions in Australia:

According to the Stockholm Environment Institute analysis, there is very little room for further emissions of greenhouse gases if global temperatures are to be kept "well below 2°C" – much less below the less dangerous 1.5°C. This analysis notes that these are generous estimates of the available budgets, and argues that a reasonable likelihood of limiting warming to below 1.5°C implies a global carbon budget of less than (and perhaps significantly less than) 250 billion tonnes of carbon dioxide equivalent (Gt CO₂) from the start of 2015. Australia's share of this budget equals less than four years of its current emissions.³⁹

2.34 The Australian Government's plan is driven by Direct Action policies which are claimed to 'reduce emissions, increase energy productivity and improve the health of soils and the environment', a key feature of which is the Emissions Reduction Fund (discussed below).⁴⁰

2.35 There are two Australian Government policies which are relevant to the electricity sector: the Renewable Energy Target (RET); and the Emissions Reduction Fund (ERF) crediting and purchasing mechanism.⁴¹

2.36 The Clean Energy Regulator states:

The [RET] is an Australian Government scheme designed to reduce emissions of greenhouse gases in the electricity sector and encourage the additional generation of electricity from sustainable and renewable sources.⁴²

38 *Submission 69*, p. 5.

39 *Submission 16*, p. 4.

40 Department of the Environment and Energy, *Australia's 2030 climate change target*, 2015.

41 See Climate Change Authority, *Policy Options for Australia's electricity supply sector: Special review research report*, August 2016, p. 20.

42 Clean Energy Regulator, *About the Renewable Energy Target*, 15 September 2016. Available at: <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target> (accessed 6 November 2016).

2.37 There are two schemes operating as part of the RET:

The Large-scale Renewable Energy Target, which encourages investment in renewable power stations to achieve 33 000 gigawatt hours [GWh] of additional renewable electricity generation by 2020, and

The Small-scale Renewable Energy Scheme, which supports small-scale installations like household solar panels and solar hot water systems.⁴³

2.38 The ERF is described by the Clean Energy Regulator as:

...a voluntary scheme which operates to provide incentives for a range of organisations and individuals to adopt new practices and technologies to reduce their emissions.⁴⁴

2.39 A participant must register with the ERF, secure a contract with the Australian Government through an auction, run the project according to the method chosen and report back to the ERF, and as a result gain Australian Carbon Credit Units (ACCUs) for the reductions that have been achieved and sell them.⁴⁵

2.40 The ERF uses this system as an exchange scheme for carbon emissions, which is described as a 'safeguard mechanism'. The Clean Energy Regulator states that:

While the crediting and purchasing elements provide incentives for businesses to reduce their emissions, the safeguard mechanism will ensure that emissions reductions purchased by the government are not offset by significant increases in emissions above business-as-usual levels elsewhere in the economy.⁴⁶

2.41 The ERF and safeguard mechanism have been the subject of significant public controversy and the government's claims for the policies have been highly contested. A number of submissions highlighted the inadequacies of the policies. For example, Environment Victoria stated:

A number of reputable analyses have suggested that the Federal government's Direct Action Policy (DAP) and more specifically the [ERF] will not be able to achieve the 5 percent cut to emissions that the Government has agreed to, let alone reductions consistent with Australia's contribution to staying under a 2°C limit. In fact, modelling by SKM MMA and Monash University's Centre of Policy Studies found a likely increase in

43 Clean Energy Regulator, *How the scheme works*, 28 October 2015. Available at: <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works> (accessed 6 November 2016).

44 Clean Energy Regulator, *About the Emissions Reduction Fund*, 15 February 2016. Available at: <http://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund> (accessed 7 November 2016).

45 Clean Energy Regulator, *How does it work*, 21 October 2016. Available at: <http://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund/How-does-it-work> (accessed 7 November 2016).

46 Clean Energy Regulator, *The safeguard mechanism*, 13 January 2016. Available at: <http://www.cleanenergyregulator.gov.au/ERF/About-the-Emissions-Reduction-Fund/the-safeguard-mechanism> (accessed 7 November 2016).

emissions by 8-10 percent by 2020. In a study by Reputex, emissions growth of 16 percent by 2020 was projected under DAP.

The "Safeguard Mechanism" of the ERF was intended to create a cap on total emissions, but the design of the mechanism means it provides no safeguard at all. Indeed, analysis by Environment Victoria found that emissions from the energy sector could theoretically increase by 120 million tonnes per year without breaching the safeguard mechanism. This included possible increases of 40-50 million tonnes from coal-burning power stations alone.

...

Ultimately, the [ERF] exerts no pressure on coal generators, and therefore plays no role in modernising our electricity supply.⁴⁷

The role of the electricity sector in meeting emissions targets

2.42 A number of submissions highlighted the key role that the electricity sector could play in Australia meeting its emissions reductions targets. For example, Environment Victoria argued:

While decarbonisation is required across all sectors of Australia's economy, our earliest and largest opportunity to reduce climate pollution is through a managed phase out of Australia's fleet of coal-burning power stations.⁴⁸

2.43 The CCA's Special Review research report stated:

Available studies consistently find that Australia has opportunities to achieve cost-effective reductions in electricity sector emissions as part of national action consistent with limiting warming to 2 degrees.⁴⁹

2.44 The CCA noted that the electricity sector is Australia's largest single source of emissions and that decarbonising the sector will require withdrawal of high-emissions generators over the coming decades.⁵⁰

2.45 The CCA's recommendations were underpinned by independent modelling from the Jacobs Group on achieving a below two degrees scenario which showed that by 2030 brown coal stations would be closed and over two-thirds of black coal would also be decommissioned.⁵¹

47 *Submission 16*, p. 9.

48 *Submission 16*, p. 6.

49 Climate Change Authority, *Policy Options for Australia's electricity supply sector: Special review research report*, August 2016, p. 21.

50 Climate Change Authority, *Towards a Climate Policy Toolkit: Special Review on Australia's Climate Goals and Policy*, August 2016, pp. 110 and 115.

51 Jacobs Group, *Climate Change Authority Report: Modelling illustrative electricity sector emissions reduction policies (iteration with CGE modelling)*, June 2016. Available at: <http://climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/files/SR%20Modelling%20reports/Jacobs%20modelling%20report%20-%20CGE%20scenarios.pdf> (accessed 22 November 2016).

Timeline for action to achieve Paris Agreement obligations

2.46 The committee received evidence outlining a variety of timelines for the transition of the electricity sector. Environment Victoria stated that while Australia's energy system was undergoing transformation, 'it is not occurring at the pace necessary to properly address the challenge of global warming'.⁵²

2.47 Associate Professor Frank Jotzo, Director of the Centre for Climate Economics and Policy, ANU College of Asia & the Pacific and Professor John Wiseman, Deputy Director of the Melbourne Sustainable Society Institute, University of Melbourne, provided the committee with information from their work on the International Coal Transitions Research project:

The Nationally Determined Contributions (NDCs) submitted under the UNFCCC Paris Agreement imply significant reductions in the share of coal in primary energy by 2030. Holding the increase in global temperature to well below 2°C and pursuing efforts to limit it to 1.5°C would require even deeper reductions in coal use in the energy system by 2030 and 2050, even allowing for [carbon capture and storage] technology.

Relevant research and advocacy efforts have so far focused, with a high degree of success in many places, on stopping new coal plants. But early phase out of both coal production and consumption assets will also be necessary to stay well below 2°C.⁵³

2.48 In his primary submission to the inquiry, Associate Professor Jotzo outlined a timeframe for transition which sees electricity supply carbon-free by 2050:

Achieving a low-emissions economy requires a low-carbon or zero-carbon electricity system. As shown in the Deep Decarbonisation Pathways Project, other pillars of decarbonisation are electrification of transport and energy use in buildings and industry, with greater energy efficiency, as well as emissions savings in industry and agriculture and carbon sequestration on the land.

Various analyses have shown the viability of an electricity system based on renewables in Australia. Modelling prepared by the CSIRO for the Australian Deep Decarbonisation Pathways report shows a scenario where electricity supply transitions to renewables during the 2020s and 2030s and is carbon-free by 2050, while electricity demand increases substantially to accommodate electrification and economic growth.

...

52 *Submission 16*, p. 6.

53 See Associate Professor Frank Jotzo, *Submission 4*, Attachment 2, p. 1, and Professor John Wiseman, *Submission 5*, p. 8. Emphasis in original. Article 4 of the Paris Agreement provides that Parties shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve. Parties shall pursue domestic mitigation measures with the aim of achieving the objectives of such contributions.

In this scenario, black coal fired electricity is largely phased out by the early 2030s, while the more emissions intensive brown coal fired plants are all closed by 2020.⁵⁴

2.49 The CCA in its Special Review, *Towards a climate policy toolkit: Special Review on Australia's Climate Goals and Policies*, noted:

To achieve its emissions reduction goals, Australia's emissions must decline more steeply in the coming years than they have in the past.⁵⁵

2.50 The Climate Institute argued that, without addressing the situation in the immediate future, urgent damaging measures would be required past 2030 in order to meet the Paris Agreement requirements and avoid catastrophic global warming. It states:

...climate action after 2030 would need to be more extreme – more than 80 per cent of the coal-fired generation fleet would have to be closed in less than five years and new clean energy capacity would have to jump four-fold and keep rising. The impacts of such a disruptive shift would be felt across the economy.⁵⁶

2.51 The Climate Institute recommends that a policy framework be put in place to achieve net zero emissions by mid-century. Among other strategies to meet this target, The Climate Institute recommends the systematic retirement of the existing ageing power generators to ensure that all have exited by 2035, and to replace these stations with zero or very low emission energy technology.⁵⁷

2.52 The Climate Institute submitted:

Separate pieces of analysis by the Climate Change Authority, the Climate Institute, and ClimateWorks Australia and the Australian National University find that, irrespective of the policy (or policies) used to reduce electricity emissions consistent with the 2°C goal, all existing coal-fired power stations need to retire before 2035. This deadline is also consistent with analysis by the IEA [International Energy Agency] which finds that all OECD [Organisation for Economic Co-operation and Development] countries need to "all but phase out" generation from "unabated" coal stations by 2035.

54 *Submission 5*, pp. 2–3.

55 Climate Change Authority, *Towards a Climate Policy Toolkit: Special Review on Australia's Climate Goals and Policy*, August 2016, p. 50. Available at: <http://climatechangeauthority.gov.au/sites/prod.climatechangeauthority.gov.au/files/files/Special%20review%20Report%203/Climate%20Change%20Authority%20Special%20Review%20Report%20Three.pdf> (accessed 21 November 2016).

56 The Climate Institute, *Policy Brief: A switch in time: Enabling the electricity sector's transition to net zero emissions*, April 2016, p. 1. Available at: http://www.climateinstitute.org.au/verve/resources/TCI_A-Switch-In-Time_Final.pdf (accessed 7 November 2016).

57 The Climate Institute, *Policy Brief: A switch in time: Enabling the electricity sector's transition to net zero emissions*, April 2016, p. 1.

If the exit pathway is not consistent with net zero emissions by 2050, the risk remains that it will have to be adjusted in the future. The greater the gap between the exit pathway and the net zero emissions goal, the greater and more disruptive the eventual adjustment will have to be. Our analysis finds that, for example, a pathway consistent with the government's current 2030 emission reduction target of 26-28 per cent below 2005 levels would consume more than 90 per cent of the sector's thirty-year carbon budget in the first ten years, necessitating a precipitous drop in electricity emissions and a very rushed and messy transition to cleaner energy in the early 2030s.⁵⁸

2.53 Origin Energy Limited (Origin) stated that the 2030 emissions reduction target is 'significant'. Origin went on to explain the scale of change necessary:

In order to achieve it, the nation's annual emissions will need to be reduced from current levels of about 545 MtCO₂ to about 440 MtCO₂ in 2030, or a bit over 100 MtCO₂ in terms of an annual point in time difference.

In order to meet this target and the deeper emissions reductions that will be required over the longer term then a suite of comprehensive policies will be required....

Electricity is the largest source of emissions in Australia, at about a third. Using the electricity sector as an example and assuming it makes a proportional contribution to the reductions mentioned above, then this is equivalent to about a 33 MtCO₂ pa reduction on current levels. To put this in context, this is equivalent to closing one of the most emissions intensive brown coal-fired generators in Victoria plus probably another one or two further black coal-fired generators in other regions and replacing them completely with renewable energy. This illustrates the scale of the challenge ahead for both the nation and the electricity sector. We note that the Paris Agreement envisages increasing the ambition of national targets over time.⁵⁹

Increasing generation of renewables over time

2.54 In order to meet the Paris Agreement targets and to effectively retire coal fired power stations, it has been contended that there must be a correlating increase in renewable energy systems.⁶⁰

2.55 Many submitters and witnesses who presented evidence to the committee argued that if coal fired power stations were to close, they would need to be replaced with power stations using different energy sources in order to maintain energy security. Mr Andrew Stock, Climate Councillor, Climate Council, stated that:

58 The Climate Institute, *Submission 58*, pp. 3–4.

59 *Submission 39*, p. 2.

60 Clean Energy Council, *Power Shift: A blueprint for a 21st century energy system*, p. 15. Available at: <http://www.cleanenergycouncil.org.au/dam/cec/policy-and-advocacy/reports/2016/power-shift.pdf> (accessed 7 November 2016).

Currently the [coal] sector is the largest contributor to Australia's emissions, at 188 million tonnes in 2015. By any measure, whether it is a pro rata adjustment to the reductions that are required and committed to now by this nation by 2030, or possibly a further extension of that based on the inability of the current [Intended Nationally Determined Contributions (INDCs)] to meet the two-degrees Celsius glide path, abatement in the electricity sector could be required by 2030 of between around 50 million tonnes and 100 million tonnes per year, recognising that currently it is around 188 million tonnes per year. So these are very large adjustments. The current renewable energy target, the large-scale target, will only reduce abatement in that time frame by around 30 million tonnes a year, if it is fully developed. So we believe that we will need to see large-scale scale-up of renewable energy. Indeed not just the Climate Council but any number of studies have indicated that, for Australia to meet the emissions abatement/reduction targets that it has committed to, a substantial portion of Australia's coal-fired stations will need to close by 2030.⁶¹

2.56 When asked if replacing existing coal fired power stations with new, more energy efficient power stations should be considered as an alternative option to renewable energy, Ms Kelly O'Shannassy, Chief Executive Officer, Australian Conservation Foundation noted:

I do not believe it is, because what we base our work on, and the international work on, is the notion of a carbon budget—the amount of emissions you have left in order to reach those goals in the Paris Agreement—and it is very clear that we need to get to net zero levels of pollution by mid-century to have a chance of the two degrees...

... So it is a better option to replace the current fleet, which does need replacing, with plant that does not produce those net levels of emissions right now. The technology is showing that renewable energy sources are our best opportunity.⁶²

2.57 On the choice between building new coal fired or renewable power stations Associate Professor Jotzo told the committee:

Stepping back from environmental policy objectives, the current levelised cost of electricity, in terms of new build of renewables and coal-fired power, are just about on par. With stagnating electricity demand at the moment, we do not really need large amounts of extra capacity right now or in the next few years. Essentially, the capital costs of coal-fired power stations are not changing over time whereas renewable's costs are falling. Add to that that most investors would be factoring in the probability of some form of carbon constraint or cost of carbon at some point in the future, and I would judge it highly unlikely that you would see commercial investment in coal-fired plants in Australia at any point in the future.⁶³

61 *Committee Hansard*, 9 November 2016, p. 1.

62 *Committee Hansard*, 9 November 2016, p. 17.

63 *Committee Hansard*, 9 November 2016, p. 17.

Maintaining electricity security and reliability

2.58 Maintaining the security and stability of the electricity market is a critical issue in the debate regarding the future of coal fired power stations. As the Australian Mines and Metals Association explained in its submission:

...if Australia reduces its reliance on coal (through the retirement of coal fired power stations) and if the demand for energy (electricity) were to remain or increase, without the same amount out of supply being brought on to the market by alternative energy sources, the price of energy (electricity) will rise as well as elevating the risk of supply shortages (dependent on inventory levels).⁶⁴

2.59 When retiring power stations, a priority should therefore be placed upon maintaining sufficient power stores. The NEM currently has a surplus of available energy. In the 2014-15 financial year, the NEM held between 7,650 megawatts and 8,950 megawatts of surplus capacity, particularly in New South Wales, Victoria and Queensland.⁶⁵

2.60 The ACF submitted:

According to the Australian Energy Market Operator (AEMO), surplus generation capacity and flattening demand mean that no new generation is needed in the next ten years. The Independent Market Operator in Western Australia has also declared that "no new capacity will be required in the South West Interconnected System until 2023-24".⁶⁶

2.61 Dr Roger Dargaville of the Melbourne Energy Institute argues that many coal fired power stations have been running at lower capacity due to the excess power in the NEM. Thus, increasing capacity in these power stations would assist in maintaining sufficient stores in the NEM, while assisting the transition to renewable energy replacements and providing energy security.⁶⁷

2.62 Environment Victoria also referred to the excess capacity in the NEM providing security of supply:

Until recently, rising electricity demand has been making the task of replacing coal-fired electricity with renewable energy more difficult. However, since the early 2010s the National Electricity Market has had significantly more capacity than will be needed for some years. This excess electricity generation capacity in the NEM has created an opportunity to

64 *Submission 67*, p. 2.

65 Mr Dylan McConnell, *FactCheck: does Australia have too much electricity?* 10 September 2014. Available at: <https://theconversation.com/factcheck-does-australia-have-too-much-electricity-31505> (accessed 7 November 2016).

66 *Submission 69*, p. 10.

67 Dr Roger Dargaville, *The case for shutting down Hazelwood power station – some facts and figures*, 5 July 2012, Available at: <https://theconversation.com/the-case-for-shutting-down-hazelwood-power-station-some-facts-and-figures-7940> (accessed 3 November 2016).

remove existing coal-fired generation with no short-term risk to the security of supply.⁶⁸

2.63 This argument is also supported by The Australia Institute, which noted that idling mines and stations increase environmental harm and delay the producers' requirement to take responsibility for the rehabilitation of the area.⁶⁹

2.64 The Clean Energy Council submitted:

While surplus generation capacity remains in the electricity market, complementary mechanisms like the RET [Renewable Energy Target] are important to drive the construction of new renewable energy generators. An additional complementary mechanism is needed to allow for an orderly closure and withdrawal of the most polluting power stations.⁷⁰

2.65 In terms of the reliability of the network as coal fired power stations are retired and replaced with renewable energy, the ACF noted:

The Australian Energy Market Operator (AEMO) has also confirmed that the National Electricity Market can operate with 100 per cent renewable energy while meeting the current National Electricity Market reliability requirement. In other words, 100 per cent renewable energy can meet the energy needs of the NEM 99.998 per cent of the time.⁷¹

2.66 The Clean Energy Finance Corporation made a related point:

An electricity system with high levels of renewables is capable of delivering baseload electricity supply if the system is flexible enough to respond to shortfalls in intermittent generation supply (i.e. wind and solar farms) with dispatchable generation, time-shifting and storage (e.g. bagasse, hydro, solar thermal, micro grids, pumped hydro, batteries etc) and through additional transmission interconnection capacity that integrates NEM regions.⁷²

Heatwave in January and February 2017

2.67 In January and February 2017, an ongoing heatwave affected the stability of the NEM. The Bureau of Meteorology stated in its monthly weather report of January

68 *Submission 16*, p. 6.

69 Dr Richard Denniss and Rod Campbell, 'Two birds. one little black rock: Solving the twin problems of incentives for retirement of coal fired generation and funding rehabilitation liabilities', *Policy Brief*, The Australia Institute, December 2015, p. 8. Available at: http://www.tai.org.au/sites/default/files/P157%20Two%20birds%20one%20little%20black%20rock%20%5BPRINT%5D_1.pdf (accessed 3 November 2016).

70 Clean Energy Council, *Submission 13*, p. 4.

71 *Submission 69*, p. 6.

72 *Submission 64*, p. 8.

2017 that 'exceptionally' high temperatures were recorded in New South Wales, southern Queensland and north-eastern South Australia.⁷³

2.68 High temperatures are recognised to have an impact on the reliability of energy systems. The AEMO drew this connection in a report, stating that '[e]nergy use in summer is highly dependent on ambient temperatures, with increased energy use for cooling increasing actual and forecast demand'.⁷⁴ The AEMO's report explained that temperature forecasts are factored into forecasts of available generation capacity and demand in order to calculate the reserve power available. In the event that there is insufficient reserve to maintain the security of the power system, the AEMO 'will take operational action to restore it'.⁷⁵

2.69 In February 2017, the continuing heatwave resulted in a number of incidents where load shedding was utilised by the AEMO in New South Wales and South Australia in order to maintain system security and avoid mass outages. Major outages were recorded on 8 February in South Australia and on 10 February in New South Wales.

2.70 A number of witnesses commented that the increasing number of extreme weather events is indicative of a changing climate. Ms Blair Palese of 350.org Australia stated:

To think about new coal now is an insane concept when we see the impacts we have already seen around the world and in Australia. Just the warming that we have seen so far include: four states hitting heatwave levels in the last two weeks or three weeks at 47 and 48 degrees Celsius; only seven per cent of the Great Barrier Reef not being impacted by ocean warming, meaning that the majority of our reef is already being impacted; bushfires, drought and extreme storms—and it is becoming the norm nationally. We need to take action not just because it is the right thing to do environmentally. But, economically, we are not preparing ourselves for what is coming in the low-carbon world.⁷⁶

2.71 Ms Daisy Barham, Nature Conservation Council, supported this viewpoint. Ms Barham further noted the urgency of the retirement of coal fired power stations, stating:

...we know that we are already feeling the impacts of climate change through heatwaves, droughts and increased bushfires here in New South

73 Bureau of Meteorology, *Australia in January 2017*, 1 February 2017, <http://www.bom.gov.au/climate/current/month/aus/summary.shtml> (accessed 28 February 2017).

74 Australian Energy Market Operator, *System Event Report – South Australia, 8 February 2017*, 15 February 2017, <https://www.aemo.com.au/Media-Centre?tagId=%7B605BA73B-9768-4D46-8833-A8FBD05B3236%7D> (accessed 16 February 2017) p. 14.

75 Australian Energy Market Operator, *System Event Report – South Australia, 8 February 2017*, 15 February 2017, <https://www.aemo.com.au/Media-Centre?tagId=%7B605BA73B-9768-4D46-8833-A8FBD05B3236%7D> (accessed 16 February 2017) p. 17.

76 *Committee Hansard*, 22 February 2017, p. 2.

Wales. There has never been a more urgent time to get going on the urgent transition out of coal- and gas-fired electricity.⁷⁷

COAG review of energy security

2.72 In October 2016, the Council of Australian Government (COAG) Energy Council agreed to 'an independent review to develop a national electricity blueprint to ensure Australia's energy security as we transition to a lower emissions future.'⁷⁸

2.73 The review will be led by Australia's Chief Scientist, Dr Alan Finkel AO. A preliminary report will be prepared for the COAG meeting in December and a final report is expected to be presented in early 2017.⁷⁹

2.74 On the matter of Dr Finkel's review, Mr Andrew Stock, Climate Councillor, Climate Council (the Council) told the committee:

...the Finkel review currently underway reviewing the national electricity market must ensure that the NEM is structured to manage this major electricity sector transition and decarbonisation and that the national electricity objectives should include emissions abatement as a fourth aim.⁸⁰

2.75 The *Preliminary Report of the Independent Review into the Future of the National Electricity Market* (the Preliminary Report) was presented by Dr Finkel to the COAG Leaders' Meeting on 9 December 2016.⁸¹

2.76 The Preliminary Report found that the current energy framework is in a state of rapid change and the NEM is struggling to keep up with increasing demands on its infrastructure. The introduction of multiple new forms of energy technology (particularly wind and solar) and the growing trend in home battery storage systems were found to have fundamentally changed the nature of the NEM.⁸²

77 *Committee Hansard*, 22 February 2017, p. 2.

78 The Hon Josh Frydenberg MP, Minister for the Environment and Energy, 'Ministers agree to independent review to develop a national energy security blueprint', *Media release*, 7 October 2016. Available at: [http://www.joshfrydenberg.com.au/siteData/uploadedData/Minister%20Frydenberg%20-%20Media%20Release%20-%20Ministers%20Agree%20to%20Independent%20Review%20of%20the%20National%20Electricity%20Market%20\(7%20October%202016\)_fa799071-3c5b-46d0-a180-b72b3e78fa62.pdf](http://www.joshfrydenberg.com.au/siteData/uploadedData/Minister%20Frydenberg%20-%20Media%20Release%20-%20Ministers%20Agree%20to%20Independent%20Review%20of%20the%20National%20Electricity%20Market%20(7%20October%202016)_fa799071-3c5b-46d0-a180-b72b3e78fa62.pdf) (accessed 6 November 2016).

79 The Hon Josh Frydenberg MP, Minister for the Environment and Energy, 'Ministers agree to independent review to develop a national energy security blueprint', *Media release*, 7 October 2016.

80 *Committee Hansard*, 9 November 2016, p. 1.

81 The independent review of the National Electricity Market (the Review) was established at a COAG Energy Ministers' meeting on 7 October 2016. See: <http://www.environment.gov.au/energy/national-electricity-market-review>

82 *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia 2016, p. 7.

2.77 The Preliminary Report recognises the need for balance between the competing policy demands of maintaining the security of baseload power in the NEM, managing the fluctuations in power provided by renewable energy, ensuring affordable energy services for consumers, while meeting Australia's obligations in regards to international agreements on greenhouse gas emissions.⁸³

2.78 While the Preliminary Report focussed on the need for overall reform of the NEM, it noted:

Coal fired power stations continue to provide the majority of Australia's electricity generation...But reduced total electricity demand, increased competition from renewable energy generation, volatility of wholesale prices, investor concerns over long-term viability and the high maintenance costs of older power stations have led to a number of coal-fired generators being withdrawn from the market. Nine coal-fired power stations have closed since FY2012, representing around 3,600 MW of installed capacity. In addition, it has recently been announced that the 1,600 MW Hazelwood Power Station in Victoria will close by 31 March 2017.⁸⁴

2.79 The Preliminary Report also discussed potential emissions reduction policies on the regulated closure of fossil-fuelled power stations, which was a key topic in this inquiry's interim report. It relied on the report released on 9 December 2016 by the Australian Energy Market Commission (AEMC) which analysed three forms of emissions reduction regulation:

- a market-based, emissions intensity target (EIT);
- extending the current Large-scale Renewable Energy Target (LRET); and
- government-regulated closure of certain power generators.⁸⁵

2.80 The AEMC report suggested that the best form of regulating for emissions reduction resulted from the EIT mechanism, as it had the best outcomes of the three options in terms of price to consumers, costs to the economy and security of the power

83 *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia 2016, pp 8-10.

84 *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia 2016, p. 25.

85 AMEC 2016, *Integration of energy and emissions reduction policy*, Report, 9 December 2016, <http://www.aemc.gov.au/getattachment/1a286b0f-93e2-4b95-90f9-9b65d4733797/Final-Report.aspx> (accessed 7 February 2017).

system.⁸⁶ However, on 7 December 2016 the Prime Minister, the Hon Malcolm Turnbull MP, ruled out the possibility of an EIT scheme.⁸⁷

2.81 The Preliminary Report further looked into the AMEC's analysis of regulated closure of coal fired power stations, stating:

The regulated closure policy had a slightly higher economic cost than the emissions intensity scheme. However, the regulated closure policy had the largest impact on electricity prices. This is because as coal plants are retired, supply of low cost power is reduced which puts upward pressure on wholesale prices. The AEMC also noted that a regulated closure policy that involved payments to generators to close down may create a barrier to exit. This is because generators might no longer respond to price signals in the market, but instead wait for payment signals from the government.⁸⁸

2.82 The final report of the Independent Review is due to be presented to COAG by mid-2017.⁸⁹

The AEMO National Transmission Network Development Plan

2.83 On 12 December 2016, the AEMO released a report focussing on the pathway for efficient transmission grid development in the NEM over the next 20 years. The *National Transmission Network Development Plan* (NTNDP) projected that under a neutral economic growth scenario, up to 63 per cent of the existing coal generation fleet may withdraw in the next twenty years, which would represent nine gigawatts (GW) being withdrawn from the fleet's total generation of 15.5 GW during the 2030s.⁹⁰

2.84 Using the NTNDP analysis, the retirement of coal fired power stations could be timed according to financial viability and announced intentions to close power stations at the end of their operational lives. The AEMO found that this would result

86 AMEC 2016, *Integration of energy and emissions reduction policy*, Report, 9 December 2016, <http://www.aemc.gov.au/getattachment/1a286b0f-93e2-4b95-90f9-9b65d4733797/Final-Report.aspx> (accessed 7 February 2017).

87 Prime Minister the Hon Malcolm Turnbull MP, doorstep, 7 December 2016, <https://www.pm.gov.au/media/2016-12-07/doorstop> (accessed 14 February 2017). The Prime Minister made this statement in the context of the announcement on 5 December 2017 of a review by the Department of Environment and Energy of climate change policy. See Department of the Environment and Energy, *Review of Australia's climate change policies*, available at: <http://www.environment.gov.au/climate-change/review-climate-change-policies>.

88 *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia 2016, p. 23.

89 Dr Alan Finkel AO, Australia's Chief Scientist, 'Future Security of the National Electricity Market', *Media Release*, 9 December 2016, available at <http://www.chiefscientist.gov.au/2016/12/media-release-future-security-of-the-national-electricity-market/> (accessed 17 March 2017).

90 Australian Energy Market Operator, *National Transmission Network Development Plan*, 12 December 2016, https://www.aemo.com.au/mwg-internal/de5fs23hu73ds/progress?id=0STQ2ke-2Fm6O3ZGK9TchJYY_nkPpDqXcoDT7taV9a0,&dl (accessed 22 December 2016), p. 17.

in a 'greater projection of gas-powered generation to support development of new renewable generation'.⁹¹

National Electricity Objective

2.85 The AEMO operates the NEM. The AMEC makes and amends the National Electricity Rules that underpin the NEM. These include rules that:

- govern the operation of the NEM—the competitive wholesale electricity market and the associated national electricity system;
- govern the economic regulation of the services provided by monopoly transmission and distribution networks; and
- facilitate the provision of services to retail customers.

2.86 The AEMC conducts independent reviews and provides advice to governments on the development of electricity markets. When performing these functions, the AEMC is required by law to have regard to the National Electricity Objective as stated in the National Electricity Law:

To promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to – price, quality, safety, reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system.⁹²

2.87 Some stakeholders to the inquiry argued that decarbonisation or a pollution reduction objective should be included in the National Electricity Objective.⁹³

2.88 Mr Jonathan Upson, Senior Business Development Manager, Infigen Energy expressed support for the objective to be broadened:

That is a very important point. Currently, the national electricity objective is all about security, supply and cost—that is it. So if you put in a rule change that does not contribute to cost or security or supply, it gets rejected because that is not the national electricity objective. So it is very important that there be a third objective for reducing emissions, or however you want to portray it, because when rule changes are proposed, they will have to evaluate all three of those criteria. I admit it is going to be a challenge to balance the three objectives, but that is where we are today. If you want to reduce emissions in the electricity industry, it needs to be something that is

91 Australian Energy Market Operator, *National Transmission Network Development Plan*, 12 December 2016, https://www.aemo.com.au/mwg-internal/de5fs23hu73ds/progress?id=0STQ2ke-2Fm6O3ZGK9TchJYY_nkPpDqXcoDT7taV9a0,&dl (accessed 22 December 2016), p. 17.

92 Australian Energy Market Commission, *National Electricity Market*, <http://www.aemc.gov.au/Australias-Energy-Market/Markets-Overview/National-electricity-market#NEO> (accessed 21 November 2016).

93 See for example, Mr Andrew Stock, Climate Councillor, Climate Council, *Committee Hansard*, 9 November 2016, p. 1.

uniform not only in legislation and in our Paris commitments; it needs to be in the national electricity objective as well.⁹⁴

2.89 Representatives from AGL Energy indicated their broad support for the better integration of energy in climate policy settings:

I think it is something that certainly needs to be referenced...one of the difficulties that we currently have is that the regulatory bodies within our market do not necessarily have a mandate to consider legitimate Commonwealth public policy goals around decarbonisation. Their mandate is really defined by their specific aspects...I think they need a little bit more permission, so to speak, through that objective to really integrate those two policy streams.⁹⁵

2.90 Mr Kieran Donoghue, General Manager Policy, Australian Energy Council indicated that changing the objectives may not be the most effective mechanism:

We do not think that would be likely to be a particularly effective instrument. It may depend a bit on the detail. In practice that would require some of the energy market agencies to effectively try to make some difference decisions. But if there is not that clarity in the national polity then trying to change the objectives of the NEO would not be an effective substitute for that. Conversely, if we do get that clarity which we need, there would be no particular need to embed anything new in the NEO because we would have the clarity and the judgement about rules, and applying the rules would be in the context of that. So we do not think it would actually do what its supporters seem to think it would do. It is a proxy for getting policy right at the national level.⁹⁶

94 *Committee Hansard*, 17 November 2016, p. 59.

95 Dr Timothy Nelson, Head of Economic Policy and Sustainability, AGL Energy, *Committee Hansard*, 17 November 2016, p. 7.

96 *Committee Hansard*, 17 November 2016, p. 15.

Chapter 3

Options for the retirement of coal fired power stations

3.1 Evidence to the inquiry highlighted that Australia's coal fired power stations will need to be retired in the medium term in order to make way for lower-emissions sources of power generation. Various options could be utilised to facilitate this process, and are discussed through this chapter.

3.2 Broadly, the options for facilitating the retirement of coal fired power stations include the following:

- leave retirement decisions solely to industry and market forces (without any further changes to government policy settings);
- directly regulate closures (i.e. government directs particular power stations to shut down through regulation, with the plant owner bearing the cost of closure);
- introduce a government payment-for-closure scheme, where the government pays high emissions intensity plant operators to shut down (with the taxpayer sharing the cost of closure);
- market mechanisms introduced by regulation, creating incentives for closure (or disincentives for continued operation) with the market ultimately deciding which power stations retire and when. Possible market mechanisms include:
 - a carbon pricing mechanism, causing higher-emitting plants to incur greater costs, making them less competitive and more likely to cease operations;
 - an emissions intensity scheme, whereby the government sets a baseline emissions intensity target, with below-baseline producers rewarded and above-baseline producers penalised via a tradable permits mechanism;
 - a regulated market mechanism for closure (e.g. the Jotzo model), whereby payments are made by the industry as a whole to shut down the power stations which are the most cost effective to close.

'Barriers to exit' and need for policy certainty

3.3 Much of the policy discussion in this area focusses on whether there are 'barriers to exit' which impact on the decision-making of coal plant operators when determining if (and when) to close.

3.4 The question is not merely whether any barriers to exit exist, but whether these barriers are significant enough to prevent an 'efficient' or 'orderly' restructuring of the market to occur (with older, high-emissions plant capacity retiring first). As explained by the AEMC:

A barrier to exit is any cost or foregone profit that a firm must bear if it leaves an industry. While these costs therefore represent barriers to exit for

individual generators they are only a problem if they are a barrier to *efficient* exit decisions.

For example, based on this definition, it will not always be efficient for generators with the highest variable cost to exit the market first. Where generators with high variable costs have high shut down costs, it can be an optimal outcome for them to exit the market after generators with low variable costs but low shut down costs.¹

3.5 Several barriers to exit for coal fired power stations have been identified in the Australian context, which can be summarised broadly as follows:

- *First-mover disadvantage*: If one plant exits the market, the remaining plants will receive higher revenues, which acts as a disincentive to closure as every operator has an incentive to defer closure in the hope that another plant will close.²
- *Low operating costs of older coal plants*: Brown coal fired power stations generally carry lower short-run marginal costs of production than other power generators, meaning they may have a greater capacity to continue functioning at low cost even as they approach or exceed their expected operating lifespan.³
- *Closedown and site remediation costs*: The cost of shutting down a power plant permanently (even as opposed to 'mothballing' a plant or moving to seasonal rather than full-time production) is high, with site remediation costs estimated as being between \$100-\$300 million for Australian plants.⁴
- *Policy uncertainty*: This uncertainty has the effect of making it difficult for plant operators to predict what the cost of exiting the market will be now, as opposed to in the future. Hence, this uncertainty may cause inefficient investment and closure decisions.⁵

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- 1 Australian Energy Market Commission, *Advice to the COAG Energy Council: Barriers to Generators Exiting the Market*, June 2015, p. 3, available at <http://www.aemc.gov.au/Markets-Reviews-Advice/Barriers-to-Generators-Exiting-the-Market#> (accessed 1 November 2016).
 - 2 Frank Jotzo and Salim Mazouz, *ANU Centre for Climate Economics and Policy*, CCEP Working Paper 1510, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 3. [*Submission 4*, Attachment 1]
 - 3 Frank Jotzo and Salim Mazouz, *ANU Centre for Climate Economics and Policy*, CCEP Working Paper 1510, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 3. [*Submission 4*, Attachment 1]
 - 4 Tim Nelson, Cameron Reid and Judith McNeill, 'Energy-only markets and renewable energy targets: complementary policy or policy collision?', *AGL Applied Economics and Policy Research Working Paper No. 43*, August 2014, p. 2.
 - 5 Australian Energy Market Commission, *Advice to the COAG Energy Council: Barriers to Generators Exiting the Market*, June 2015, pp. 22–23; Tim Nelson, Cameron Reid and Judith McNeill, 'Energy-only markets and renewable energy targets: complementary policy or policy collision?', *AGL Applied Economics and Policy Research Working Paper No. 43*, August 2014, p. 16.

3.6 This final factor, policy uncertainty, was identified by numerous stakeholders to the inquiry as a key issue creating instability in industry decisions—along with the corollary observation that introducing more policy stability in this area would promote better outcomes for investors and market participants. For example, Associate Professor Frank Jotzo argued:

Australia's energy sector has been exposed to significant investment uncertainty due to pervasive policy uncertainty and climate policy reversals for over a decade. Such uncertainty has detrimental effects on the investment climate and potentially on the cost effectiveness of investment...For an effective and efficient low-carbon transition, stable and predictable policy settings are needed.⁶

3.7 The Australian Energy Council argued similarly:

A benefit of the market is that it can discover what the real economic life of a power station is and when it is worthwhile to invest in refurbishing a plant to extend its operating life. Stable carbon policy is needed to inform this investment decision making, and potentially signal that coal-fired power station emissions intensity may lead them to close earlier than without a carbon policy.⁷

3.8 AGL Energy submitted:

The transition to a decarbonised and modernised generation sector requires large scale investment, recent AGL analysis estimates this at \$23 billion in renewables alone to achieve an emission reduction consistent with a 27% reduction in [greenhouse gas] emissions by 2030.

Such investment will be supported by policy that provides macro level certainty as to the timeframe and operating life of incumbent plant.

Such certainty has the potential to benefit a range of factors contributing to the efficient transition including new investments, management of existing capital stock, policy development, community transition and energy market development.⁸

Leaving retirement decisions solely to industry and market forces

3.9 The status quo approach would leave any retirement decisions on the closure of coal fired power stations up to the plant owners themselves, with no external changes in government policy settings to assist this process. This approach was endorsed by the COAG Energy Council in December 2014, which stated:

6 *Submission 4*, p. 4. See also: Clean Energy Finance Corporation, *Submission 64*, p. 7; Clean Energy Council, *Submission 13*, p. 1.

7 *Submission 44*, p. 6.

8 *Submission 12*, p. 3.

The Council considers it is for the market to provide signals for investment and de-investment for generation, and opposes the transferral of the costs of retiring assets onto consumers or taxpayers.⁹

3.10 Advocates for this position argue that plant operators will choose to cease operations as necessary, in accordance with existing market conditions, and that there are no barriers to exit that are significant enough to warrant government intervention. The AEMC undertook work in 2015 to identify barriers to generators exiting the NEM, and found that 'there is nothing in the National Electricity Law or Rules which would constitute a barrier to efficient exit decisions by generators'.¹⁰

3.11 The AEMC stated that recent experience shows that generators are not being prevented from leaving the market under current policy settings:

While it is possible the uncertainty around exit costs is creating a barrier to efficient exit, a number of generators have announced exit decisions in recent years. The evidence suggests that any barriers to exit have not deterred generators from commencing various stages of exit or the full retirement of plant. This would support leaving it to the market to determine which plant should exit.¹¹

3.12 In particular, the AEMC pointed to the closure in May 2016 of the Northern and Playford B coal power stations in South Australia and the announced closure of the Hazelwood plant as examples of generator exit without further policy intervention.¹²

3.13 The AEMC stated further in its submission to the inquiry:

The decision of a generator to retire should be a commercial decision.

Investment and divestment decisions are based on a range of factors. A decision to retire a generator can take a number of years and requires intimate knowledge of the commercial and operating structures of that generator as well as clear expectations about future revenues and costs. Generators are best placed to manage the risk of their own investment or divestment decisions. The added benefit of this approach is that the risks of poor investment decisions are borne by generators rather than taxpayers or electricity consumers (as would be the case if a government were to intervene).¹³

3.14 Other stakeholders have maintained that existing barriers to exit do risk distorting the process of market transition, arguing that additional policy intervention may be required in order to facilitate the phased closures of older, higher-emissions

9 COAG Energy Council, *Meeting Communiqué*, Adelaide, 11 December 2014.

10 Australian Energy Market Commission, *Advice to the COAG Energy Council: Barriers to Generators Exiting the Market*, June 2015, p. 3.

11 Australian Energy Market Commission, *Advice to the COAG Energy Council: Barriers to Generators Exiting the Market*, June 2015, p. 24.

12 *Submission 76*, p. 3.

13 *Submission 76*, p. 3.

generators. The imperative to reduce Australia's carbon emissions in line with our international commitments is also cited as a reason for implementing policies that would have the effect of curbing emissions in the electricity sector, even if a consequent result of such policies is to force coal powered generators to close sooner than they otherwise would have.¹⁴

3.15 In its submission, AGL Energy stated:

There is a role for governments to establish policy that facilitates 'orderly' rather than 'disorderly' exit of emissions intensive aged power stations. Such policy could be based upon age (e.g. Canadian rule which requires power stations to be closed or retrofitted with carbon capture and storage when they turn 50), emissions intensity or a market mechanism (as proposed by Jotzo and Mazouz). Ultimately, policy makers should view such a closure policy as not only an important means of securing energy supplies from modern generation equipment; but also an effective way of systemically reducing greenhouse gas emissions and providing communities the certainty they deserve to plan for such a transition.¹⁵

3.16 Mr Andrew Stock of the Climate Council told the committee that without a coordinated closures policy, it is difficult for generators to properly plan and announce plant retirement decisions:

Planning for closure is actually quite problematic at an individual operator level for some quite difficult commercial reasons—that is, the electricity market operates much like another financial market would in that people selling electricity not only trade in the physical product on a day-to-day basis where they dispatch but they also trade financially in the futures market to support their physical retail contract positions. So when a decision for closure is made, it is very hard to telegraph that because if you are doing that you are trading with inside information potentially. This is one of the reasons why closure announcements come in the current market in the way they do. If the owners of power stations make a final decision before they announce that decision to the market, they are potentially trading with inside information, and that has quite serious consequences.¹⁶

3.17 Various policy mechanisms have been discussed as potentially aiding the transition away from coal fired power generation and towards lower emissions generation. These approaches are discussed further below. Several of these proposed mechanisms have been investigated by the Climate Change Authority (CCA) as part of its Special Review of Australia's climate action, initiated in 2014 and completed in August 2016.¹⁷ As part of this special review, the CCA commissioned two sets of

14 See, for example: Clean Energy Finance Corporation, *Submission 64*, p. 8.

15 *Submission 12*, p. 2.

16 *Committee Hansard*, 9 November 2016, p. 4.

17 See: Climate Change Authority, 'Special Review', <http://climatechangeauthority.gov.au/reviews/special-review> (accessed 4 November 2016).

modelling on the effects of different carbon pricing policy options on the electricity sector.

Policy mechanisms based on direct regulation

3.18 Policy options based on direct regulatory responses by government (as opposed to market-based mechanisms implemented by government) considered by stakeholders to the inquiry included payment-for-closure schemes and several other models for regulating the closure or ongoing operations of coal power stations.

Payment-for-closure schemes

3.19 Under this model, governments agree to pay certain power station owners to close, encouraging an orderly exit of older and high-emission coal power stations from the market. The Australian Government previously announced a 'contracts for closure' scheme in 2011, as part of its clean energy package that also included the introduction of a carbon price.¹⁸ Dr Jenny Riesz summarised the outcome of the proposed scheme as follows:

This scheme aimed to permanently close around 2000 MW of highly emissions intensive generation capacity by 2020 via payments to particular plant owners from the Federal Government. The amount paid was to be determined by negotiation...

Closure proposals were received by the Government from all eligible generators in early 2012. Negotiations ceased on 5 September 2012 with the announcement that no agreement had been reached. Again, there were differing views on the reason for this outcome. However, the expectation of a low carbon price, high gas price and high black coal price appear to have pushed up the asking price of brown coal generators beyond that which the Government was prepared to pay.¹⁹

3.20 A variant of this kind of scheme to retire brown coal power stations is due to be implemented in Germany: starting from October 2016, a capacity of 2.7GW of power from three brown coal plant operators will be taken out of production, with payments of 230 million euros per year made to the operators over a seven year period. The cost of these payments is borne by electricity consumers (increasing costs to consumers by 0.05 euro cents per kilowatt hour).²⁰

18 Department of Resources, Energy and Tourism, *Contracts for Closure: Program Administrative Guidelines*, 30 September 2011. Available at <http://webcache.googleusercontent.com/search?q=cache:y34kDVBKYJ8J:www.industry.gov.au/Energy/Documents/cei/CFC/Program-Administrative-Guidelines.doc+&cd=1&hl=en&ct=clnk&gl=au> (accessed 7 November 2016).

19 Dr Jenny Riesz, Mr Ben Noone and Associate Professor Iain MacGill, 'Payments for closure: Should Direct Action include payments for closure of high emission coal-fired power plants?', Centre for Energy and Environmental Markets, Working Paper, October 2013, p. 9.

20 *Deutsche Welle*, 'The end of lignite coal for power in Germany', 27 October 2015. Available at: <http://www.dw.com/en/the-end-of-lignite-coal-for-power-in-germany/a-18806081> (accessed 2 November 2016).

3.21 Direct payment-for-closure schemes have been criticised for a number of reasons in the Australian context. Professor Frank Jotzo and Mr Salim Mazouz argued in their 2015 paper on the retirement of coal fired power stations:

...payments-for-closure schemes can lead to unhealthy expectations of future industry subsidies from government and therefore a deferral of plant closure decisions with associated emissions.

Secondly, the politics of paying significant sums of taxpayers' money to the owners of old, highly emissions intensive power stations would be highly problematic. It also does not fit the narrative of the present Emissions Reduction Fund (ERF) mechanisms, which is one of subsidising businesses taking positive actions to move to cleaner production processes, not of compensation payments to sunset industries.²¹

3.22 The COAG Energy Council expressed the view in December 2014 that it does not support assistance to generators to exit the market.²²

3.23 Alinta Energy, which closed its Flinders coal mine and power station in South Australia in May 2016, submitted that no government payments or incentives to close are required. It argued that the market 'understand[s] and price[s] the cost of closure into the long term planning', and ultimately the public purse should not pay for private closure.²³

Direct regulation of power station closures and operations

3.24 Another set of options available to government would be to introduce regulatory measures that directly police the emissions performance of power stations, or mandate the retirement of coal fired power stations based on specified criteria. Direct regulatory responses could include:

- introducing standards for the emissions performance of new or existing power stations, creating industry-wide standards;
- facility-level absolute emissions baselines for high-emission generators (i.e. where each plant has a baseline for their total emissions that they must not exceed); and
- mandated closure of power stations over time, on the basis of age or emissions intensity.²⁴

3.25 The Australian Energy Council commented on regulatory closure options in its submission:

21 Frank Jotzo and Salim Mazouz, *ANU Centre for Climate Economics and Policy*, CCEP Working Paper 1510, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 7. [*Submission 4*, Attachment 1]

22 COAG Energy Council, *Meeting Communiqué*, Adelaide, 11 December 2014, p. 1.

23 *Submission 27*, pp 4-5.

24 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 32.

Regulatory closure, or even the requirement to give an extended closure notice, may prejudice both financing arrangements and supply contracts of power plants. This may then precipitate a disorderly closure if loans are called in early or suppliers terminate contracts. However, all of this depends on the type of regulatory closure.²⁵

Emissions standards for power generators

3.26 Mandating emissions performance standards for any new power generators would prevent any new high-emitting coal fired stations from being built.

3.27 Canada has implemented an emissions standard for new and existing coal fired generators, meaning that no new coal fired power stations can be built without carbon capture and storage (CCS) technology.²⁶

3.28 Similar to Canada, the United States has adopted emissions standards for new coal generators, which effectively require CCS to be implemented in any new projects.²⁷

3.29 Emissions standards of this type have been considered by the Australian and state governments in the past, and have been implemented only to be subsequently withdrawn in some Australian jurisdictions.²⁸

Absolute emissions baselines for generators

3.30 This model would set a baseline constraint on emissions output of each incumbent generating facility, without any market-based certificate trading between generators.²⁹ The emissions baselines for each plant can be decreased over time to steadily increase the level of emissions reductions required and force generators to adopt low emissions technology (e.g. implementing CCS retrofit for coal plants) or exit the market.

3.31 The potential impact of a version of this policy in Australia was modelled by Jacobs Group (Jacobs) in 2016 for the Climate Change Authority, which found that its introduction would cause significant electricity price increases in the 2020s, more so than other policy options.³⁰

25 *Submission 44*, p. 7.

26 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 65.

27 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 65.

28 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 66.

29 Jacobs, *Consultation Paper: Modelling illustrative electricity sector emissions reduction policies*, 29 May 2015, p. 93.

30 Jacobs, *Consultation Paper: Modelling illustrative electricity sector emissions reduction policies*, 29 May 2015, p. 94.

Regulated closures of coal fired power stations over time

3.32 This policy option involves the regulated closures of coal stations over time, either on the basis of age or on the basis of emissions intensity. As explained by Jacobs:

[These schemes] would close existing coal capacity in roughly linear fashion starting with the oldest or most emissions intensive, with the order of plant closure publicly announced at the time the policy is introduced. Each plant identified for closure would be legally required to either close or CCS retrofit by its closure date.³¹

3.33 Modelling conducted for the CCA by Jacobs in 2016 investigated the option of government mandating the regulated closures of all remaining coal fired power stations operating in Australia by 2030 on the basis of age. Under this scenario, coal generators that do not undergo a retrofit to incorporate CCS technology would be closed on the basis of age, and no new coal capacity could be built without CCS technology.³²

3.34 This scenario modelling found that pursuing this policy would lead to less overall emissions reductions by 2050 than other policies modelled (which are discussed further below).³³ The CCA also found that regulated closures would be a more expensive means of reducing carbon emissions than market-based mechanisms:

[The CCA's] analysis of regulated closure indicates that using it to achieve a large post-2020 emissions reduction goal in the absence of other measures in the electricity sector would entail higher costs than other policies and would not offer a direct incentive for new low-emissions plant to be built.³⁴

3.35 Choosing plant age as the basis for progressive power station closure under this model may also not produce the most efficient outcomes. Jotzo and Mazouz argue that the information asymmetry between governments and plant owners is a significant drawback to the directly regulated closures model:

Direct regulation suffers from government not having sufficient information about business cost structures, and therefore it would be difficult for the regulator to identify which plant would be the most cost-effective to close

31 Jacobs, *Consultation Paper: Modelling illustrative electricity sector emissions reduction policies*, 29 May 2015, p. 9.

32 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 73.

33 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 76.

34 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 63.

and how much to offer in compensation if such compensation was offered.³⁵

3.36 Further, they argue that in Australia's current political context 'it appears unlikely that a government would choose a pure regulatory approach that singles out power stations and imposes the full cost of early closure on the owners of that station'.³⁶

3.37 Associate Professor Jotzo commented further at a public hearing:

The regulated approach, according to a timetable, age or emissions intensity would obviously give great predictability of the schedule of exit. In my view, it has the disadvantage of not being the least-cost pathway. Almost by definition, the least-cost pathway of exit will deviate from 45 years out or whatever it may be. If a government wanted to go down the regulatory closure pathway, you would want to combine that with flexibility instruments such as tradeable operation rights.³⁷

3.38 Doctors for the Environment recommended that the degree of pollution and its danger to local communities should be a major factor in deciding priority for closure and in advising community and workers of the need for closure. It noted that several states in Australia already impose pollution licensing fees on power plant operators that could in theory drive the closure of heavily-polluting plants, but argued that these schemes 'have been ineffective due to the inadequate scale of fees imposed'.³⁸

Market-based mechanisms

3.39 The CCA concluded in a research paper in August 2016 as part of its Special Review that a market-based mechanism to reduce carbon emissions should be implemented in the Australian electricity supply sector:

A market mechanism in the sector would allow Australia to meet its targets at a lower cost to the community than would be possible without such a policy in the toolkit. The sector's characteristics (measurable emissions, relatively small number of large emissions sources, sophisticated profit-seeking investors operating in generally competitive generation markets) suggest market mechanisms will be feasible and more cost-effective than the alternatives. In addition, market mechanisms can be scaled to achieve

35 Frank Jotzo and Salim Mazouz, ANU Centre for Climate Economics and Policy, *CCEP Working Paper 1510*, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 17. [*Submission 4*, Attachment 1].

36 Frank Jotzo and Salim Mazouz, ANU Centre for Climate Economics and Policy, *CCEP Working Paper 1510*, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 6. [*Submission 4*, Attachment 1].

37 *Committee Hansard*, 9 November 2016, p. 18.

38 *Submission 53*, p. 15.

deep emission cuts, and are flexible to changing market and technology conditions.³⁹

3.40 The market-based policies considered as part of the CCA's review included: a cap and trade scheme; an emissions intensity scheme; a carbon tax; and a baseline and credit scheme.

3.41 Under all the policy scenarios modelled as part of the CCA's review (including the direct-regulation models discussed above), coal fired generation would decline significantly in Australia in the medium term. As Jacobs stated in its final modelling report, all the policy scenarios modelled involve the entire brown coal fleet and two-thirds of the black coal fleet being decommissioned by 2030.⁴⁰

Emissions intensity schemes

3.42 The CCA ultimately recommended the introduction of an emissions intensity scheme for the electricity supply sector in Australia.⁴¹ Jacobs gives an overview of how such a scheme would operate in its modelling report undertaken for the CCA:

An emission intensity baseline is set for the electricity supply sector as a whole (based on tonnes of carbon dioxide equivalent per megawatt hour sent out). All generators are allocated permits (representing one tonne of carbon dioxide equivalent) equal to their own generation multiplied by the baseline. At the end of the compliance period all generators surrender permits for each tonne of carbon dioxide equivalent emitted. This effectively means that generators with intensity below the baseline have surplus permits to sell (so receive a subsidy) and generators with intensity above the baseline need to buy additional permits (so incur an extra cost). Emissions permits can also be banked indefinitely for future use or borrowed in limited quantities.

Demand for permits available in each year creates an explicit carbon price, and the relative price of electricity made from more emissions-intensive sources increases. In contrast to a conventional cap and trade scheme, there is no absolute emissions cap, so in practice overall sectoral emissions will vary depending on electricity demand.⁴²

39 Climate Change Authority, *Policy Options for Australia's Electricity Supply Sector: Special Review Research Report*, August 2016, p. 52.

40 Jacobs, *Modelling illustrative electricity sector emissions reduction policies: Final Report*, 25 August 2016, p. 4. The full list of policy scenarios modelled by Jacobs for the CCA's review are: carbon pricing via a carbon tax or cap and trade scheme; an emissions intensity target scheme; a new large-scale renewable energy target; a low emissions target with wider eligibility than the RET; a feed-in-tariff scheme incorporating contracts for differences; regulated closures of high-emissions generators; and an absolute baselines scheme applied to individual facilities.

41 Climate Change Authority, *Towards a climate policy toolkit: special review on Australia's climate goals and policies*, August 2016, p. 7.

42 Jacobs, *Modelling illustrative electricity sector emissions reduction policies: Final Report*, 25 August 2016, pp 24–25.

3.43 Jacobs' modelling on this policy scenario predicts that during the first decade of implementation (that is, 2020–2030) all coal fired power stations are shut-down as a result of the imposed policy, with mostly wind generators and combined cycle gas turbines replacing the retired capacity.⁴³ The generation mix for electricity supply in Australia to 2050 under this scenario is shown in Figure 3.1.

3.44 Origin Energy stated its support for a mechanism like this to manage the transition to a low-carbon electricity sector:

Origin supports the progressive decarbonisation of the electricity sector in Australia and an eventual goal of net zero emissions by 2050 or earlier. We believe the introduction of a well-designed cost of carbon abatement for the electricity sector, such as an emissions intensity scheme, is the key to managing this transition.⁴⁴

Jotzo model for regulated closure of brown coal power stations

3.45 Jotzo and Mazouz advocate for a different type of market-based mechanism to drive the closure of the most emissions-intensive brown coal station(s) in Australia.⁴⁵ They argue that in the absence of any policy intervention, the economics of Australia's fleet of coal fired power stations is such that black coal stations may close operations first, before the more emissions-intensive brown coal fired stations.⁴⁶ This would lead to poorer environmental outcomes in terms of overall carbon emissions and air pollutants than if brown coal capacity was closed earlier and black coal generation capacity remained online.

3.46 Their suggested model is in effect a hybrid market-based regulated closures model. It is summarised as follows:

The principle of the proposed mechanism is that government offer power plants the opportunity to bid for the closure of some amount of capacity, leaving it to the bidding process to determine which plant(s) will close and what the magnitude of the payment to the closing plant is. The remaining plants are then mandated by government to make financial transfers to the plant that exits the market, in line with their emissions.⁴⁷

43 Jacobs, *Modelling illustrative electricity sector emissions reduction policies: Final Report*, 25 August 2016, p. 59.

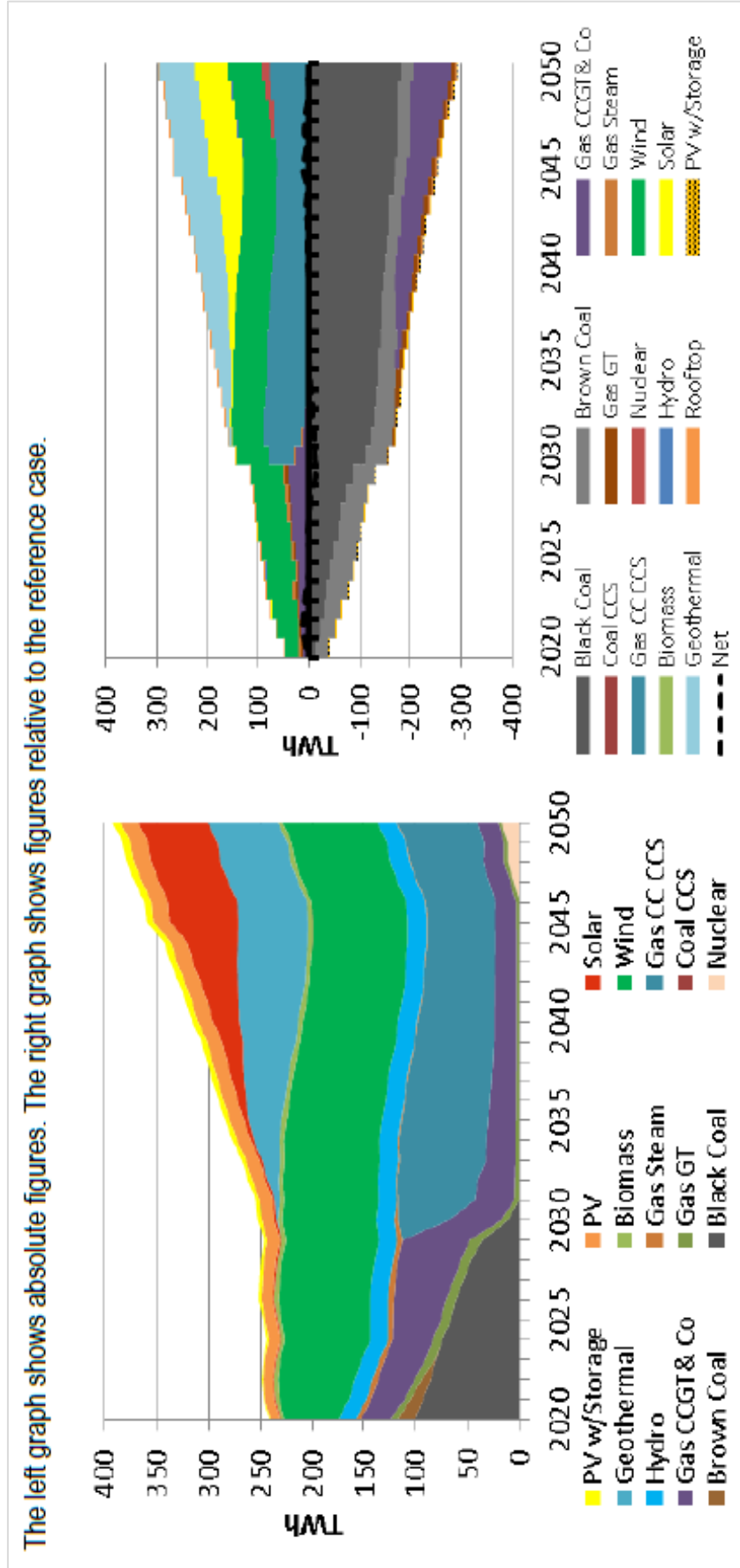
44 *Submission 39*, p. 1.

45 Frank Jotzo and Salim Mazouz, *ANU Centre for Climate Economics and Policy*, CCEP Working Paper 1510, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015. [*Submission 4*, Attachment 1].

46 This is because Australia's brown coal plants have lower short run marginal costs than their black coal counterparts, enabling them to potentially remain viable for longer periods.

47 Frank Jotzo and Salim Mazouz, *ANU Centre for Climate Economics and Policy*, CCEP Working Paper 1510, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 8. [*Submission 4*, Attachment 1].

Figure 3.1: Generation mix of electricity supply under an emissions intensity target scenario



Source: Jacobs, *Modelling illustrative electricity sector emissions reduction policies: Final Report*, 25 August 2016, p. 59.

3.47 Jotzo and Mazouz argue that such a mechanism would: provide emissions savings from plant closure at least cost; rely on a market mechanism to identify which plant should close and what magnitude payment is required; avoid budgetary costs by sourcing the payments for closure from the power stations remaining in production; and provide some incentives to adjust the power mix to reduce emissions.⁴⁸

Competitive bidding process to identify which stations to close

3.48 Under the Jotzo model, relevant plants (most likely Victoria's brown coal fired power stations) would be invited to submit a bid for the amount of money they would be willing to accept in return for ceasing operations by a predetermined date, remediating their plant site and funding an assistance package to their workers and local communities. A government regulator would then assess the bids, alongside the likely emissions savings resulting from each possible closure, and choose the most cost-effective bid.⁴⁹

3.49 The generator chosen for closure would then receive the full amount specified in their bid, in pre-determined instalments, paid for by the other generators remaining in the market. Under Jotzo's preferred model, the share of payments each remaining generator would need to contribute would be determined on the basis of their carbon dioxide emissions during the year following the closure of the chosen plant, creating further incentives for high-emitting plants to submit low bids in the bidding process.⁵⁰

3.50 Jotzo and Mazouz consider that the cost of such plant closure (and its capacity exiting the market) would be reflected in some rises to electricity prices. They estimate an increase of five to 14 per cent in wholesale prices over the course of one year (and dropping again afterwards), with a corresponding increase in retail prices in the order of one to two per cent, over one year.⁵¹

3.51 Associate Professor Frank Jotzo discussed this model with the committee at a public hearing:

Our proposal, in a nutshell, is for a market mechanism whereby existing power stations submit bids as to financial compensation required to shut down according to a pre-agreed time line. A government or regulator would choose the most attractive bid, which may well be the bid that delivers the greatest expected emission savings per dollar of compensation required.

48 Frank Jotzo and Salim Mazouz, ANU Centre for Climate Economics and Policy, *CCEP Working Paper 1510*, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 8. [*Submission 4*, Attachment 1].

49 Jotzo and Mazouz note (at p. 10) that strategic bidding strategies may be employed to distort the optimal outcome of the auction, requiring the regulator to carefully customise design of the auction.

50 Frank Jotzo and Salim Mazouz, ANU Centre for Climate Economics and Policy, *CCEP Working Paper 1510*, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, pp 10–11. [*Submission 4*, Attachment 1].

51 Frank Jotzo and Salim Mazouz, ANU Centre for Climate Economics and Policy, *CCEP Working Paper 1510*, 'Brown coal exit: a market mechanism for regulated closure of highly emissions intensive power stations', November 2015, p. 16. [*Submission 4*, Attachment 1].

This is a competitive process—best bid wins—and the money is then levied on the remaining power generators. The logic behind that is that these are the power generators that will benefit through increased capacity utilisation of their plants and, to some extent, through increased prices in the wholesale market. This would enable for exit according to a timetable. It would create a source of funding for structural adjustment, and possibly also for improved site rehabilitation above and beyond the level that is required by law of the exiting companies.⁵²

Criticism of Jotzo model

3.52 The Jotzo model has been criticised, most notably by Frontier Economics in a May 2016 paper.⁵³ This paper argues that the predicted electricity impacts of a closure of one of Victoria's brown coal power stations, as advocated for in the Jotzo model, would be much more significant than Jotzo and Mazouz allow for. Frontier's estimates are that retail prices would rise by up to 25 per cent in Victoria in the year immediately following closure, with sustained price rises of 9 per cent in following years, as well as less severe price rises in New South Wales and South Australia.⁵⁴

Options for implementation of policy combinations and need for further research

3.53 Stakeholders highlighted the fact that a combination of policies may be required to effect an orderly exit from the market of coal generators and concurrent increase in generation capacity from renewable sources.⁵⁵ In particular, some argued that the continuation of a large scale renewable energy target beyond 2020, when coupled with other policy mechanisms to constrain emissions from coal generators or regulate their closure, would be the most effective means of managing this transition.⁵⁶

3.54 Associate Professor Jotzo made the point that currently, research on options to facilitate closure of coal fired power stations in Australia has been relatively limited. He argued that additional work is required to fully understand the options and provide input to policy, including by further investigating:

- how policy mechanisms for power station closure would interact with other policies, such as baseline-and-credit or the renewable energy target;
- how predictability of exit can be achieved without unduly compromising cost effectiveness, including the potential role for industry compacts; and

52 *Committee Hansard*, 9 November 2016, p. 18.

53 Frontier Economics, *Sudden Impact: Scrutinising the wholesale price impact of assisted closure of brown coal power stations*, May 2016.

54 Frontier Economics, *Sudden Impact: Scrutinising the wholesale price impact of assisted closure of brown coal power stations*, May 2016, pp 11–12.

55 See, for example: Environment Victoria, *Submission 16*, p. 2; Australian Conservation Foundation, *Submission 69*, p. 12.

56 WWF-Australia, *Submission 77*, pp 5–6.

- options to provide effective support for structural adjustment, and how to raise funds for structural adjustment ideally without relying on public budgets.⁵⁷

Recent policy announcements by the Australian Government

3.55 Throughout January to February 2017, the Australian Government began to signal a new approach to energy policy. During his speech at the National Press Club on 1 February 2017, the Prime Minister, the Hon Malcolm Turnbull MP, indicated that the government was willing to support investment in 'clean coal' technology. The Prime Minister stated:

Australia is the world's largest exporter of coal, has invested \$590 million since 2009 in clean coal technology research and demonstration, and yet we do not have one modern High Efficiency Low Emissions (HELE) coal fired power station let alone one with [carbon capture and storage].⁵⁸

3.56 The Prime Minister spoke about the need to secure baseload power capacity:

Here's the current picture - old, high emissions coal fired power stations are closing down, reducing baseload capacity. They cannot simply be replaced by gas - because it's too expensive - or by wind or solar because they are intermittent.

Storage has a big role to play, that's true, but we will need more synchronous baseload power and as the world's largest coal exporter we have a vested interest in showing that we can provide both lower emissions and reliable base load power with state of the art clean coal fired technology.⁵⁹

3.57 The Prime Minister further noted that future policy should be 'technology agnostic', and identified security and cost as the guiding principles in the government's response to the challenges in the energy sector.⁶⁰

3.58 The Prime Minister's statements were echoed on 2 February 2017 by the Minister for the Environment and Energy, the Hon Josh Frydenberg MP. Minister Frydenberg stated that the government was committed to ensuring baseload capacity to deliver energy security, and that they were 'looking at all their options' in providing that.⁶¹

57 *Submission 4*, p. 7.

58 The Hon Malcolm Turnbull MP, Prime Minister, 'Address to the National Press Club', 1 February 2017, transcript available at <https://www.pm.gov.au/media/2017-02-01/address-national-press-club> (accessed 17 March 2017).

59 The Hon Malcolm Turnbull MP, Prime Minister, 'Address to the National Press Club', 1 February 2017.

60 The Hon Malcolm Turnbull MP, Prime Minister, 'Address to the National Press Club', 1 February 2017.

61 Sabra Lane, 'High efficiency, low emissions coal power crucial to transition to clean energy: Frydenberg', *ABC News*, 2 February 2017, <http://www.abc.net.au/am/content/2016/s4612896.htm> (accessed 9 February 2017).

3.59 Minister Frydenberg noted that the Clean Energy Finance Corporation (CEFC) did not refer only to renewable energies, and that the government was open to using the fund to assist in financing production of clean coal power stations. He pointed to the prevalence of high efficiency, low emission power stations in Japan as an example of countries using coal technology to provide energy while meeting their obligations under the Paris Agreement.⁶²

3.60 During Senate Additional Estimates on 27 February 2017, Mr Oliver Yates, Chief Executive Officer of the CEFC, confirmed that the agency had received a proposal requesting a loan in order to build a \$1.2 billion coal plant with carbon capture and storage facilities.⁶³

Response from stakeholders

3.61 A number of energy companies responded to the propositions of the Prime Minister and Minister Frydenberg stating that they had no intention of building any new coal fired power stations, which included 'clean coal' plants.⁶⁴

3.62 The Chief Scientist, Dr Alan Finkel AO, stated that such technologies were not suitable for the Australian energy market. While Dr Finkel expressed support for carbon capture and storage technology, he did not support using taxpayer-funded subsidies to fund these projects. Dr Finkel further noted that the Japan case study was not applicable in Australia due to Japan's efforts to phase out nuclear power.⁶⁵

3.63 The banking industry also reacted to the government's proposal with caution. Mr Geoff Summerhayes, Executive Board Member, Australian Prudential Regulation Authority (APRA), warned that there are significant risks to the investment sector in funding clean coal. Citing a report from the Centre for Policy Development and the Future Business Council on the legal issues arising from climate change, Mr Summerhayes stated:

The opinion found that company directors who fail to properly consider and disclose foreseeable climate-related risks to their business could be held

62 Sabra Lane, 'High efficiency, low emissions coal power crucial to transition to clean energy: Frydenberg', *ABC News*, 2 February 2017, <http://www.abc.net.au/am/content/2016/s4612896.htm> (accessed 9 February 2017).

63 Senate Environment and Communications Legislation Committee, *Estimates Hansard*, 27 February 2017, p. 48.

64 Ben Potter, 'Energy industry gives Malcolm Turnbull's clean coal power call the cold shoulder', *Australian Financial Review*, 1 February 2017, <http://www.afr.com/news/energy-industry-gives-malcolm-turnbulls-clean-coal-power-call-the-cold-shoulder-20170201-gu39hz> (accessed 3 February 2017).

65 Mark Ludlow, 'Chief Scientist Alan Finkel says 'clean coal' has to stack up', *Australian Financial Review*, 2 February 2017, <http://www.afr.com/news/politics/chief-scientist-alan-finkel-says-clean-coal-has-to-stack-up-20170201-gu3nzs> (accessed 3 February 2017).

personally liable for breaching their statutory duty of due care and diligence under the Corporations Act.⁶⁶

3.64 Some witnesses who gave evidence to the committee were critical of the government's preference for clean coal, arguing that the cost and complexity of these technologies make them unviable.⁶⁷ This evidence is discussed later in this chapter.

Announcement of plan to expand the Snowy Hydro scheme

3.65 On 16 March 2017, the Prime Minister announced a plan to expand the Snowy Hydro scheme, aiming to increase its 4,000 MW output by 50 per cent through the construction of new tunnels and power stations in the scheme, at a cost of up to \$2 billion. It was announced that a feasibility study for the project would be completed by the end of 2017, with the new plant aiming to come online within four years.⁶⁸

The South Australian energy market

3.66 On 14 March 2017, South Australian Premier, the Hon Jay Weatherill, announced a new policy framework to ensure that energy is affordable and reliable, while ensuring that power is sourced, generated and controlled within South Australia. The \$550 million plan included the construction of the largest battery in Australia to store wind and solar energy, building a government-owned gas-fired power station with a 250 MW capacity to secure back-up resources, and incentivising gas production.⁶⁹

3.67 In announcing the plan, Premier Weatherill emphasised the need for a state energy plan that included renewable technology:

South Australia will now lead our nation's transformation to the next generation of renewable storage technologies and create an international reputation for high-tech industries.⁷⁰

66 Geoff Summerhayes, 'Speeches - Australia's new horizon: Climate change challenges and prudential risk', *Australian Prudential Regulation Authority*, 17 February 2017, <http://www.apra.gov.au/Speeches/Pages/Australias-new-horizon.aspx> (accessed 27 February 2017).

67 See, for example: Mr John Asquith, Community Environment Network, *Committee Hansard*, 22 February 2017, p. 34; Dr Bradley Smith, Senior Climate and Energy Campaigner, Nature Conservation Council of New South Wales, *Committee Hansard*, 22 February 2017, p. 6.

68 Caitlyn Gribbin, 'Snowy Hydro scheme boost to secure electricity supply on east coast: Government', *ABC News Online*, 16 March 2017, <http://www.abc.net.au/news/2017-03-16/snowy-hydro-scheme-funding-boost-to-secure-electricity-supply/8358502> (accessed 16 March 2017).

69 Premier Jay Weatherill, *News releases – South Australia is taking charge of its energy future*, 14 March 2017, <http://www.premier.sa.gov.au/index.php/jay-weatherill-news-releases/7198-south-australia-is-taking-charge-of-its-energy-future> (accessed 14 March 2017).

70 Premier Jay Weatherill, *News releases – South Australia is taking charge of its energy future*, 14 March 2017, <http://www.premier.sa.gov.au/index.php/jay-weatherill-news-releases/7198-south-australia-is-taking-charge-of-its-energy-future> (accessed 14 March 2017).

3.68 Critically, the proposal also seeks to give the South Australian Energy Minister powers to override the AEMO and direct power stations and utilities to act in the interests of South Australians. The Energy Minister, the Hon Tom Koutsantonis, stated:

We can't rely on this broken national market any longer. Our plan will deliver increased local generation and powers to help prevent outages and more competition to put downward pressure on power prices for families and businesses.⁷¹

International developments in energy policy and markets

3.69 The committee heard evidence at its Sydney public hearing regarding the dramatic shifts occurring in the way energy policy and markets are being restructured globally. Mr Tim Buckley, Director of Energy Finance Studies at the Institute for Energy Economics and Financial Analysis (IEEFA), identified five key drivers for the transformation occurring internationally away from coal fired power generation:

- continued technology innovation;
- economies of scale (particularly with the weight of China taking a global leadership position in this process) driving renewable costs down;
- the rapid build up of global financial sector capacity in response to rising stranded asset risks;
- the global commitment to policy action as agreed at the COP21 in Paris; and
- the critical requirement for countries like China and India to deal with air, water and particulate pollution.⁷²

3.70 Mr Buckley highlighted key recent developments in China and India, including:

- China's cancellation of plans to construct a further 100 GW of new coal fired power plants, as its electricity generation mix rapidly diversifies away from coal generation towards hydro, renewables and nuclear;⁷³
- the announcement in December 2016 of India's draft national electricity plan, which involves not constructing any new coal fired power plants in the next decade while increasing India's renewable energy stores fivefold in the same period; and

71 Premier Jay Weatherill, *News releases – South Australia is taking charge of its energy future*, 14 March 2017, <http://www.premier.sa.gov.au/index.php/jay-weatherill-news-releases/7198-south-australia-is-taking-charge-of-its-energy-future> (accessed 14 March 2017).

72 Opening statement, tabled by the Institute for Energy Economics and Financial Analysis (public hearing, Sydney 22 February 2017), p.1.

73 Opening statement, tabled by the Institute for Energy Economics and Financial Analysis (public hearing, Sydney 22 February 2017), p. 2.

- the outcome in February 2017 of a reverse auction tender in India which will deliver power from a new 750 MW solar facility at a cost of US\$45 per megawatt hour, the lowest price ever recorded for such a contract.⁷⁴

Providing reliable power through Australia's energy transition

3.71 An overarching issue discussed throughout the inquiry was how to ensure reliability of power supply in Australia while the transition from an energy system dominated by coal fired generation to a renewables-dominated system is completed.

3.72 Various possibilities for promoting reliability of supply were discussed at the committee's public hearings, including the use of clean coal technologies, the role of gas fired power generation, and emerging energy storage solutions, primarily battery storage.

Possibility of utilising 'clean coal' technologies

3.73 Various stakeholders to the inquiry commented on the possible role of 'clean coal' technologies; either through implementing carbon capture and storage technologies (integrated into new coal plants, or retrofitted onto existing plants), or through building new, more efficient coal fired power plants.

3.74 The Minerals Council of Australia argued in its submission that building new, high-efficiency, low emissions coal fired power plants in Australia and deploying carbon capture and storage technologies could be part of the solution in Australia's transition to a lower-emissions energy mix:

Australia has the opportunity to upgrade its coal generation fleet as existing plants come to the end of their life. We do not argue that all coal plant should be replaced by another coal plant. No energy source should be guaranteed market share. But the option of [high-efficiency, low emissions] coal must be on the table. It is the most competitive option. It can deliver baseload power and it can deliver 50 per cent lower emissions with the promise of further substantial emissions reductions with the deployment of carbon capture and storage technologies.

...

New super-efficient black coal plants are commercially available and operating throughout the world...Super-efficient brown coal plants are also planned or already delivering low cost, baseload energy around the world, including in Germany, Poland, the United States and Thailand. With a bold vision NSW, Queensland and Victoria and other jurisdictions can invest in Australia's future by building ultra-supercritical black and brown coal base load plants here too.⁷⁵

3.75 This issue was explored extensively at the committee's two public hearings held in February 2017, in the context of comments from government ministers in support of clean coal. Several potential problems with implementing clean coal

74 *Committee Hansard*, 22 February 2017, pp 39-40.

75 *Submission 29*, pp. 1-2 and Attachment 1, p. 11.

technologies were raised with the committee, relating primarily to the cost and complexity of implementing the technology.

3.76 Councillor Martin Rush, Mayor of Muswellbrook Shire Council, expressed the view that while the possibility of utilising 'clean coal' technologies should not be summarily dismissed, its potential will likely be overridden by cost factors which will make coal uncompetitive over time:

The reality is that coal itself as a former fuel for power generation is becoming relatively more expensive compared with renewables. So we have to see clean coal within the context of the larger cost. There will come a time, and it will happen before too long, and it already occurs in some aspects of the demand for energy—for example, daytime peak—where solar is overwhelmingly cheaper already than coal. It is true for base load that thermal coal is still cheaper, but that will not be the case forever. So when we look at the issue of clean coal it has to be done across the whole of the strata of cost, not just the externalities. The only thing clean coal is dealing with is that fraction of the total cost that is the externality of the carbon footprint. The problem for clean coal, ultimately, is that its relative costs continues to increase. So I think the practical economic reality is that by 2050 clean coal is certainly not a solution—we have already heard that—and as a transition it is probably pie in the sky. But let's not rule it out. But if we are going to make policy decisions based upon whether or not clean coal is a viable transition pathway, then let's get some science around it first.⁷⁶

3.77 Mr Tim Buckley, IEEFA, stated that carbon capture and storage technologies significantly increase the net cost of energy production compared with current coal fired generation, and that this makes it unlikely to be competitive into the future.⁷⁷

3.78 Mr Barry Ladbrook from Sustainable Energy Now also commented on the complexity and cost of carbon capture and storage technologies:

It is possible to...strip CO2 out of a variety of sources...The issue is just the enormous cost that is associated with it. And when I say 'enormous', I mean: basically, you are sticking a chemical process that is quite expensive onto a power system, so you are adding a whole other degree of complexity. You are then sticking a transport system onto that. You are then sticking a geological injection system onto that. So you are sticking three very different, very complex systems onto one that is already a complex system. So you have got a whole lot of logistical operational issues to deal with there...[Y]ou are effectively spending a lot of money to make a power system less efficient. And, when you add all those costs up together and all that complexity—never mind the reputational issues, and the security issues about the geological structure being sound—it really is a minefield.⁷⁸

76 *Committee Hansard*, 22 February 2017, pp 12-13.

77 *Committee Hansard*, 22 February 2017, p. 43.

78 *Committee Hansard*, 23 February 2017, pp 8-9.

3.79 The Global CCS Institute disputed the claim that carbon capture and technologies are prohibitively expensive:

[This misconception] stems from simple comparisons to cheap and intermittent forms of renewable energy, rather than on comparisons of 'value' in providing controllable electricity supply and on a cost per tonne of CO₂ avoided basis. To illustrate this point, the high penetration of intermittent renewables requires significant additional expenditure on a combination of backup dispatchable generation, battery storage, transmission augmentation, demand side management, and other technologies to ensure the reliability and resilience of the grid. Coal and gas-fired generators with [carbon capture and storage] do not introduce cost or risks associated with grid integration.⁷⁹

3.80 Dr Bradley Smith, Nature Conservation Council, argued that holding out the promise of clean coal was misguided, as it is still not viable to implement despite significant investment in attempts to develop the technology:

Clean coal is a fairytale. It is a distraction, but it is a very dangerous one because all it does is delay. We know this plant is not going to get built. What we need are real things that can be built now. This debate goes back a decade, I think, to when people gave the clean coal thing a try and found out that it would not work...We cannot afford to waste another 10 years. We need to move forward with our energy transition. We are in the middle of it now, so we need solutions we can deploy now.⁸⁰

3.81 Ms Daisy Barham, Nature Conservation Council, concurred that 'clean coal' is used as a delay tactic by its proponents that would ultimately make the inevitable transition to renewable energy more expensive and more painful for communities currently reliant on coal fired generators.⁸¹

Role of gas fired power generation

3.82 The question of whether gas fired generation could play a more substantial role as a transitional power source in Australia was discussed at length during the committee's public hearings.

3.83 Mr John Asquith, Community Environment Network, noted that gas fired generation operates at approximately double the efficiency rate of coal fired power generation, and argued that gas should be utilised while better energy storage systems are still in development.⁸²

3.84 Mr Asquith highlighted that a significant benefit of gas fired generation over coal fired generation is its ability to respond more quickly to demand signals, with gas generators able to commence electricity production within one to two hours' notice, as

79 *Submission 134*, p. 3.

80 *Committee Hansard*, 22 February 2017, p. 6.

81 *Committee Hansard*, 22 February 2017, p. 9.

82 *Committee Hansard*, 22 February 2017, p. 35.

opposed to a timeframe of 24-48 hours for a coal fired generator to ramp up to its full production capacity.⁸³

3.85 Problems with the gas market in Australia that affect its availability and cost-effectiveness as a fuel source were also noted by stakeholders to the inquiry. For example, Mr Buckley of the IEEFA expressed the view that with gas prices at historically high levels, gas-fired power generation 'is no longer a low-cost source of supply'.⁸⁴

3.86 Ms Blair Palese of 350.org argued that the cost of infrastructure for expanded gas fired generation, coupled with the unpredictability of gas prices, worked against utilising it as a transitional energy source:

[T]he price question of gas is a really critical one. It is quite transient up and down based on international market standards. We cannot control that even if we try hard. Price-wise it does not compete in anyway with solar and wind... Secondly, when you look at investing in more gas, you are looking at 30 to 40 years of fossil fuel infrastructure, and that is expensive. When you add those two things up, to be honest, if you put a market mechanism in place, gas would not be in the mix. It would be very quickly moved out because it is just too costly to install a whole new system and the gas itself is expensive.⁸⁵

3.87 Ms Barham advocated for bypassing gas as a transition fuel altogether, on the grounds of maximising possible reductions in carbon pollution:

Gas is still a fossil fuel. It does still have significant carbon emissions whereas we know that renewable energy does not have those carbon emissions. So we are strongly advocating that we skip straight to renewable energy, as we have seen so many other parts of the world do, and even states in Australia are really investing in renewables. We do not need gas.⁸⁶

Emerging energy storage technologies

3.88 Technologies which store electricity in order to provide power when it is not available from renewable energy sources have become an emerging focus in developing solutions to provide reliability of power supply in a renewables-dominated system. Battery storage technologies, solar thermal storage and pumped hydro storage were all discussed during the committee's inquiry.

Grid level storage

3.89 As noted earlier in this chapter, the South Australian Government has recently committed to building Australia's largest battery storage facility, via a \$150 million renewable technology fund, to create a grid-connected battery providing 100 MW of

83 *Committee Hansard*, 22 February 2017, pp 35-6.

84 *Committee Hansard*, 22 February 2017, p. 45.

85 *Committee Hansard*, 22 February 2017, p. 6.

86 *Committee Hansard*, 22 February 2017, p. 6.

storage capacity.⁸⁷ The Victorian Government has also recently announced funding of \$25 million to be invested in energy storage projects, with the aim of creating 100 MW of energy storage capacity in Victoria by the end of 2018.⁸⁸

3.90 Evidence to the committee from solar thermal company SolarReserve and submissions from Repower Port Augusta made a strong case that solar thermal, with some government assistance, would be a viable contribution to both storage and new energy production.⁸⁹

3.91 In February 2017 the Australian Renewable Energy Agency and Clean Energy Finance Corporation also announced additional funding to be directed towards accelerating the development of flexible capacity and large-scale storage projects including battery storage.⁹⁰

3.92 The Australian Government's recently announced plan to expand the capacity of the Snowy Mountains Hydro scheme over the next four years would also significantly increase the amount of storage-based electricity available to be fed into the grid during times of peak demand.⁹¹

Household battery storage solutions

3.93 Several witnesses predicted that while household battery storage solutions are not currently widespread, they will become commercially competitive and become a significant factor in the overall energy market within the next few years. Mr Bruce Mountain of Carbon and Energy Markets Australia told the committee:

[M]y estimate is that a household in Adelaide that installs a battery and solar combination will outlay around \$16,000, and the all-in price of electricity that they incur, after paying down that investment plus the net export to the grid and the net purchase from the grid, beats any offer in the residential retail market. So households would be better off. As a consequence I expect rapid uptake of battery and solar combinations. I

87 South Australian Government, 'Our Plan: Battery Storage and Renewable Technology Fund'; available at <http://ourenergyplan.sa.gov.au/our-plan.html#OP1> (accessed 14 March 2017)

88 The Hon Daniel Andrews, Premier of Victoria, and the Hon Lily D'Ambrosio, Victorian Minister for Energy, Environment and Climate Change, 'Large Scale Energy Storage: An Investment in Jobs, Reliability and Affordability', *Media Release*, 14 March 2017, available at <http://www.premier.vic.gov.au/large-scale-energy-storage-an-investment-in-jobs-reliability-and-affordability/> (accessed 14 March 2017).

89 *Committee Hansard*, 17 November 2016, p. 52

90 Australian Renewable Energy Agency, 'ARENA and CEFC support solutions for certainty of energy supply, including flexible capacity and large scale energy storage', 1 February 2017, available at <https://arena.gov.au/media/arena-and-cefc-support-solutions-for-certainty-of-energy-supply-including-flexible-capacity-and-large-scale-energy-storage/> (accessed 14 March 2017).

91 See: Caitlyn Gribbin, 'Snowy Hydro scheme boost to secure electricity supply on east coast: Government', *ABC News Online*, 16 March 2017, available at: <http://www.abc.net.au/news/2017-03-16/snowy-hydro-scheme-funding-boost-to-secure-electricity-supply/8358502> (accessed 16 March 2017).

expect that they will continue to be connected to the grid for backup...It will take time for the market to adopt, for the installer capacity to develop and so on. I think the fleetness of foot that we have seen in the installation community with solar is likely to be replicated in battery. I cannot see a reason why we will not have a rapid uptake amongst the household consumers. But I think, realistically, it will be sizeable commercial factor in five years time.⁹²

3.94 Ms Jemma Green, a Research Fellow at Curtin University, was even more optimistic about the timeframe for household battery storage units to become commonplace:

The announcement by Tesla of their Powerwall on 30 April 2015 moved the price of battery storage to around \$350 per kilowatt hour. Since then the price has come down further and it sits at around \$275 per kilowatt hour. What that means in practice is that battery storage is likely to compete with grid sourced electricity pricing within the next 24 months. It is not really at that point where you will see mainstream uptake of battery storage, but, when the delta between grid priced electricity and battery sourced is probably 20 per cent cheaper, then I think you will start to see mainstream uptake.⁹³

3.95 Ms Green noted research from Morgan Stanley expressing view that the point at which there would be mainstream uptake of this technology would be when the price for a combined solar and battery storage household system decreased to around \$10,000, which is forecast to happen within the next 18 months.⁹⁴

3.96 In relation to the cost of household storage systems, Mr Ian Porter from Sustainable Energy Now stated:

[T]he cost of battery storage is on the same cost-decline curve as solar PV, which we saw between 2009...and 2014: the cost of solar PV fell by 80 per cent, and is on the same continuing cost decline...Battery storage is on the same cost-decline curve. As we know, Tesla in Nevada, in the US, are opening a plant which will double the capacity of lithium storage. Lithium is one form of battery. There are many other types of storage systems under development at this time which we will see come into the public domain within the next few years, and this will contribute of course to the disruption technologically, driven by the economics.⁹⁵

3.97 In discussing the impact of the increased uptake of household solar and battery packages on the broader energy market, Mr Mountain predicted it would create significant challenges for electricity retailers:

I think the impacts will be very significant for retailers. They would lose almost all of their volume to a customer that installs a battery and a

92 *Committee Hansard*, 22 February 2017, pp 47-8.

93 *Committee Hansard*, 23 February 2017, p. 21.

94 *Committee Hansard*, 23 February 2017, p. 22.

95 *Committee Hansard*, 23 February 2017, p. 7.

reasonably-sized solar system. I think there will also be a significant impact to the network service providers, which, absent regulatory change, will translate into higher revenues to be got back from the remaining customers.⁹⁶

3.98 When asked whether electricity retailers could change their business model in response to this change by buying power from groups of households with storage to then on-sell to other consumers, Mr Mountain commented:

Yes. I should think there is no particular trading advantage. They can either buy wholesale or aggregate up a number of smaller households with solar and battery that they can buy at a retail level, and that may well happen. I doubt, though, that it will be anywhere near as profitable as the existing retail business. In fact, it is not that I doubt; I am absolutely certain it will not be.

I think the commercial model of electricity retail as we have today—buying it wholesale, or, in the case of the larger generator retailers, producing much of what they sell and then on selling to the customer—will change for many small customers.⁹⁷

3.99 Other possible solutions to better integrate household solar and battery storage systems into the broader grid were also highlighted to the committee. For example, Ms Green informed the committee of the work of her company Power Ledger, which has developed technology allowing peer-to-peer trading of electricity generated by households with rooftop solar systems:

The technology that we have developed uses a blockchain to enable peer-to-peer trading of electricity. So, if you have solar panels and you have electricity surplus to your requirements, you can sell that to your neighbour via the regulated network...It means, if you do not have solar panels, you are able to procure renewable electricity. Maybe you are in a rental property or in a building that does not have suitable access to the roof space, it means you are able to get renewable electricity. If you are a household you might size your solar and battery system to self supply but you might have additional roof space and you would like to monetise that. So this technology enables those transactions to take place.⁹⁸

3.100 Ms Green stated that electricity retailers may start utilising these kinds of technologies in the future to offer peer-to-peer trading as a premium service to consumers, or may even offer a solar and battery system to consumers at no up-front cost, with revenue derived from the system then to be shared by the consumer and the retailer.⁹⁹

96 *Committee Hansard*, 22 February 2017, p. 48.

97 *Committee Hansard*, 22 February 2017, p. 48.

98 *Committee Hansard*, 23 February 2017, p. 22.

99 *Committee Hansard*, 23 February 2017, p. 22.

Chapter 4

Options for managing the transition away from coal fired power stations

4.1 Stakeholders to the inquiry commented at length on how a phased closure of coal generators could be best managed. In particular, the need for the development of a national transition plan was highlighted, integrating energy and climate policy as well as coordinating the response to assist affected workers and communities.

Need for a national transition plan

4.2 Support for a consistent, long-term national transition plan was widespread among submitters to the inquiry. Engineers Australia argued:

...the Australian government needs to create a transition plan which outlines policy mechanisms to encourage the retirement of Australia's highest emitting power stations, while also providing options for affected workers and communities...Without a clear plan, Australia risks the potential to lose a large portion of its generating capacity in a short period without any alternatives in place, while at the same time undermining its Paris COP21 commitments.¹

4.3 Engineers Australia submitted that this transition plan should outline:

- how Australia will achieve its emission reduction targets through the electricity generation sector, outlining a transition from fossil fuel power plants to renewable and low carbon emission options;
- a timeline for when Australia will begin the transition away from major capacity fossil-fuelled power stations, and what generation options will be used to replace them;
- the obligation costs that the major fossil fuel power stations will incur when exiting the market, outlining incentives to exit where required;
- incentives for investors of new zero and low emission technologies with policies to run alongside research and development, drawing on market forces where possible;
- changes to the electricity grid to accommodate more distributed generation and management of supply availability and resilience; and
- policies for increased reliability and resilience of Australia's electricity system through a mix of generation and distribution applications, energy storage solutions and smart-grid technologies.²

4.4 In relation to transition planning, Alinta Energy stated:

1 *Submission 11*, p. 4.

2 *Submission 11*, pp 9–10.

An area for further thought and improvement to consider is in the area of planning the transition to closure where orderly exit can be greatly enhanced by an effective generator transition plan published in advance for the entire market and an appropriate energy and renewable policy framework.³

4.5 The Electrical Trades Union (ETU) argued that a national transition plan is required to 'ensure that Australia's transition is managed in a fair and just manner, where affected workers and communities are supported to find secure and decent jobs in a clean energy economy'.⁴

4.6 Some submitters and witnesses commented that the different climate and energy policy settings pursued by various state and territory jurisdictions in Australia increased complexity and uncertainty for market participants, and that a more cohesive national framework is required. The Australian Energy Council stated:

Without material changes to better integrate carbon and energy policy in national frameworks, Australian energy customers will pay more for their electricity, or potentially face more supply risk, in the transition to achieving a cleaner energy system. A national carbon reduction mechanism will provide more efficient and reliable national abatement outcomes than a series of disconnected targets and schemes in individual jurisdictions.⁵

4.7 The Australian Mines and Metals Association submitted that Australia should develop a National Energy Transition Plan, including harmonised renewable energy targets that ensures affordable, reliable and secure energy and delivers just, stable, predictable and measured transitions.⁶

Establishment of a statutory authority to manage the transition process

4.8 Several stakeholders argued that establishing a new statutory authority to manage this transition would be the most effective way to ensure a consistent, long-term national plan.

4.9 The Australian Council of Trade Unions (ACTU) recommended that the Australian Government establish a national independent statutory authority, named Energy Transition Australia (ETA), within the environment and energy portfolio, 'to navigate the transition to a clean energy economy'. The ACTU outlined the benefit of this approach as follows:

The key focus of the ETA will be to minimise the impact of unplanned closures on workers and their communities through managing this transition in a regulated manner and developing plans to ensure the ongoing economic prosperity of affected regions. Given Australia's current energy mix and the need for substantial investment in renewable energy, it is important that this

3 *Submission 27*, p. 5.

4 *Submission 2*, p. 5.

5 *Submission 44*, p. 6.

6 *Submission 67*, p. 6.

transition is managed carefully and in a manner that supports the continued supply of electricity...

Creating a body that has the freedom, independence and mandate to adopt a long term approach to managing this transition will help ensure that decarbonisation occurs efficiently and fairly – without working people and their families bearing the brunt of this transition and being plunged into unemployment or insecure work through a sudden plant closure.⁷

4.10 The ACTU argued that while a number of federal bodies have already been established to advise on climate policy and support investment in renewable energy, an independent authority to manage the overall transition process is 'an important part of the mix' to implementing a cohesive national policy framework in this area.⁸

4.11 The proposed new authority would be overseen by a tripartite advisory board comprising industry, unions and government, and would be responsible for reporting to parliament and the responsible minister.⁹ Under the ACTU's proposal, the role of the new authority would be to:

- oversee a planned and orderly closure of Australia's coal fired power stations;
- manage an industry-wide multi-employer pooling and redeployment scheme, where existing workers would have an opportunity to be redeployed to remaining power stations or low-emissions generators; and
- develop a labour adjustment package to support workers obtain new decent and secure jobs, including by providing funding for workers to access job assistance support, retraining, early retirement and travel and relocation assistance.¹⁰

4.12 The ACTU noted that various models, including the Jotzo model, have been proposed in relation to determining the order and timing of plant closures, and proposed that the new statutory authority would be responsible for selecting and administering the most appropriate mechanism to facilitate these closures.¹¹

4.13 The ACTU's proposal states that the new authority could also undertake a review of the NEM regulatory bodies¹² to ensure that the roles and activities of these agencies are consistent with the low emissions modernisation of the electricity sector.¹³

7 *Submission 17*, Attachment 1, p. 18. The Electrical Trades Union outlined a plan for the establishment of a similar body, a 'Just Transition Commission', see *Submission 2*, pp. 10–11.

8 *Submission 17*, Attachment 1, p. 18.

9 *Submission 17*, Attachment 1, p. 18.

10 *Submission 17*, p. 2.

11 *Submission 17*, Attachment 1, pp.18–19.

12 These bodies are: the Australian Energy Market Commission, the Australian Energy Regulator and the Australian Energy Market Operator.

13 *Submission 17*, Attachment 1, p. 17.

Developing region-specific plans

4.14 Additionally, the ACTU's proposed new authority would work with all three levels of government in Australia to develop specific plans for regions affected by the closure of coal fired power stations.¹⁴ This would include:

- mapping potential new industries to affected regions based on competitive and other advantages as well as worker skills. As part of this mapping exercise, infrastructure gaps should be identified and prioritised.
- developing and implementing specific industry and environmental policies to attract new investment, the growth of new industries and the creation of quality, secure jobs in affected regions. Such policies could include additional renewable energy investment incentives, investment tax incentives and the prioritised construction of new infrastructure.¹⁵

4.15 WWF–Australia supported the ACTU's proposal, arguing that the establishment of an oversight body to manage the transition process has been a key to successful transitions in other international jurisdictions.¹⁶

4.16 The Australian Greens introduced a bill into the House of Representatives on 21 November 2016, which seeks to establish a statutory authority, Renew Australia, to plan and drive the transition to a new clean energy system in Australia. The functions of Renew Australia would include:

- overseeing the implementation of new energy objectives to achieve 90 per cent renewable electricity generation in Australia by 2030; and
- laying out a timetable for the planned closure of coal fired power stations in Australia, with a default plan involving the closure of all plants by 2030.¹⁷

A 'just transition' for workers and communities

4.17 One of the arguments posed in favour of a strategic national plan to retire coal fired power stations is that it reduces uncertainty for workers in the industry and allows them to plan for a future without coal.

4.18 In the past fifteen years, there has been a push by labour organisations and environmentalists across the world for what is termed a 'just transition'. A 'just transition' is defined as linking 'ecological sustainability with issues of work, equity and social justice'.¹⁸ In discussing 'just transition' policies in Australia, Geoff Evans of the University of Newcastle states that:

14 *Submission 17*, p. 2.

15 *Submission 17*, Attachment 1, p. 5.

16 WWF–Australia, *Submission 77*, p. 9. See also Electrical Trades Union of Australia, *Submission 2*, p. 10.

17 Renew Australia Bill 2016, clause 11 and Schedule 1; Explanatory Memorandum, pp 2–3.

18 Geoff Evans, 'A Just Transition to a Renewable Energy Economy', *Chain Reaction*, No. 103, September 2008, p. 13.

A just transition process recognises the needs of both current and future generations for safe, secure and satisfying jobs. Participants in a just transition seek to build collaborations rather than conflict, and in particular, to avoid a false 'jobs vs. the environment' conflict. A just transition is needed to ensure that the costs of change do not fall on vulnerable workers and communities.¹⁹

4.19 The ETU noted that prior to the Paris meeting, the International Labour Organisation (ILO) had published guidelines on how to achieve a 'just transition' for workers and communities.²⁰ The concept of a just transition was subsequently incorporated into the preamble of the Paris Agreement, which states that Parties, in signing up to the agreement will:

*[Take] into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities...*²¹

4.20 Ms Ged Kearney, President, ACTU, explained the principles of 'just transition' as follows:

From our perspective, the key principles underpinning a just transition include: equitable sharing of responsibilities and fair distribution of the costs across society; institutionalised formal consultations with relevant stakeholders, including trade unions, employers and communities at both national and regional levels; the promotion of clean job opportunities and the greening of existing jobs and industries through public and private investment in low-carbon development strategies, and, alongside that, organised economic diversification policies for those communities at risk; formal education training, retraining and lifelong learning for working people; and social protection measures—that is, active labour market policies; access to health services and social insurances, among other things; and respect for and protection of human and labour rights. We believe that, in signing the Paris Agreement, the federal government has an obligation to responsibly plan and manage the transition to a clean-energy economy in a way that puts working people and their communities first.²²

4.21 In its submission, the Construction, Forestry, Mining & Energy Union (CFMEU) stated that:

19 Geoff Evans, 'A Just Transition to a Renewable Energy Economy', *Chain Reaction*, No. 103, September 2008, p. 13.

20 *Submission 2*, p. 6. See also International Labour Organisation, *ILO adopts guidelines on sustainable development decent work and green jobs*, 5 November 2015. Available at: http://www.ilo.org/global/topics/green-jobs/news/WCMS_422575/lang--en/index.htm (accessed 21 November 2016).

21 United Nations Framework Convention on Climate Change, Paris Agreement, 12 December 2015.

22 *Committee Hansard*, 9 November 2016, p. 27. See also Electrical Trades Union of Australia, *Submission 2*, pp 6–7.

...if Australia is capable of having climate policy that requires all or most of the electricity sector to be low or zero greenhouse gas emission, then it should also be capable of planning for the social impacts that arise from that. Governments have a duty to manage the impacts of their policies.²³

4.22 The Australian Manufacturing Workers Union (AMWU) submitted that in regions affected by coal station closures, the government must take steps to support investment which attracts businesses able to utilise the existing skills base of affected workers:

For example, solar-thermal power provides a renewable source of base-load energy generation and requires a much larger workforce than solar-radiation power generation. Many of the skills required to maintain and operate such a power station are very similar to those required in a coal fired power station. In addition, manufacturing businesses would be well suited to many of the affected regions because they require employees with very similar skills to power station workers.

Attracting new businesses to these areas and assisting existing small and medium sized businesses to grow is the missing piece of the federal government's usual approach to address the problems created by the closure of a major employer. This approach supports workers, their families and their communities by creating quality jobs that provide decent work in the affected region.²⁴

Comparison with international experiences

4.23 The committee took evidence from witnesses with experience managing the current transition of the coalmining industry in Germany. Mr Norbert Maus of the RAG Corporation explained to the committee that a decision was made in 2007 that the coalmining industry in Germany would 'most likely' end by 2018:

We had a total of 11 years, of which nine have passed, to prepare and work towards this. We talked with our colleagues; we talked with everybody; we held all the necessary discussions to make clear to everybody that the political decision to end coalmining by 2018 had been taken. Of course, in 2007 we had the figures around how many people would be eligible for early retirement and, if they were not, what we could do, how many people were in fixed term contracts and so on. Our focus has always been on the people, to make sure that we help them and support them. We will now work till the end of 2018 within the funding that we have and we will continue to produce coal until then. I am very happy with the way we have implemented the process so far.²⁵

4.24 The ETU stated that, historically, industry transitions had not been carried out well in Australia:

23 *Submission 18*, p. 9.

24 *Submission 60*, p. 4.

25 *Committee Hansard*, 9 November 2016, p. 23.

Transitioning an industry is a massive economic and social disruption and is something that has been done poorly to date in Australia. History shows that workers and communities often bear the brunt of such transitions suffering hardship, unemployment and generations of economic and social depression.²⁶

4.25 In particular, the experiences described in Germany can be contrasted with the recent announcement of the closure of the Hazelwood power station. On 25 May 2016, ENGIE's chief executive officer Ms Isabelle Kocher stated before a French senate committee that ENGIE was planning to gradually withdraw from coal fired power generation in its international operations.²⁷ Ms Kocher told the French senate committee that:

For the Hazelwood plant, we are studying all possible scenarios, including closure, or a sale if the state of Victoria tells us that it cannot meet power-generating needs without this plant.²⁸

4.26 After Ms Kocher's comments were published in the Australian media, ENGIE released a media statement which emphasised that any decision on the future of the station must be made by the ENGIE Board with approval from the ENGIE and Mitsui shareholders. ENGIE stated that this decision was yet to take place, and that business would continue despite the difficult trading conditions.²⁹

4.27 From May to November 2016, it was unclear whether ENGIE would move to close the plant. Victorian Energy Minister the Hon Lily D'Ambrosio, stated in May 2016 that she had been told that 'there are no immediate plans to shutdown or sell off Hazelwood'.³⁰ However, on 24 September 2016, it was reported that ENGIE was expected to hold a board meeting in mid-October in order to finalise a decision regarding the potential closure of Hazelwood.³¹

26 Electrical Trades Union of Australia, *Submission 2*, p. 4.

27 Melissa Davey and Reuters, 'Australia's dirtiest power station may be closed or sold, French owner says', *The Guardian*, 26 May 2016. Available at: <https://www.theguardian.com/australia-news/2016/may/26/hazelwood-power-station-may-be-closed-or-sold-off-french-owner-says> (accessed 16 November 2016).

28 Melissa Davey and Reuters, 'Australia's dirtiest power station may be closed or sold, French owner says', *The Guardian*, 26 May 2016.

29 ENGIE, 'Hazelwood', *Media statement*, 26 May 2016. Available at: <http://www.gdfsuezau.com/media/UploadedDocuments/News/Hazelwood%20statement%20-%20Media%20Release%202.pdf> (accessed 16 November 2016).

30 Ben Potter, 'Hazelwood closure could mark beginning of end for Victoria's brown coal', *Australian Financial Review*, 26 May 2016. Available at: <http://www.afr.com/business/energy/french-energy-giant-engie-mulls-closure-of-hazelwood-power-station-20160525-gp426a> (accessed 16 November 2016).

31 Josh Gordon and Adam Morton, 'Hazelwood shutdown: Victoria's dirtiest power station set to close next year', *The Age*, 24 September 2016. Available at: <http://www.theage.com.au/victoria/hazelwood-shutdown-victorias-dirtiest-power-station-set-to-close-early-next-year-20160923-grn0ph.html> (accessed 16 November 2016).

4.28 On 3 November 2016, ENGIE announced that it would close Hazelwood by the end of March 2017. Mr Alex Keisser, Chief Executive of ENGIE in Australia, stated in a media release that:

Hazelwood is now more than 50 years old. It has been a wonderful contributor to the National Electricity Market but we have now reached the point where it is no longer economic to operate...ENGIE in Australia would need to invest many hundreds of millions of dollars to ensure viable and, most importantly, continued safe operation. Given current and forecast market conditions, that level of investment cannot be justified.³²

4.29 Mr Keisser said that a number of options had been assessed, such as revamping the existing infrastructure, repowering with different sources of energy, or reducing the number of operational units. However, this was found to be economically unviable and the station's eight generators would be closed by 31 March 2017.³³

4.30 An open letter was also issued to the public by Mr Keisser, which recognised the impact that closure would have on workers and the neighbouring communities. The letter stated:

At this time, our priority is to support our people as we prepare for closure. Departing ENGIE employees will receive all their entitlements, including a redundancy package. They will also have access to a range of support services.³⁴

4.31 In relation to the closure process, ENGIE's letter stated:

While this decision will obviously have an impact on the local community, I assure you we will work with governments, regulators, unions and regional residents to ensure an orderly closure, including comprehensive rehabilitation of the mine and remediation of the power station site.³⁵

4.32 ENGIE also foreshadowed the possibility of the sale of the Loy Yang B coal fired power station in the Latrobe Valley, which provides up to 17 per cent of Victoria's power supply.³⁶

4.33 At the committee's public hearing in Melbourne, residents from the Latrobe Valley highlighted the impact of this uncertainty has had. Mr Ron Ipsen, Vice President of Voices of the Valley, told the committee:

32 ENGIE Australia, 'Hazelwood to close in March 2017', *Media release*, 3 November 2016. Available at: <http://www.gdfsuezau.com/media/UploadedDocuments/News/Hazelwood%20Clousure/Hazelwood%20closure%20-%20Media%20release.pdf> (accessed 10 November 2016).

33 ENGIE Australia, 'Hazelwood to close in March 2017', *Media release*, 3 November 2016.

34 ENGIE Australia, *Open letter to the community*, 3 November 2016. Available at: <http://www.gdfsuezau.com/media/newsitem/Hazelwood-to-close-in-March-2017> (accessed 16 November 2016).

35 ENGIE Australia, *Open letter to the community*, 3 November 2016.

36 ENGIE Australia, 'Hazelwood to close in March 2017', *Media release*, 3 November 2016.

We are finding that a lot of the distress in the workers and within the community is around uncertainty, and we believe that the only way around that uncertainty is—the opposite of uncertainty—vision.³⁷

4.34 Mr Ipsen outlined for the committee the plan that his organisation was working on for the Latrobe Valley community:

We have worked on a plan. We sat down and figured out what the elements were that were needed for transition. They include new industries. On those new industries, we have built further new industries. We are looking at tackling the renewable energy target for Victoria. We are going to ask the state government for 10 per cent of the renewable energy target. We are going to ask them for \$10 million to build a solar panel factory. We want to produce 770,000 solar panels in the valley. We want them Australian made. We want them made in the valley. We want to build transition panels for a transition. We want to transition the community. It takes 50,000 houses to produce 200 megawatts, which is one Hazelwood unit. We cannot do eight Hazelwood units, but we reckon we can do one. We reckon, if we get the union and the green movement behind us, we can build our virtual power station. If we have our research, our incubators and the usual sort of 'catch the workers and retrain them', we reckon we can have a go. That is pretty much what the plan is.³⁸

4.35 The committee was informed by Repower Port Augusta that an almost identical scenario has played out following the closure of the Alinta-owned power stations in Port Augusta in May 2016:

The closure of the Port Augusta power station was announced with no plan to support the community to transition. Six months on from the closure the community is still to receive significant support from Federal or State Governments.

Since 2011, members of the Port Augusta community have pushed for solar thermal plants with storage to be built in the region creating new jobs and delivering on-demand clean power. This is a plan that should have been in place before coal closure was announced.

The experience of the Port Augusta closure emphasises the need for a national plan for the phase out of fossil fuels that is accompanied with serious transition packages for local communities and workers.³⁹

4.36 The committee notes recent media reports that some of Hazelwood's skilled workers will be able to transfer to other power stations once Hazelwood closes.⁴⁰

37 *Committee Hansard*, 17 November 2016, p. 29.

38 *Committee Hansard*, 17 November 2016, p. 29.

39 *Submission 24*, pp 1–2.

4.37 The ETU also referred to transitions proposals in the UK, which would see workers move to the renewable energy industry. The '1 Million Climate Jobs' report was compiled by the UK's Trade Union Group against Climate Change and the group subsequently lobbied the government to hire a million people to do new climate jobs via an integrated National Climate Service:

Whilst the report is [much] broader than a transition plan for workers, a critical component is that under the plan anyone who loses a job in an old high carbon sector like mining, oil, power stations or car sales must be guaranteed a permanent job in the National Climate Service at the same rate of pay. UK labour Leader Jeremy Corbyn has endorsed the plan and committed to it if elected.⁴¹

4.38 In subsequent public hearings the committee heard further evidence of the importance of transition planning for workers at coal fired power stations, particularly in relation to the communities of Muswellbrook in NSW and Collie in Western Australia.

4.39 Councillor Martin Rush, Mayor of Muswellbrook Shire Council, emphasised the need to focus on the workers in planning for transition:

When we are setting targets for climate change and targets for structural adjustment around energy policy, we also need to be making sure that the communities that have generated, for a significant amount of time, power for the state and federal economies are protected, from a human perspective, through that transition.⁴²

4.40 Ms Leonie Scoffern, who lives at Allanson near Collie, also highlighted the need for community involvement in any transition planning:

...if we can have an open discussion about it in Collie and get the wider community's point of view, that is all that really needs to happen. I do not want things to be discussed over the top of our heads. Involvement for all of us here is what we need.⁴³

4.41 Councillor Rush argued that the failure to consider communities had been one of the 'severe oversights' in federal policy in managing the transition:

What we need to start doing is to talk about the transition, have a plan and give the communities that have long provided cheap, affordable, reliable energy to the people of New South Wales and Australia confidence that

40 Stephanie Chalkley-Rhoden, 'Hazelwood workers to be transferred to other power stations when coal plant closes', *ABC Online*, 10 March 2017, <http://www.abc.net.au/news/2017-03-10/hazelwood-workers-to-be-transferred-to-other-power-stations/8342644>; Mark Richards, 'The Hazelwood transition deal gives my wife and me a future in our hometown', *The Guardian*, 17 March 2017, <https://www.theguardian.com/commentisfree/2017/mar/17/the-hazelwood-transition-deal-gives-my-wife-and-i-a-future-in-our-hometown>.

41 *Submission 2*, pp 7–8.

42 *Committee Hansard*, 22 February 2017, p. 10.

43 *Committee Hansard*, 23 February 2017, p. 18.

they will not be the victims of this transition. That has always been the key problem in the transition planning.⁴⁴

Planning for transition before closure

4.42 Mr Steve McCartney, State Secretary, AMWU Western Australia Branch, recommended that any discussion of shutting down a coal fired power station needs to be pre-empted by the question: 'what are we going to do with the town?'.⁴⁵ Mr McCartney illustrated his point using the example of the community in Collie:

What are we going to do about the mental health of the people who live in the town? What are we going to do to make sure that this town stays a town? And what sorts of long-term jobs are we going to give or industry are we going to build in the town or around the town that is going to facilitate their and their children's future?⁴⁶

4.43 Mr McCartney continued:

What we imagine could happen in Collie is that we will have a problem with youth unemployment rising because governments have not got a plan for a transition. You know and I know that companies are not going to invest in new skills, skills development and apprentices unless they are absolutely supported by government. If they are going to have to invest it themselves, they are not going to invest it, because of the pressure that is on the mine or on the power station... Before you talk about shutting down the power station in the area, what actual industry are you going to start in that place before it happens so that the transition starts with their children? The young people in the town are where the transition should start, and no-one is thinking about them.⁴⁷

4.44 Mr McCartney stated it is important for governments to invest in transition upfront. However, Mr McCartney understood that the operators of coal fired power stations might be 'dubious' of such an approach because they may 'lose good labour':

What happens, of course, is that as part of that transition re-employable people who are prepared to move just bolt, and all of a sudden the business becomes untenable. That is why we are saying that a just transition needs to be a company that can still function until it is closed, with a business that can grow off the back of it, and the business that grows off the back of it needs to be supported.⁴⁸

4.45 Mr Glenn McLaren, Lead Organiser, AWMU Western Australia Branch added:

44 *Committee Hansard*, 22 February 2017, p. 10.

45 *Committee Hansard*, 23 February 2017, p. 13.

46 *Committee Hansard*, 23 February 2017, p. 14.

47 *Committee Hansard*, 23 February 2017, p. 14.

48 *Committee Hansard*, 23 February 2017, p. 16.

The transition plan that we talk about cannot lead to unemployment and social disadvantage. We see enough of that in Australia as it is, in rural sectors.⁴⁹

4.46 Mr McCartney argued that the impact on workers when a coal fired power station was retired was amplified because operators were already cutting pay and conditions:

Hundreds of thousands of dollars have been removed from the left-hand side of the ledger of these companies. For instance, take people who have worked in that industry for 30 years accumulating entitlements. They have had all of their accumulated entitlements cut down by 43 per cent and their agreement, their [Enterprise Bargaining Agreement], redundancy removed and replaced with [National Employment Standards]. So, for a guy that was working there for 30 years—and a good percentage of these people have worked in the coalmine since their early teens, so there are a lot of people who have been there for 20 or 30 years—the redundancy would have been about \$280,000. So, if you had a shutdown of that particular mine, say, because of the impact of shutting down a coal-fired power station, those people would have some sort of semblance of tide-over money to keep them going as a family or something in their back pocket for them to start looking for a future. But, if the way of companies in this industry is going to be that they slash and burn the entitlements of workers as the pressure on those companies gets harder, we are actually doubling the impact of closing down coal-fired power stations.⁵⁰

4.47 Councillor Rush outlined some of the initiatives underway in Muswellbrook Shire to prepare for transition:

We have had an intimate connection with the provision of energy in our community for over 100 years, but we look forward to the day that we can continue that by providing renewable energy, albeit in a rural context. We are working with the University of Newcastle and Hunter TAFE, as well as a number of key agricultural stakeholders including the Farmers Federation, on how we can provide that renewable energy within that rural context. That includes feedstocks for biofuels, including green diesel, wind generation and, of course, solar, as well as pumped water storage by using the residual mining voids for reuse by providing essentially pumped water storage as a form of battery storage for some of the more intermittent forms of renewable energy provision.⁵¹

4.48 Mr McCarthy proposed the following plan for Collie:

The important thing, I think, is that if we are going to be serious about this making it into the 21st century and it not just a being flight of fancy we have to link to the TAFE and universities, because part of getting this is getting design and engineering. It is no good being a train builder unless

49 *Committee Hansard*, 23 February 2017, p. 17.

50 *Committee Hansard*, 23 February 2017, p. 13.

51 *Committee Hansard*, 22 February 2017, p. 11.

you are the best train builder. You want to be able to be in competition with the rest of Asia. The way you do that is build a 21st-century facility, not upgrade an old one. When you create that opportunity, then people are prepared to invest money to go there. When it makes that investment opportunity a little easier because it is landing on, say, gifted land or tax concessions, it gives them an opportunity for the start-up to actually start up.⁵²

Chapter 5

Committee view

5.1 In the few short months since the publication of the committee's interim report, public debate concerning Australia's energy policy and the transition away from a fossil fuel-dominated system of electricity production has reached fever pitch. Significant blackout events in South Australia and New South Wales over the summer months have focused much attention on the roles of the various components of our energy system. Ad-hoc policy pronouncements from both federal and state governments in early 2017 have only added to the confusion and regulatory uncertainty, without moving the country any closer to a cohesive national plan for energy transition.

5.2 Globally, it is clear that the era of coal fired power generation is drawing to a close. Recent policy announcements from India and China in particular show that this is occurring more rapidly than could have been predicted even a few years ago. Cost reductions in renewable technologies, combined with the swift advancement of energy storage technologies, mean there is now no need for additional coal fired generation capacity to be built worldwide.

5.3 Strong leadership is required from the Australian Government to forge a comprehensive national policy response to deal with this transition—leadership which has been sorely lacking in recent times.

Reality of the transition away from coal fired power generation

5.4 The age and declining economic potential of Australia's fleet of coal fired power generators, as well as Australia's commitment to reducing its carbon emissions footprint in line with the Paris Agreement, means it is inevitable that many of these coal fired generators will cease operations in the medium term. This will be the case even in the absence of any further policy measures from government to encourage closure of these generators and further uptake of renewable generation.

5.5 The question is not if coal fired power stations will close, but how quickly and orderly these closures will occur, and what supporting policies, if any, will be in place to help manage the process.

5.6 Strong evidence to the committee suggested that for Australia to make emission reductions consistent with meeting the Paris goals and carbon budget the equivalent of one Hazelwood sized coal-fired power station a year needs to close.

5.7 It is imperative that this reality is acknowledged by government, industry and the broader community, so that this transition can be adequately planned for and implemented at the lowest cost to consumers, taxpayers, workers and communities.

Need for an orderly closure process to encourage price stability and investment certainty

5.8 Some stakeholders have put forward the view that no further policy consideration or intervention is necessary to facilitate an orderly exit of coal fired

power generators from the market. This view was vigorously refuted by other submitters and witnesses, who argued that leaving retirement decisions solely to plant operators creates inefficient outcomes, causes greater price volatility and exacerbates the instability and costs for affected workers and communities.

5.9 The experience of announced coal fired power station closures in Australia over the last four years shows that companies, on average, have given less than four months' notice to affected workers and communities of upcoming plant closures.¹ From a national, long-term planning perspective, this is clearly unacceptable. It highlights the need for an orderly closure process to be facilitated by government on a nation-wide basis, with closures announced ahead of time to give certainty to investors, take into account impacts on the broader electricity system, and allow for a just transition for affected workers and communities.

5.10 The committee has heard that uncertainty around the government's future energy and climate policies are a key factor undermining the ability of market participants to make informed long-term investment decisions. A coordinated, national approach to energy decarbonisation must be pursued, with collaboration between all three levels of government, industry and workers being key to ensuring that regional issues around plant closures are given due prominence.

5.11 The need for a national approach means that it is imperative for the COAG Energy Council to agree on a mechanism for the orderly retirement of coal fired power stations. This should include amending the National Electricity Objectives to include a pollution reduction objective in addition to the three existing objectives of reliability, safety and security.

5.12 The committee considers that this transition to a low-carbon electricity sector will also require coordination by a standalone statutory authority that can oversee the implementation of mechanisms to close coal fired generators and measures to support workers and communities, as argued for by various stakeholders to the inquiry.

5.13 The committee has taken considerable evidence since its interim report, through the receipt of additional written submissions and two further public hearings.

5.14 This evidence has only strengthened the committee's views articulated in its interim report, namely: that the transition away from coal fired power generation towards renewable sources of generation is inevitable; that this transition is already occurring; and that urgent and decisive action from government at all levels is required to facilitate this transition in an orderly and efficient fashion.

5.15 The committee made four recommendations in its interim report:

Recommendation 1

5.16 The committee recommends that the Australian Government adopt a comprehensive energy transition plan, including reform of the National Electricity Market rules.

1 Environment Victoria, Appendix to *Submission 16* tabled at a public hearing on 17 November 2016.

Recommendation 2

5.17 The committee recommends that the Australian Government, in consultation with industry, community, union and other stakeholders, develop a mechanism for the orderly retirement of coal fired power stations to be presented to the COAG Energy Council.

Recommendation 3

5.18 The committee recommends that the Australian Government, through representation on the COAG Energy Council, put in place a pollution reduction objective consistent with Australia's obligations under the Paris Agreement in the National Electricity Objectives.

Recommendation 4

5.19 The committee recommends that the Australian Government establish an energy transition authority with sufficient powers and resources to plan and coordinate the transition in the energy sector, including a Just Transition for workers and communities.

5.20 The committee reiterates these recommendations and urges the government to consider and respond to these recommendations as a matter of urgency.

Additional issues and recommendations

5.21 In addition to reiterating its initial recommendations, several further issues were highlighted in evidence provided to the committee since its interim report which are also worthy of comment and recommendation.

Health and environmental impacts of coal fired power stations

5.22 The committee heard further evidence during its recent public hearings about the continued negative impact coal fired power stations have on the health of those who reside in their vicinity and the environment surrounding them. Despite the longstanding operations of coal fired generators in Australia, these impacts have not been adequately studied or accounted for in making decisions about plant longevity and retirement.

5.23 It is imperative that these impacts be part of the conversation about when assets should be retired; in the committee's view, these impacts strengthen the case for orderly closure of coal fired power stations as soon as possible. In the interim it is important the proper health assessments be conducted and enforcement of air standards be undertaken.

Recommendation 5

5.24 The committee recommends:

- **That the Australian Government commission a comprehensive and independent assessment of the health impacts of coal fired power stations.**
- **That the Australian Government develop a load-based licencing arrangement for coal fired power stations for adoption at COAG based on the New South Wales Load-Based Licencing scheme, with fees that**

reflect the health impacts and other externalities of power station emissions.

- **That the Australian Government take additional measures to ensure compliance with the standards set in the National Environmental Protection (Air Quality) Measure and - in the case of sulphur dioxide and nitrogen dioxide - international best practice standards. In regions where these standards are exceeded such as the Hunter and Latrobe Valleys, coal fired power stations must be compelled to reduce emissions to levels below the NEPM standards.**
- **That the Australian Government ensure a more rigorous assessment of power station emissions through an independent audit of reports provided through the National Pollutant Inventory.**

Rehabilitation of retired power stations

5.25 As coal fired power stations and mines are retired there is a need to properly rehabilitate the sites to ensure a positive environmental and social legacy. Without adequate rehabilitation bonds or provisioning for the costs of rehabilitation there is a real risk that taxpayers will end up bearing the burden of these rehabilitation costs, or alternatively that rehabilitation will not be performed to an adequate standard.

5.26 The owners of the Hazelwood power station recently increased their rehabilitation provision to \$742 million for the power station and mine which gives an indication of the potential cost of mine rehabilitation.

Recommendation 6

5.27 The committee recommends that the Commonwealth and state energy ministers should undertake a national audit of likely rehabilitation costs for existing coal mines and power stations and assess these costs against the current provisions or bond arrangements.

5.28 The committee recommends that the Commonwealth and state energy ministers should also work to develop a common approach to setting rehabilitation bonds to ensure that rehabilitation costs are properly provisioned for.

Solutions to enhance reliability and stability of power generation and delivery

5.29 In the wake of recent blackout events, the need to provide solutions that deliver reliability and stability in the electricity system while delivering low-emission power generation is clearer than ever.

5.30 The committee heard evidence that uncertainty about the timeline for the retirement of coal fired power stations and the uncertainty about climate and energy policy has led to significant under investment in new energy generation.

5.31 As a result the failure of the Australian Government to put in place policies to support new energy generation is creating significant pressure and instability on the NEM.

5.32 Investments in large-scale battery storage by the South Australian and Victorian governments are to be commended, as are funding initiatives from ARENA directed towards the development of both grid-scale and household battery storage solutions. Initiatives involving pumped hydro storage and other grid-stabilising technologies should also be explored, although these may require longer timeframes to implement and are thus less capable of alleviating the immediate problems facing the electricity system.

5.33 The committee heard evidence that household battery storage technologies will achieve widespread take-up among consumers within the next five years, if not sooner. Governments at every level should be doing all they can to encourage this development and to ensure that the regulatory framework facilitates innovation in this space, for example through encouraging inventive technical solutions such as household peer-to-peer trading of electricity. Applications such as this have the potential to encourage decentralised generation and distribution of electricity, while enhancing the stability and integrity of the grid itself.

Recommendation 7

5.34 The committee recommends that the Australian Government continue and expand the Renewable Energy Target beyond 2020 and consider adopting renewable energy reverse auctions such as adopted by the ACT to bring more new generation into the national electricity market.

5.35 The committee also recommends that the Australian Government support the continuing deployment grid level battery storage and of household solar and battery storage technologies, including making the necessary regulatory changes, such as aligning the settlement and bidding time periods in the National Electricity Market, to encourage the utilisation of products that promote decentralisation of electricity production while enhancing the stability of the grid.

'Clean coal' technologies

5.36 Despite the best efforts of the coal lobby and the current Australian Government, it has become increasingly apparent that 'clean coal' technologies are too expensive and unreliable to be competitive with renewable energy sources in the short term, let alone over the longer asset lifespans of coal fired generators.

5.37 Arguments that 'clean coal' can be a viable part of Australia's future energy mix are an irresponsible smokescreen, designed to prop up an industry in structural decline and stymie the uptake of renewable, affordable and reliable energy solutions.

5.38 The energy industry itself, as well as the financial sector, has made it clear in recent months that investments in new coal fired power generation in Australia are not commercially viable, regardless of whether these new plants are slightly more efficient than the existing fleet of generators. Carbon capture and storage technologies are also still not commercially viable, despite many years of investment by both governments and industry into their development.

5.39 The only way new coal fired power stations could be built in Australia is if they are heavily funded or subsidised by government. This would constitute an

outrageous waste of taxpayer money, and the committee calls on the Australian Government to commit to not funding any such projects.

Recommendation 8

5.40 The committee recommends that the Australian Government commit to not provide any direct funding, subsidies or other support for the construction of new coal fired power stations in Australia.

Finkel review

5.41 The committee is concerned that recent policy announcements and statements by the Australian Government have come in advance of the final report of the Independent Review into the Future of the NEM currently being conducted by the Chief Scientist, Dr Alan Finkel AO. These announcements by the Australian Government have effectively prejudged legitimate policy options, such as the introduction of an Emissions Intensity Scheme for the electricity sector, before the independent review has completed its work.

5.42 It is imperative that the Australian Government consider all options presented by the final report of the Finkel Review fairly and transparently, so that the most efficient and least-cost pathway to achieving a stable, low-emissions electricity system in Australia can be realised.

Recommendation 9

5.43 The committee recommends that the Australian Government reverse its ideological opposition to the introduction of a scheme for managing the transition in the electricity sector such as an Emissions Intensity Scheme or the setting of pollution intensity standards and commit to considering fairly all policy options presented by the forthcoming final report of the Finkel Review.

Senator Peter Whish-Wilson

Chair

Coalition Senators' Dissenting Report

Introduction

1.1 The Coalition Senators do not support the Recommendations contained in the Final Report. The majority report does not adequately or fairly reflect the evidence presented to the committee. Further, the Coalition Senators object to the ideologically driven conclusions which are counter to the Government's technology agnostic policy approach.

1.2 The Coalition Senators recognise that the energy sector is essential to Australian's wellbeing and standard of living, and plays a pivotal role in Australia's ongoing prosperity. Energy security must be government's number one energy policy priority. The transition to a lower emissions economy must be done in a way that maintains a secure and affordable energy supply to industry and households.

1.3 The bringing together of the Environment and Energy portfolios under the Federal Minister for the Environment & Energy in August 2016 is facilitating the integration of climate change and energy policy with the central aim to keep energy secure, reliable and affordable whilst achieving emissions reductions.

1.4 The Government has a comprehensive policy framework in place to achieve this objective:

- ratification of both the Paris Agreement on climate change and the Doha Amendment to the Kyoto Protocol;
- Australia's ambitious and responsible target to reduce emission by 26 to 28 per cent below 2005 levels by 2030;
- Australia is currently on track to beat its cumulative 2020 target by 22 million tonnes;
- the successful Emissions Reduction Fund (ERF) has delivered over 178 mt of abatement at an average price of \$11.83;
- the 2017 review of climate change policies which follows the Government's commitment to review its policies when it set Australia's target to reduce emissions by 26 to 28 per cent below 2005 levels by 2030 is underway and set to be completed by the end of 2017;
- the Renewable Energy Target (RET);
- the National Energy Productivity Plan (NEPP) that will see our energy productivity increase by 40% by 2030;
- measures to support clean energy investment, including the \$10 billion Clean Energy Finance Corporation (CEFC) and the Australian Renewable Energy Agency (ARENA);
- vehicle emissions standards; and
- a domestic phase down of hydrofluorocarbon gases as part of a recently developed global agreement.

1.5 At the same time, the Federal Government, in conjunction with the COAG Energy Council, is currently developing a long-term national blueprint for the national energy sector through the Finkel Review. A final report to the Energy Council is expected mid 2017.

1.6 Since these measures have been announced, the Government has also been actively pursuing a technology neutral approach as evidenced by:

- At the Government's request, ARENA and the Clean Energy Finance Corporation agreeing to work together on a new funding round for large-scale energy storage and other flexible capacity projects including pumped hydro. The Government is making energy storage infrastructure a critical priority to ensure better integration of wind and solar into the energy market and more efficient use of conventional power.
- The Government commitment to the Snowy Mountains Scheme 2.0 plan that will increase the generation of the Snowy Hydro scheme by 50%, adding 2000 megawatts of reliable renewable energy to the National Electricity Market – enough to power 500,000 homes.
- The Government through ARENA partnering in a feasibility study for a 100-200 megawatt pumped hydro project at Cultuna in the Spencer Gulf in South Australia.
- Together with the Clean Energy Finance Corporation, ARENA is assisting Genex Power to investigate the feasibility of a pumped storage hydro power plant at the discussed Kidston Gold Mine in North Queensland. This has potential to generate up to 250MW of rapid response flexible power for the National Electricity Market (NEM).
- ARENA is supporting a study by ANU to develop a map of potential sites for off-river pumped hydro projects.
- The Government has obtained commitments from east coast gas producers to guarantee that gas will be available to meet peak demand periods in the national electricity market as soon as possible. This agreement is especially important given the increasing reliance on gas as a stabilising energy source able to quickly respond to the variability of intermittent sources of energy.

1.7 The Coalition Senators support a transition of the energy market which is supportive of displaced workers, their families and surrounding communities. The indirect impacts on associated small-medium businesses need to be considered in any Government response which is why the Federal Government's package in response to the Hazelwood closure not only supported workers and their families but was also designed to support the broader community across the region.

1.8 Fundamentally, and contrary to the Majority Report, Coalition Senators do not believe that the best way to achieve an effective transition is to force the exit of coal fired power generation from the electricity system.

Senator Linda Reynolds
Deputy Chair

Senator Jonathon Duniam

Labor Senators' Dissenting Report

1.1 Labor members of the committee note the clear lack of any coherent energy policy from the Government, which has led to a spike in system unreliability, electricity prices and carbon pollution.

1.2 Labor members note that this overarching lack of policy direction from the Government sends confusing signals to the energy market in Australia, which includes coal fired power generation, which is causing an investment freeze for all types of new electricity generation assets and is putting affordability and reliability of electricity under increasing threat.

1.3 Labor members note that having generation closure decisions made by private participants without guidance from Government can, and has, led to chaotic closures that place system reliability and affordability at risk, as well as placing unnecessary stress on workers and communities.

1.4 It was clear from the overwhelming majority of evidence to the committee that the Government's ever changing policy position on the Renewable Energy Target has contributed to reduced investment in new energy supply in Australia, particularly renewable energy.

1.5 It was also clear the Government's refusal to articulate and implement a clear national energy policy post 2020 has undermined investment decisions in the sector, which have in turn undermined system reliability and affordability, as well as the transition to low emission generation.

1.6 Labor members note the Government's own carbon pollution projections show emissions in 2030 to be the same as recorded in 2005, while the Federal Government's commitment under the Paris Agreement is a minimum reduction in emissions of 26-28 per cent on 2005 levels by 2030.

1.7 Labor members note that evidence to the inquiry indicates that in order to achieve this emissions reduction at the least cost, policy settings should be stable and predictable.

1.8 Stable, long-term and bipartisan policy settings are most conducive to least-cost investment and abatement in the sector, which translates to lower prices for electricity consumers.

1.9 Labor members note the strong view of the energy industry that direct investment in new coal fired powered generation by the Commonwealth Government would very likely be unfeasible on any cost-benefit basis.

1.10 Labor members note that coal fired power generation will continue to play a significant role over the coming decades within the framework of reducing emissions in the sector.

1.11 For example, the Queensland Renewable Energy Expert Panel have indicated that the early retirement of coal-fired generation in Queensland is not required in order to achieve a 50% Renewable Energy Target in Queensland by 2030.

1.12 Labor members note that as coal fired power generators come to the end of their natural lifespan, there is no national policy framework to ensure inevitable coal plant closures occur in a manner that safeguards national electricity system stability or affordability.

1.13 Labor members note that such a framework has been called for by numerous witnesses to the inquiry, as well as diverse organisations in public debate, ranging from the Construction, Forestry, Mining and Energy Union to the Business Council of Australia.

1.14 Labor members note that as coal fired power generators come to the end of their natural lifespan, policy mechanisms need to give effect to a just transition for affected workers and communities likely impacted by generator closures.

1.15 These measures need to ensure that workers are not abandoned without appropriate notice, support and employment opportunities, and should include worker transfer schemes of the type recently agreed for workers at Hazelwood.

1.16 Labor members note that a coherent energy policy with long term consistent investment signals that support new generation investment delivers better outcomes for workers than the current Government's lack of national policy and constantly changing priorities and proposals.

1.17 To achieve the transition at least cost, policy settings should be stable and predictable and should utilise the latest and future technologies, in both generation and storage.

Recommendation 1

1.18 The Federal Government restate its commitments to both the Paris Agreement and the Renewable Energy Target, in light of mixed messaging and conflicting signals from the Government which are hurting investment.

Recommendation 2

1.19 The Federal Government commit to developing and implementing a stable and consistent energy policy to support new investment in the sector post 2020 through its 2017 Climate Change Review and that as a matter of urgency, it re-introduce an emission intensity scheme into consideration by this review.

Recommendation 3

1.20 The Federal Government establish mechanisms to support a just transition for workers and communities resulting from the retirement of coal fired power generators, including a national framework for worker redeployment schemes modelled on the Victorian Government's Latrobe Valley Worker Transfer Scheme.

Senator Anthony Chisholm

Senator Sam Dastyari

Senator Anne Urquhart

Appendix 1

Submissions, tabled documents and answers to questions on notice

Submissions

1	Dandenong Renewable Energy Association
2	Electrical Trades Union of Australia
3	Australian Psychological Society
4	Associate Professor Frank Jotzo
5	Professor John Wiseman
6	Whitsunday Residents Against Dumping
7	Victorian Division of the National Tertiary Education Union
8	Transgrid
9	SolarReserve
10	Centre for Social Change
11	Engineers Australia
12	AGL Energy Limited
13	Clean Energy Council
14	Infigen Energy
15	Leadership Forum on Energy Transition
16	Environment Victoria
17	Australian Council of Trade Unions
18	CFMEU
19	350.org Australia
20	Climate Council of Australia
21	Energy Policy Institute of Australia
22	Social Justice Board, Uniting Church in Western Australia
23	Community Power Agency
24	Repower Port Augusta
25	Citizens' Climate Lobby
26	Renergi Pty Ltd
27	Alinta Energy
28	Climate Action Moreland
29	Minerals Council of Australia
30	Power-Less Pty Ltd
31	Lighter Footprints
32	ELENGAS
33	Environment Defender's of Australia
34	Community Environment Network
35	Anglican EcoCare Commission
36	North Queensland Conservation Council
37	AusNet Services
38	Australian Marine Conservation Society
39	Origin Energy Limited

40	Transition Kingston
41	Moreland Energy Foundation
42	Beyond Zero Emissions
43	Hunter Communities Network
44	Australian Energy Council
45	Institute of Public Affairs
46	Committee for Gippsland
47	Great Barrier Reef Divers
48	Mackay Conservation Group
49	ABB Australia
50	Nature Conservation Council
51	Climate Conversations Group
52	Australian Services Union
53	Doctors for the Environment Australia
54	Australian Services Union - SA and NT Branch
55	Voices of the Valley
56	La Trobe Valley Sustainability Group
57	Grattan Institute
58	The Climate Institute
59	Queensland Conservation
60	Australian Manufacturing Workers Union
61	Friends of the Earth
62	Port Augusta City Council
63	Environmental Justice Australia
64	Clean Energy Finance Corp
65	Melbourne Energy Institute
66	Latrobe City Council
67	Australian Mines and Metals Association
68	Victorian Council of Social Service
69	Australian Conservation Foundation
70	Energy Networks Australia
71	EnergyAustralia
72	Sustainable Energy Now
73	The Australia Institute
74	Australian Youth Climate Coalition and Seed
75	Major Energy Users Inc
76	Australian Energy Market Commission
77	World Wildlife Fund-Australia
78	Government of South Australia
79	NSW Nurses and Midwives' Association
80	Mr Angus King
81	Mr Laurence Capill
82	Mr Michael Campbell OAM
83	Ms Robyn Charlton
84	Mr Graeme Wheeler
85	Ms Anne Close

86	Ms Lorraine Bull
87	Mr Dylan McConnell
88	Mr Ben Rose
89	Name Withheld
90	Mr Gary Rowbottom
91	Kendall Lovett and Mannie De Saxe
92	Ms Peggy Fisher
93	Ms Vicki Brooke
94	Mrs Judith Leslie
95	Mr Louis deVilliers
96	Mr Graham Proctor
97	Ms Mabel Quakawoot
98	Mrs Keira Bury
99	Dr Kim Loo
100	Mr Chris Bakewell
101	Ms Deidre Olofsson
102	Council for the National Interest
103	Dr Bill Tran
104	ClimActs
105	Locals Into Victoria's Environment
106	Darebin Climate Action Now
107	Climate Change Balmain-Rozelle Inc
108	Dr Sally Weller
109	Mr Malcolm Moore and Mr Robert Scholes
110	Mr Ivan Quail
111	Mr James Stewart
112	Mr Jonathan Peter
113	Ms Peggy Fisher
114	Mr Adrian Boss
115	Ms Verity Robin
116	Ms Sybille Frank
117	Mr Michael Rynn
118	Mr Markus Eglie
119	Mr Murray Scott
120	Mr Derek Robertson
121	Mr Mik Aidt
122	Ms Patricia Lisle
123	Mr Jonathan Milford
124	Ms Lesley Walker
125	Ms Cathy Hall
126	Ms Miriam Robinson
127	Mr Adrian Plummer
128	Ms Patricia Earnshaw
129	Mr Alan Roberts
130	Mr John White
131	Dr Kate Charlesworth

132	Ms Rosie White
133	Mr Adam Carson
134	Global CCS Institute
135	Johannes Brits
136	Ms Elspeth Ferguson
137	Mr Geoff Miell
138	Colong Foundation for Wilderness
139	Lithgow Environment Group Inc.

Form letters

Form letter type 1: received from 297 individuals

Tabled documents

1. Environment Victoria - *Recent closures of coal burning power stations in the national electricity market*, Appendix to Submission 16 tabled by Environment Victoria (public hearing, Melbourne, 17 November 2016).
2. Environment Victoria – *'Life after coal: Pathways to a just and sustainable transition for the Latrobe Valley'*, September 2016, tabled by Environment Victoria (public hearing, Melbourne 17 November 2016).
3. Correspondence in relation to planning of the Liddell and Bayswaters power stations, tabled by Muswellbrook Shire Council (public hearing, Sydney 22 February 2017)
4. Additional information, statistics in relation to emission toxicity and a photograph, tabled by Environmental Justice Australia (public hearing, Sydney 22 February 2017)
5. Opening statement, tabled by the Institute for Energy Economics and Financial Analysis (public hearing, Sydney 22 February 2017)
6. Opening statement, tabled by the Australia Institute Centre for Future Work (public hearing, Sydney 22 February 2017)
7. 'Sustainable Energy Now Presentation for Senate Inquiry into Closure of Coal Fired Power Stations', tabled by Mr Ben Rose (public hearing, Perth 23 February 2017)
8. 'The Shift to Basecost Renewables: 10 Predictions for 2017', Bloomberg New Energy Finance, 18 January 2017, tabled by Mr Ben Rose (public hearing, Perth 23 February 2017)

9. Geoff Summerhayes, 'Australia's New Horizon: Climate Change Challenges and Prudential Risk', 17 February 2017, tabled by Mr Ben Rose (public hearing, Perth 23 February 2017)
10. Renew WA, 'Climate Consensus Statement', tabled by Mr Piers Verstegen (public hearing, Perth 23 February 2017).

Answers to questions on notice

1. Answer to question on notice received from AGL Energy following public hearing in Melbourne on 17 November 2016.
2. Answer to question on notice received from Clean Energy Council following public hearing in Melbourne on 17 November 2016.
3. Answer to question on notice received from Environment Victoria following public hearing in Melbourne on 17 November 2016.
4. Answer to question on notice received from SolarReserve following public hearing in Melbourne on 17 November 2016.
5. Answer to question on notice received from EnergyAustralia following public hearing in Melbourne on 17 November 2016.
6. Answer to question on notice received from Australian Energy Council following public hearing in Melbourne on 17 November 2016.

Appendix 2

Public hearings

Wednesday, 09 November 2016 – Canberra

Climate Council

Mr Andrew Stock, Climate Councillor

The Climate Institute

Mr Erwin Jackson, Deputy Chief Executive Officer

Ms Olivia Kember, Head of Policy

The Australia Institute

Mr Roderick Campbell, Research Director

Private capacity

Associate Professor Frank Jotzo

Australian Conservation Foundation Inc

Ms Kelly O'Shanassy, Chief Executive Officer

Industriegewerkschaft Bergbau, Chemie, Energie

Mr Michael Mersmann, Director, Globalisation and European Policy

Works Council, RAG Corporation

Mr Norbert Maus, Chair, through Claudia Koch, interpreter

Australian Council of Trade Unions

Ms Gerardine (Ged) Kearney, President

Construction, Forestry, Mining and Energy Union

Mr Anthony Maher, National President

Mr Peter John Colley, National Research Director

Electrical Trades Union

Adjunct Professor Sally Weller, Consultant

Thursday, 17 November 2016 – Melbourne

AGL Energy

Mr Anthony Chappel, Head Of Government and Community Relations

Dr Timothy Nelson, Head Of Economic Policy and Sustainability

Australian Energy Council

Mr Matthew Warren, Chief Executive Officer

Mr Kieran Donoghue, General Manager Policy

EnergyAustralia

Mr Mark Collette, Executive Energy

Mr Lee Evans, Policy and Advocacy Leader

Ms Lisa Gooding, Government and Policy Leader

Voices of the Valley

Ms Wendy Farmer, President

Mr Ron Ipsen, Vice-President

Ms Bronya Lipski, Member

Latrobe City Council

Mr Philip Alexander Stone, General Manager City Development

Earthworker Cooperative

Mr Dan Musil, Secretary

Centre for Social Change

Dr Amanda Cahill, Director

Environment Victoria

Mr Mark Wakeham, Chief Executive Officer

Dr Nicholas Aberle, Campaigns Manager

Infigen Energy

Mr Jonathan Upson, Senior Business Development Manager

SolarReserve

Mr Daniel Thompson, Director of Development

Clean Energy Council

Ms Alicia Webb, Director of Large Scale Energy

Melbourne Energy Institute, University Of Melbourne

Professor Michael Brear, Director

Professor Pierluigi Mancarella, Chair, Professor of Electrical Power Systems

Victorian Division, National Tertiary Education Union

Dr Colin Long, Secretary

Wednesday, 22 February 2017 – Sydney

Nature Conservation Council of New South Wales

Dr Bradley Smith, Senior Climate and Energy Campaigner

Ms Daisy Barham, Campaigns Director

350.org

Ms Catherine Blair Palese, Chief Executive Officer

Muswellbrook Shire Council

Cr Martin Rush, Mayor

Environmental Justice Australia

Dr James Whelan, Researcher

Doctors for the Environment Australia

Dr John van der Kallen, Chair New South Wales

Dr Ben Ewald, Member

Private capacity

Mr Michael Campbell, OAM

Colong Foundation for Wilderness Ltd

Mr Keith Muir, Executive Director

Central Coast Community Environment Network

Mr John Asquith, Chairman

Private capacity

Ms Robyn Charlton

Institute for Energy Economics and Financial Analysis

Mr Tim Buckley, Director of Energy Finance Studies Australasia

Carbon and Energy Markets Australia

Mr Bruce Mountain, Director

Centre for Future Work

Dr Jim Stanford, Director

Thursday, 23 February 2017 – Perth

Sustainable Energy Now Inc.

Mr Barry Ladbrook, Member

Mr Ben Rose, Policy Coordinator

Mr Angus King, Tech Team member

Mr Ian Porter, Chairman

Conservation Council of Western Australia

Mr Piers Verstegen, Director

Dr George Crisp

Bunbury Against Coal Exports

Mr Laurence Capill

Australian Manufacturing Workers Union, Western Australia Branch

Mr Steve McCartney, State Secretary

Mr Glenn McLaren, Lead Organiser

Private capacity

Ms Leonie Scoffern

Private capacity

Ms Jemma Green, Research Fellow, Curtin University

Reenergi Pty Ltd

Mr Antony Piccinini, CEO

