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Attitudes of incumbent regimes to a renewable energy transition: a case study of Queensland, Australia

Abstract

Transitions to renewable energy (RE) have been the subject of considerable debate in both academic and policy circles (Geels, 2002). In this study, we examine documents at both state and federal level to ascertain whether key stakeholders, such as mining, business, utilities and the energy sector, are concerned with, and effectively planning for, a renewable energy transition. It is critical to examine their views, since powerful stakeholders can strengthen, or undermine, the commitment of government to a renewable energy transition. The literature shows quite clearly that government policies are critical in transitions, for instance policies can spur private investment and influence actors' perceptions of the risk-reward equation (Wüstenhagen & Menichetti, 2012). We highlight the assumptions, narratives and tensions that underlie an energy transition. As a theoretical basis for this research, the lens of 'social acceptance', including socio-political, community and market acceptance, is employed (Wüstenhagen, Wolsink & Bürer, 2007). The study evaluates social acceptance of renewable energy on a continuum ranging from 'not accepted', 'moving towards acceptance', and 'high acceptance' where responses are progressive and innovative. Although scholars note that owners of fossil fuels are a powerful lobby group and are able to obstruct ambitious climate policy quite effectively because they are well-organised and their business models are based on the use of cheap fossil fuels (Edenhofer & Flachsland, 2013; Hall & Taplin, 2008), this study found that there is a certain level of social acceptance for an energy transition. Key stakeholders - mining, utilities, energy and the business sector - support an integrated climate and energy policy to help Australia meets its commitments under the Paris agreement.

Introduction

There is growing recognition that the use of greenhouse gas-producing fossil fuels in the electricity system must be phased out due to the threat of climate change (Nelson, 2016). Climate change causes variances in the frequency, intensity and timing of extreme climate events such as heat waves, drought, wildfire, floods, and coastal storms (Field et al., 2013). In the long run, climate change poses substantial economic loss to Australia due to the prospect of extreme weather events and coral bleaching within the Great Barrier Reef Marine Park (Department of the Environment, n.d; Garnaut, 2008; CSIRO, 2015). The state of Queensland, in particular, has a long history of extreme weather events (Heazle et al., 2013), which threatens the tourism industry. During 2015–2016, record temperatures triggered a major episode of coral bleaching, with scientists calling for immediate, global action to curb future warming (Hughes et al., 2017). As part of a climate change adaptation strategy, Queensland is positioning itself as the 'solar state'; yet tensions have appeared over the extent to which energy policy should be reliant on renewable energy sources and the ramifications for both energy security and the economy. Renewable energy (RE) sources such as wind and solar are increasingly seen as cheaper, as well as cleaner, than fossil fuels. According to the Climate Council (2017a), solar costs are now so low that large, industrial-scale solar plants are providing cheaper power than new fossil power. This energy scenario has implications for regions that are traditionally associated with fossil fuel extraction and can lead to tensions and debates over the most suitable mix of energy sources. Plans to build a $21.7 billion Carmichael mine (the Adani mine) in central Queensland, one of the biggest in the world, has attracted a good deal of controversy in Australia. It has been described as fundamentally at odds with global efforts to tackle climate change effectively, and "runs contrary to good government policy to transition the Australian economy in a planned way, consistent with our Paris Climate Agreement commitments" (Steffen et al., 2017, p. 9). A former leader of the Greens Party called the plan to build the coal mine as the "environmental issue of our times" (Chang, 2017). Despite having abundant energy resources, Australia, as a nation, is grappling with complex energy issues, including blackouts in South Australia, high electricity prices and gas shortages, which were outlined in the recent 'Finkel review' of the sector (Commonwealth of Australia, 2017).

This book chapter addresses current debates over renewable energy transitions and explores various themes, or frames of references, such as cost to the economy, energy security and climate change. The authors do this through an analysis of texts from various stakeholders from a five year period, 2012 to 2017. It is concluded that while debates about renewable energy are characterised by the normalisation of certain perspectives ('cost to the economy versus climate change mitigation'), others are absent, silent or de-legitimised ('stranded asset risk', 'responsibility to future generations').

There is a growing body of literature focussing on the social acceptance of renewable energy (Jacobsson & Lauber, 2006) and renewable energy policies (Lewis & Wiser, 2007). Our study follows this literature and compliments it by providing a qualitative analysis of the social acceptance of renewable energy in Australia. The paper starts with a discussion of the challenges faced in transitioning to RE, followed by an overview of social acceptance and renewable energy transitions, then the research methods are clarified and data findings are outlined. Findings are discussed in the context of the literature on energy transitions and a theoretical framework focusing on social acceptance is applied to the Australian energy sector.

Renewable energy transitions and social acceptance

Renewable energy transitions, as a narrative, refers to a transition away from fossil fuels, such as coal, gas and oil, in order to mitigate the effects of climate change (Araújo, 2014). It is argued that organising an energy transition is the major challenge of the 21st century (Urry, 2014). Numerous studies conclude that system-wide transformations are required to grapple with climate change and move to a low-carbon economy (Geels, 2012; Jacobsson & Lauber, 2006). The difficulty of overcoming 'path dependency' (which is a tendency of past practices to continue) and 'carbon lock-in' (which refers to market and policy failures which inhibit the diffusion of carbon-saving technologies despite their apparent advantages) is highlighted (Unruh, 2000), and there is a growing focus on how to govern and trigger system-wide transitions (Tukker and Butter, 2007). Technological innovation and persistent, well aligned policies are needed to stimulate an energy transition (Verbruggen et al., 2010; Grubler, 2012). Despite the challenges, shares of renewable energy in many power grids and jurisdictions around the world are reaching 20–40%, and a wealth of knowledge on how to overcome technical problems is being amassed (Martinot, 2016**).**

In a country such as Australia, which has substantial domestic supplies of fossil fuels (particularly coal and gas), organising an energy transition is particularly challenging. Coal is particularly rich in carbon: when black coal is burnt, it can produce more than twice its weight in carbon dioxide (Hong & Slatick, 1994), yet the owners of this resource take little, or no, responsibility for the cost of emitting carbon into the atmosphere (Connor, 2016). With the recent commitment of the Federal government to the 2016 Paris Climate Agreement, it has been argued that a transition to renewables (and away from coal) needs to be at the centre of Australia's climate change mitigation effort (Kallies, 2016). To address climate change, scholars and policy advisors suggest that RE targets or carbon pricing (such as an emissions trading scheme or clean energy target implemented nationally) is essential and is likely to be an effective enabler of new RE capacity (Edenhofer et al., 2013a; Finkel, 2017; Queensland Renewable Energy Expert Panel, 2016; Meadowcroft, 2011). However, the federal government has shown inconsistent support for climate change and the 'stop/start' nature of RE policy is seen as ill-suited for triggering an energy transition (Nelson, 2016). Investors in power generation require stable policy frameworks before they commit to long-term infrastructure investment (Nelson, Nelson, Ariyaratnam & Camroux, 2013). Scholars (Grubler, 2012) highlight the need for a set of consistent, contradiction-free policy signals, yet in Australia, currently, it is estimated that subsidies, estimated at $5 billion per annum, are given to fossil fuels (Dzonzi-Undi & Li, 2016; Makhijani & Doukas, 2015), which is a stark reminder of the problem of un-alignment. It should, however, be noted that solar also received subsidies, with the cost of incentives for adoption of solar power being funded by levies on all electricity consumers, impacting on low income groups who are least likely to afford solar (Sommerfeld & Buys, 2014).

According to Geels (2014, p. 21), the resistance by incumbents, such as coal, gas and nuclear regimes, to fundamental change, suggests that *"future agendas in research and policy should pay much more attention to the destabilization and decline of existing fossil fuel regimes".* Scholars have highlighted power and

politics that underpin the development and implementation of specific policies (Smith et al., 2005; Meadowcroft, 2011). The basic idea is that policymakers and incumbent firms can form a core alliance, which is oriented towards maintaining the status quo (Geels, 2014). In Australia, research has shown that incumbents strongly opposed RE objectives when they were first introduced (Simpson & Clifton, 2014). Scholars note that owners of fossil fuels are a powerful lobby group and are able to obstruct ambitious climate policy quite effectively because their business models are based on the use of cheap fossil fuels, the costs of which do not consider externalities. They are strongly impacted by the costs of climate protection, are well-organised (Biggs, 2015; Edenhofer & Flachsland, 2013; Hall and Taplin, 2008) and hence the environment "appears rather unfertile for cultivating a low-carbon economy" (Biggs, 2015, p. 1).

Social acceptance is a concept that significantly shapes the implementation of renewable energy technologies and achievement of targets (Moula et al., 2013). Scholars (Batel & Devine-Wright, 2015; Batel, Devine-Wright & Tangeland, 2013) have written extensively about public responses to large-scale energy infrastructures. Despite increased academic attention, no clear definition of social acceptance of renewable energy technologies exists (Wüstenhagen et al., 2007). According to Wolsink (2010, p. 303), "*Social acceptance is not simply a set of static attitudes of individuals; instead it refers more broadly to social relationships and organisations, and it is dynamic as it is shaped in learning processes*". A highly cited framework proposes that social acceptance is composed of three dimensions, such as socio-political, community and market acceptance (Wüstenhagen, Wolsink & Bürer, 2007; Wolsink, 2012). A revised version separates the political from the societal/community (Sovacool and Ratan, 2012). Figure 1 depicts these dimensions. The socio-political dimension is the broadest dimension and it concerns the ability of regulators and policy-makers to craft effective polices. It refers to the institutional framework which can create favourable conditions and it can foster, or impede, acceptance in the other two dimensions. It can also refer to influences on policy-making at multiple levels, from international to local (Devine-Wright et al., 2017). Wolsink (2012, p. 826) highlights that current energy supply systems are highly institutionalised and are full of regulations, norms and socio-culturally defined patterns of thinking. For instance, this dimension concerns the willingness of policy makers to price electricity accurately, taking into account externalities, and apply policy instruments, such as 'green tariffs' or 'feed in tariffs' (FiTs). In order to make a transition to a low-carbon energy supply, institutional barriers such as price distortions or discriminatory grid system access, need to be overcome. The second dimension is community acceptance, which concerns territorial acceptance (siting of generating facilities in specific locations), effective support or satisfaction with energy infrastructure, how benefits are shared and whether it meets economic and social needs at a local level. The literature shows the need for developers to collaborate with the local community about siting decisions. The third dimension, market acceptance, is focused upon industry actors and incumbents, and the willingness of energy companies, utilities, new innovators, investors, banks along with the community, to invest in RE assets. These three dimensions operate as a sort of nexus or triangle, implying that each form of acceptance is insufficient on its own to promote an energy transition.

In this chapter, our focus is on two dimensions, specifically on the market and socio-political lens in anticipation that empirical research might tell us something about how incumbents view the policy framework and how they defend themselves and resist transitions. For instance, coal is increasingly being (re)positioned as an answer to energy security and affordability; innovations such as coal gasification and carbon capture and storage (CCS), have given rise to a 'clean coal' discourse, which is used by government to legitimate its support for coal (Geels, 2014). By exploring the views of incumbents through submissions, it might be possible to counter or diffuse opposition to a renewable energy transition. Important questions to answer are: what are incumbents saying about energy transition options and policy instruments, do they accept transitions and what consequences do they foresee? According to Verbong & Geels (2007, p. 1025), "*But although policy makers are important, other actors are also involved in renewable options (e.g. firms, utilities, special-interest groups, consumers). A proper explanation should also include perceptions, strategies and actions of these groups*". This focus on two dimensions is important since Devine-Wright et al., (2017) notes that few empirical studies have encompassed more than one of the three aspects in their analytical frame and the framework is weakened by a lack of emphasis upon how each dimension inter-related across different geographic scales, such as international, national and local. Here we propose a national scale of analysis. More specifically, the book chapter argues that incumbents are moving towards acceptance, but it is still at a low level.

INSERT FIGURE 1 HERE

Research Questions

This empirical study examines how key stakeholders view renewable energy. The objective is to investigate how RE is represented in submissions to the government, whether submissions from specific stakeholders are negatively or positively disposed towards RE, what elements of the debate the stakeholder chose to emphasise, and whether there are differences between key groups. Specific questions for the analysis are:

- How much attention is given to climate change in the submissions?
- How are fossil fuels viewed in the energy mix relative to renewable energy options?
- What themes are present in the submissions?

Research methods and sample

Qualitative content analysis is used in this study. Content analysis is an unobtrusive research technique that allows objective, systematic, and quantitative description of human communications to be obtained (Babbie, 2004). According to Boote & Mathews (1999, p. 20), content analysis is a research method that provides the *"least response bias of any research methodology",* since it often entails looking at what people do, rather than what they say they do. The content analysis is based on submissions to the state and federal government. A rationale for using this approach is that submissions are highly applicable to the concept of acceptance, furthermore, this methodology has been used in similar studies, such as studies on local planning (Berke & French, 1994); studies reviewing climate action plans (Bassett & Shandas, 2010; Baker et al., 2012; Tang et al., 2013; Baynham & Stevens, 2014) and in studies of barriers to renewable energy targets (Martin & Rice, 2012; Simpson & Clifton, 2014). There are practical reasons for choosing submissions for the analysis. The federal government has shown a high willingness to roll back support for renewable energy (Kallies, 2016), and there have been several enquiries into the electricity sector and RE targets, dating back to 2012. With the recent commitment of the federal government to the Paris Climate Agreement, there has been further enquiries relating to climate mitigation strategies and the electricity sector. Submissions are important in informing the opinion and knowledge of government policy makers and in shaping policy (Tang et al., 2013). Authors are explicit about their affiliations, and perhaps biases, and they write with an express purpose to advocate for a particular outcome. Perspectives in submissions tend to be detailed, and in contrast to newspaper articles, the authors don't face the same pressure to simplify complex debates, or share the same urgency for readership rates. Submissions are also freely available on websites and easy to discover.

Table 2 outlines the data sources such as the producer of the submission, the name of the plan and the year in which it was published. The sampling units were submissions produced by three sectors: mining (including coal), business and utilities/energy. The focus of this study is on the key players, those who may obstruct an energy transition. The literature highlights the power of incumbent regimes (Geels, 2014), so submissions from actors operating in Queensland, a state dominated by fossil fuel interests, were included in the sample. Coal-fired generation remains the dominant supply technology in Australia. Queensland (along with Victoria and New South Wales) relies on coal more heavily than other regions and has nine coal-fired power stations (AER, 2017). Submissions from individuals and environmental or non-government organisations (NGOs) were not included in the sample. The reason for this omission is that submissions from individuals tend to be ideologically averse to coal. NGOs tend to be fragmented in their approach, lack power, and compared to the political and business elites, their voices are generally "infrequent and weak" (Lindblom, 2001, p. 223). The most recent submissions were collected along with some of the earlier submissions. The latter considered issues that are no longer relevant (e.g. views on premium FiT tariffs which were paid for electricity fed back into the electricity grid from domestic solar systems, but they have since been discontinued) but some of these submissions were still analysed for insights into social acceptance of renewable energy. A total of 45 submissions were analysed. The nature of the submissions are outlined below:

(a) Review of submissions to the Climate Change Authority, which is a statutory body which was established to provide independent expert advice on Australian Government climate change mitigation initiatives (Climate Change Authority, 2012). The reports were downloaded from its website. The most recent report, *Special Review on power system security, electricity prices and emission reductions (2017),* was designed to provide advice on policies to enhance power system security and to reduce electricity prices consistent with achieving Australia's emission reduction targets in the Paris Agreement. Previous submissions were as follows: *Draft report on Australia' climate policy options (2015); Comparing emissions reduction policies for the electricity sector (2015); Australia's future emissions reduction targets (2015); 2014 Renewable Energy Target Review; Targets and Progress Review (2013) and the 2012 Renewable Energy Target Review* (Climate Change Authority, 2017).

(b) Submissions to the Department of Industry and Environment under the *Independent Review into the Future Security of the National Electricity Market*. The purpose of the consultation was to provide advice on policies to enhance power system security and to reduce electricity prices consistent with achieving Australia's emission reduction targets in the Paris Agreement. More than 360 submissions were received and all submissions were published on the authority's website in 2016. (Commonwealth of Australia, 2017).

(c) Submissions to the Federal Government (the Senate Standing Committee on Environment and Communications) on the Closure of Coal Fired Power Stations (2016). This was an inquiry into the case for planned closure of coal-fired power stations, policy mechanisms to encourage the retirement of coal-fired power stations from the National Electricity Market (NEM), and policy mechanisms to provide a just transition for affected workers and communities. The total number of submissions was 139 and they were obtained from a government website (Parliament of Australia, 2017).

Sample

The sample consisted of the following:

(1) Mining sector (n=15):

- The Minerals Council of Australia[i] which represents Australia's exploration, mining and minerals processing industry, nationally and internationally
- Rio Tinto, a global producer of minerals and metals and a major energy-intensive business
- BHB Billiton – has an extensive presence in Australia, including metallurgical coal assets (used for steel-making), known as Queensland Coal, and it is a major consumer of electricity from the NEM.

(2) Business (n=10):

- The Business Council of Australia (BCA), which brings together the chief executives of more than 100 of Australia's leading companies, including mining, retail, manufacturing, infrastructure, information technology, financial services and banking, energy, professional services, transport and telecommunications.
- The Australian Chamber of Commerce & Industry (ACCI) which is a leading national association representing the interests of Australian business, including SMEs. It includes comprises state and territory chambers of commerce and national industry associations

(3) Utilities, energy associations and electricity generators with assets in Queensland (n=20):

- Stanwell is a Queensland Government owned generator, which has the capacity to supply more than 45 per cent of the state's peak power needs. Stanwell is a diversified energy company, with an energy portfolio comprising coal, gas, diesel and hydro power generation facilities geographically dispersed across Queensland. It owns a coal fired station (black coal) in Queensland. Coal production and power generation is integrated within a single business.
- Ergon, a retail entity and distribution network service provider in Queensland
- The Australian Energy Council - represents the policy positions of Chief Executives of electricity and downstream natural gas businesses operating in wholesale and retail energy markets. These

businesses collectively generate the majority of electricity in Australia. These businesses own and operate billions in assets, are large employers and significant contributors to the nation's Gross Domestic Product. It includes the former *Energy Supply Association of Australia* (ESAA)[ii]; the *Energy Retailers Association of Australia* (ERAA), which is the peak body representing the core of Australia's energy retail organisations and the *Energy Network Association* (ENA), the peak body for Australia's electricity transmission and distribution and gas distribution businesses.

Data analysis

A qualitative research method has been used for this study in order to collect, structure, and analyse the written submissions. The submission was the unit of analysis for the study. The submissions, which were all pdf files, were entered into the NVivo qualitative statistical package. It is worth-mentioning that although NVivo was used in managing the coding process, all coding was performed manually, with the written responses interpreted in context rather than as target words or phrases. This allows for nuance and greater understanding. The identification of themes, which refers to elements identified from text, such as words, phrases and arguments, is endemic in qualitative research. The guidelines offered by Bazeley (2009) for performing high quality analysis were adopted such as using comparison and pattern analysis to refine themes; using divergent views and negative cases to challenge generalisations and returning to the theoretical literature.

There are two main methodological approaches to identifying themes: inductive – the identification of themes occurs as the researcher is reading and analysing the texts, associated with grounded theory approaches (Glaser and Strauss, 1999) and deductive – the themes are defined before the content analysis is conducted. The literature on renewable energy is extensive and it was used to inform the themes and a provisional 'starting list' of codes was created, such as economic burden; climate change and energy security. Identifying these themes a priori assisted the researcher to move the raw data from general to more specific themes. After the first round of coding, all textual data was re-analysed and new codes were developed. For example, several authors of the submissions mentioned the importance of adopting a 'technology neutral' approach so the literature was revisited and this became a new theme. The process followed the guidelines of Miles and Huberman (1994) being comparative and iterative in nature.

Limitations of research methodology

There are some drawbacks associated with the use of written statements. Firstly, submissions are not always influential and although reports which draw on submissions are tabled in parliament, they are not binding on the government (Singleton et al., 2003). Smith and Weller (1978, p. 3) bluntly described one function of a public inquiry as "*to show concern about a subject without actually having to do anything*", and that "*such inquiries may have a large symbolic content… to allow the expression of grievances*". Hence, pressure groups need to be mindful of this before committing resources to submission-writing (Hall & Taplin, 2008). Secondly, a key challenge is engaging the participation of key stakeholders and ensuring all voices are heard. The submissions may not be representative of the broader constituency (Brackertz and Meredyth, 2008). Thirdly, consistent with legitimacy theory (Dowling and Pfeffer, 1975), companies may choose to soften, or withhold, statements that could threaten their legitimacy or that could create negative reactions from stakeholders reading the reports.

INSERT TABLE 1 HERE

Findings

The following section discusses six themes: economic burden; inconsistent policy framework and technology neutrality; climate change; energy security and technological progress in fossil fuels and in renewable energy. These themes are summarised below in Table 2. These themes are also addressed in the discussions section and linked to the theoretical framework on acceptance (see Figure 2).

INSERT TABLE 2 HERE

Theme 1: Economic burden

The argument that climate policies and RE targets could damage the economy were prevalent in the submissions. There were 136 references in total. Ergon Energy suggested that higher RE targets, supported by subsidies, would result in higher electricity costs for consumers. The Minerals Council of Australia (2017, p. 8) stated that "*In just over a decade, Australia has moved from having some of lowest cost electricity and gas in the OECD to among the most expensive...The independent review appears to accept price rises to this point as inevitable, yet fails to appreciate the very real impact this will have on Australia's international competitiveness over the next decade."* Electricity price rises were linked to government policies designed to decarbonise electricity supply, the entry of intermittent generation into the market, the closure of baseload power generation and the subsequent high levels of systems integration costs (i.e., the grid and transmission cost involved in integrating intermittent power and balancing supply and demand). The Australian Energy Council attributed electricity price rises to several factors, such as the increasing cost of supply, rising prices for key fuels such as gas and coal, rising infrastructure costs and the increased cost of meeting peak demand events. Retail schemes that subsidised the cost of electricity to vulnerable groups and regional communities were also mentioned.

The ramifications of reduced energy affordability for the Australian economy were outlined in depth, such as detrimental impact on future investment decisions by the minerals sector, erosion of competitive advantage by Australian business (who historically have benefited from affordable energy prices) and on the energy–intensive sector. BHP Billiton emphasised that it is a producer of energy, but also a major use of electricity, and that electricity price increases challenges its ability to be globally competitive (BHP Billiton, 2017). The Minerals Council (2017) warns of investment moving overseas if rising energy prices are not tackled. The environment versus the economy frame are captured in the following quotation by the Australian Chamber of Commerce (2017, p. 8): "*The review acknowledges much public discussion about Australia needing a better integrated energy and climate policy…the answer should not mean that we pursue security or climate policies that cause unsustainably high levels of electricity prices that places a disproportionate cost on business*". The business sector saw the deployment of renewables as a tax on electricity, an essential business input. The Coal Association (2012) notes that coal provides low cost electricity and that it is partly due to the externality of their permissions being unpriced. The adverse impact of an energy transition on coal workers was also mentioned. The Energy Supply Association claimed that the onus was on government to create opportunities for displaced workers and affected communities, if an energy transition resulted in the exit of coal-fired power stations.

The coal and minerals industry saw a minor and complimentary role for RE in the energy system, but didn't see it as displacing coal-fired electricity. The Minerals Council (2017, p. 17) argued that "*The notion of a transition is a distraction. It has become synonymous with 100% renewable energy. There is no evidence that this is even possible let along inevitable…Policy should not be focused on creating a pathway to some pre-ordained energy mix destination in 2050. Distributed energy can be an important component but artificially incentivising it likely reduces the use and value of the existing network."* The Australian Coal Association (2012, p. 2) stressed the centrality of coal to Australia's economy and argued for the continued exploitation of abundant coal resources, in which Australia had a comparative advantage: "*The continued use of coal is integral to national competitiveness, employment and prosperity. Not only does coal underpin our standard of living, it also underpins the competitiveness of Australian industry…*" The following statement shows that coal industry did not foresee the large-scale exit of coal-fired power from energy systems. According to the Coal Association (2012, p, 10), *"There is little scope – at least at present – for economies to replace a*

significant fraction of their fossil fuel energy; most of the benefits of modern life, including transport, industry, heating and cooling, require a secure, affordable and uninterrupted supply of energy."

Theme 2: Inconsistent policy framework and technology neutrality

The submissions were deeply critical of inconsistent government policy. The Australian Energy Council (2017) stated that investment in new generation was impaired by policy uncertainty. They argued that there was a mismatch between commonwealth and state policies (e.g. state-based RE targets, state bans on gas development) and called for a durable, stable and integrated national climate and energy strategy, along with greater cooperation between state and federal policies and both major parties. Likewise, the Business Council of Australia (2017, p. 5) stated that "*electricity infrastructure involves capital intensive, long-lived assets and stable policy settings, and clear market price signals are critical to support investor confidence. Policies that suddenly shift from one place to another or see governments entering markets risk jeopardising, or at the very least confusing, this investment".* Likewise, the Australian Chamber of Commerce advocated for a single, bipartisan, consistent national response to climate change policy. They argued that multiple local, state and federal schemes imposed compliance costs on business and could distort the effect of a national market-based scheme. There was consensus that the principle of 'technology neutrality' should be embedded in climate change and energy policies. There many calls for the repeal of state-based renewable energy targets on the grounds that they drove up electricity cost and compromised energy security. It was argued by the Business Council that RE targets were not aligned with the principle of technology neutrality. The Australian Chamber of Commerce argued that technologies should have equal footing in being able to demonstrate that they can be cost-effective and deliver against integrated climate and energy objectives. Likewise, the Business Council argued that a range of electricity generation technologies are needed to meet emissions reduction targets and that no options, including coal or gas-fired generation, should be excluded from the energy mix. Both the Minerals Council and the Business Council argued that nuclear power should not be ignored.

Theme 3: Climate change

The stakeholders concerned did not dispute the scientific evidence for climate change. There was acceptance of the Paris Agreement and there was broad consensus that emissions had to be reduced in the energy sector. However, there was no mention of ethics, i.e., that mitigating climate change was the morally correct thing to do for future generations. There was support for putting a price on carbon emissions for the electricity sector, which could result in a range of generation technologies (including coal, wind, solar, gas, hydro) being implemented and offered to the market. This was favoured over RET, which was seen as a costly approach to carbon abatement. However, the perceived limitations of the Paris Climate agreement were outlined, such as the lack of a "*robust global agreement*" (Business Council of Australia, 2012, p. 10) and the inability to credibly verify the domestic action of major emitters. Both the Business Council of Australia (2013, p. 13) and the Minerals Council highlighted the importance of countries bearing their *"fair share"* of the economic burden posed by global climate change negotiations. Both groups argued that Australia's per capita emissions are high since it is measured on a production basis and not on the basis of consumption. It was argued that "*a narrative needs to be developed around our national differences"* (i.e., its resource endowments and the pace of economic and population growth) and that Australia's burden of abatement should be "*fair"* and no greater than the burdens borne by other advanced countries, as measured by the impact on GDP (Business Council of Australia, 2013, p.1). The Minerals Council argued that heavy energy users should be shielded or compensated for the costs of mitigation, to address the failure of trading partners to adopt similar policies. The business sector argued that Australia should pursue national self-interest and adopt a cautious and conservative approach to climate change policy. Likewise the Minerals Council stated that a measured transition to a low emissions economy was needed. A commonly used phrase was '*low-cost*' in the context of carbon abatement and climate change. For instance, Stanwell (2014, p.1) supported "*efficient, industry-wide emissions abatement at least cost to the Australian economy".* The Business Council favoured climate adaptation options that would deliver the lowest possible cost to the Australian economy. There were calls for economic modelling on the effects of climate change on the Australian economy. While the need to reduce emissions was acknowledged, the Mining and Business sectors made little or no reference to the costs of dangerous climate change to business, which contrasted with the utilities/energy sector. Energy Networks Australia

(2017) did address climate risk in its submission and the Australian Energy Council (2017) also acknowledged that climate risk was becoming a financial problem.

Theme 4: Energy Security

The variable, intermittent nature of renewables was emphasised. This was linked to high system costs. Rio Tinto argued that the variability and uncertainty of intermittent renewables required power stations to hold more operating reserves to ensure that demand for electricity could be met at all times, which had to be maintained and paid for. Vigorous technical arguments are put forward by the Minerals Council to support the role of coal in the energy mix. It is claimed that there is a lack of understanding of electricity and the role played by fossil fuels (gas, coal-fired plants, hydro) in the energy mix. The Australian Coal Association (2012, p.6) emphasised the unique attributes of coal, stating that "*Coal is Australia's principal source of competitively priced, reliable baseload power underpinning energy security domestically. There is no other fuel – fossil or renewable – that can perform this competitive role in the power generation mix".* The Australian Energy Council supported more renewable energy to reduce emissions and, unlike coal, did not blame renewables for the energy security problem, remarking that this was a planning and policy problem. Moratoria and outright prohibitions, which are in place currently, on onshore petroleum exploration were sharply criticised in the submissions for driving higher electricity prices and weakening energy security. The Australian Energy Council argued that gas policy needed to address the lack of supply and recognise the technical services (e.g., inertia[iii] and frequency control) that gas generators provided to the NEM.

Theme 5: Technological progress in fossil fuels

Rio Tinto, BHB Billiton and the Minerals sector argued that 'clean coal' technologies, such as high efficiency, low emissions coal (HELE) and carbon capture and storage (CCS), would play a vital role in meeting emissions reduction goals cost-effectively. They argued that a focus on clean coal technology was pragmatic, given Australia's endowment of coal and the fact that coal accounted for two thirds of Australia's electricity. They referred to coal levies that support research in this area and cited their achievements. They claimed that government spending was best focused on research and development. Likewise, the business sector recognised that providers of fossil fuels had a role to play in reducing emissions, and they acknowledged that the costs of CCS were very high.

Theme 6: Technological progress in renewables

There were several references to technological developments in the energy sector, including electric vehicles, digital metering and battery storage, and how technology could reduce per capita electricity consumption, emissions and costs. The Australian Energy Council agreed that renewables, with additional technology, could potentially offer ancillary services to the grid, and make intermittent renewables less intermittent. BHB Billiton stated that the development of large-scale battery storage had the potential to improve stability of supply as the contribution of intermittent renewable generation increased. The Business Council of Australia stated that an energy transition would be supported by technological disruption, but warned that a transition would be risky and costly, unless the performance and costs of grid-scale solar energy and battery storage dropped even faster than expected.

Discussion

In this paper, we have attempted to identify the level of acceptance for an energy transition in Australia. Socio-political acceptance is present but exists at a low level. Figure 2 shows how key stakeholders seek to defend their positions and legitimise their business goals. Submissions highlighted the centrality of fossil fuels to the Australian economy and society. There were common patterns in the submissions around an energy transition. There were numerous references to energy security, the variability or 'intermittency' of renewable energy sources, the sharp rise in electricity prices and the ways in which a transition was affecting, and could alter, the Australian economy. The business sector, in particular, was first and foremost guided by economic concerns, with deep concern over electricity price rises. There was considerable resistance to ambitious RET targets from this quarter. From the literature, there is an argument that coal

assets risk becoming stranded[iv], which means that operating mines only covering their marginal costs, and subsequently fail to provide a sufficient return on investment (Kallies, 2016). If a renewable energy transition is realised, and the increase in renewables comes at the cost of coal-fired electricity, coal plants would exit the marketplace and this would push up prices in the short term. Indeed, the high uptake of wind in South Australia, has been one of the main reasons for the closure of the last existing coal-fired power station in the state (Kallies, 2016). Molyneaux et al., (2013) suggest that many groups "*share the view that renewable energy is too expensive and unreliable to be a major component of the energy generated to meet demand".* Others note that while there are significant challenges involved with balancing supply and demand in an electricity system with high levels of variable or intermittent energy sources (Qvenild et al., 2015), these challenges are not insurmountable barriers. Wolsink (2013) notes that the intermittency of renewable sources is not a technological failure relating to their performance, but reflects a lack of socio-political acceptance to include externalities in electricity prices.

INSERT FIGURE 2 HERE

All key interest groups accepted the Paris Agreement and the international community's stated intention to limit global warming to 2°C. BHP Billiton supported emissions reduction targets, either on an economy wide or a sector-by-sector basis. Both the energy supply association and the business sector supported an integrated climate and energy policy to help Australia meets its commitments. Bulkelery (2000) notes that the coal sector accepts human-induced climate change and the submissions support this finding. Yet, business and industry attach many caveats to an energy transition and do not accept a world 'beyond coal'. They are unlikely to support Australia's efforts to decarbonise its energy systems, if the perceived economic risks become too high. State-based RE targets were seen as costly forms of abatement, a means of favouring one technology over another and an example of policy inconsistency. However, RE targets enabled "*the states to innovate on emissions abatement where the federal government has been recalcitrant*" (Crowley, 2007, p. 124). Writers take the position, like some scholars (Edenhofer & Flachsland, 2013), that national action, in the absence of global agreement, will not be effective and efficient in managing climate change. With the withdrawal of the US from the Paris agreement and attempts to legitimise 'climate skeptics' or 'denialists', (Foran, 2016), it is possible that support for an emissions trading scheme may wane in Australia. McDonald (2005, p. 153) notes that Australia is a ready follower of the US due to *"a particular conception of Australian history, culture, identity and values".* The 'environment versus the economy' frame found in the submissions is not surprising. There has been considerable analysis of Australia's self-interested behaviour in relation to global climate agreement and the drive to protect its fossil fuel industry (Crowley, 2007). According to Verbong and Geels (2007, p. 1036), "*environmental problems are receiving more attention in the regime, but in terms of guiding principles, they rank below the issues of low cost (as part of industrial policy), reliability, and diversification"*.

The data suggests that debates about renewable energy are characterised by the normalisation of certain perspectives ('cost to the economy versus climate change mitigation') and others are absent, silent or de-legitimised. The externalities linked with the large scale coal extraction, such as loss of biodiversity, water shortages, environmental damage to agricultural land and depopulation of communities (Connor, 2016) were largely ignored in the submissions. Likewise, business risk associated with climate change was downplayed by key actors, such as mining and the business sector. For instance, damage to energy infrastructure from extreme weather events is a risk factor. Furthermore, it is proposed that company directors who do not properly consider climate change related risks could be held legally liable for breaching their duty of due care and diligence (McLeod & Wiseman, 2016).

Political scholars tend to portray the fossil fuel sector as a powerful lobby group in society, and argue that big business has 'structural power', because states depend on industries to provide jobs, taxes, economic growth and dynamism (Newell & Paterson, 1998, p. 691). This power of incumbents has been noted previously with concepts such as the 'techno-institutional complex' (Unruh, 2000, p. 817); the 'hegemonic power' of fossil fuels (Evans & Phelan, 2016, p. 331) and 'carbon capital' (Urry, 2014, p. 15). Geels (2014, p. 35) argues that existing regime actors must be conceptualised as "*actively resisting fundamental change, rather than as locked-in and inert*". Likewise Baer (2016, p. 199) notes that "*the capacity of the coal mining sector to translate relatively marginal economic power into political influence to maintain and extend*

structures of advantage in state policy, is remarkable". While the coal lobby has considerable power, this study suggests that changes are taking place and that there is a certain level of acceptance for a transition to renewable energy. Such a transition is unlikely to occur in fossil-fuel dependent economies if the concerns of incumbent regimes are not addressed. Probably the most important question is under what conditions are the key actors willing to accept an energy transition? The answer is a 'measured' or slow energy transition, and market based measures that are technology neutral and that promote lowest cost abatement. Furthermore, the submissions were deeply critical of the uncertain policy framework surrounding the energy market. Lack of policy certainty was seen as a factor that inhibited investment and undermined energy security. The lack of a co-ordinated, co-operative approach to dealing with energy is a well-established theme in the literature (Jones, 2009). The call for a 'technology neutral' approach by policy makers is common in the submissions. The Minerals sector argues that the market should decide about low-carbon innovations, such as HELE and carbon capture and storage (CSS) technologies. The author of the Garnaut Review (2008) (who was commissioned by the Australian Government to provide independent advice on climate change) considers that these arguments are adequate and that government incentives for investment in low-emissions technology and in demonstration projects are justified. Recently, the federal government announced that the Clean Energy Finance Corporation (CEFC) will be allowed to invest in CSS technologies (ESDNews, 2017). It is, however, a contentious issue with some experts arguing that these technologies are not yet commercially feasible (Steffen et al., 2017). Geels (2014) notes that while this ideological, 'hands-off' approach sounds neutral, it in effect means that the government privileges powerful regime actors with more capabilities, financial resources and established market positions. Likewise, Marshall (2016) notes that the clean coal discourse in Australia functions as a defence mechanism and is a distraction against tacking the connection between coal and climate change. Scholars argue that politicians are more interested in achieving a broad buy-in from key interest groups than in implementing efficient or optimal policies; hence they seek 'co-benefits' from policy instruments (Edenhofer et al., 2013b), such as jobs and the promise of emissions reduction.

There was support for a broad-based emissions trading scheme in the submissions and this sounds reasonable. Tackling emissions from other sectors such as transport and agriculture, and not just stationary energy, sounds rational. Yet, commentators have argued that *"There is a risk that Australia is not bold enough to rely on a market-based emissions trading scheme… There will be pressure from interests that stand to lose from high permit prices for caps on price that would compromise the emissions reduction objectives. Political resistance to the implications of carbon pricing on costs for some products may drive demands for truncation of sectoral coverage"* (Garnaut, 2008, p. 546). Buckman & Diesendorf (2010) note that while there are many areas where Australia could make major cuts in its GHG emissions, the most feasible are in electricity generation and use. Electricity is easier and less expensive to reform than other major sources of its emissions, such as agriculture and transport. It is also a prime target because electricity GHG emissions make up a larger proportion of Australia's national GHG emissions than they do for any other OECD country (i.e., due to its dependence on coal-fired electricity).

The concept of social acceptance (Wolsink, 2010) shows that coal dependence is not simply a technological or policy question, it is also a socio-political issue. This research presented a social acceptance framework to better understand the response of business and industry to an energy transition. Based on content analysis of submissions to the Australian government, we are somewhat pessimistic about the level of social acceptance for a major systems change in the electricity sector. One the one hand, there was consistent alignment of opinion on the need to tackle emissions at national level, but on the other hand, economic concerns came to the fore. The institutional framework that is needed to turn the promise of an energy transition into a reality will most likely be weak. It is imperative that federal and state government work together, along with the energy sector, to bring about the much needed policy certainty in the stationary energy sector. There is a risk that the current, carbon-intensive patterns of electricity generation in Australia will continue for some time to come. In the meantime, it is essential that public support for renewable energy (Eagle et al., 2017), along with social pressures arising from disaffected politicians, the Greens, the anti-coal movement, climate action groups and environmental NGOs (Baer, 2016), be harnessed so that the Australian economy can move to a world 'beyond coal'. There will eventually come a time when policy-makers will take measures at a national level to mitigate climate change which should facilitate a transition to renewable energy.

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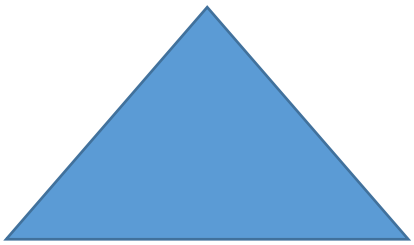
Figure 1: Three dimensions of social acceptance of renewable energy innovations

Socio-political acceptance
* of technologies, policies and institutional change
* by key stakeholders, the public, policy makers



Community Acceptance
* place attachment; landscape identity
* trust, fairness of process
* by resident, local authorities

Market acceptance
* of green tariffs, of new parties
* by consumers, investors

Source: Wolsink (2012) and Wüstenhagen, Wolsink & Bürer (2007)

Table 1: Details of submissions consulted for the content analysis

Organisation or industry association	Sector	Title of submissions	No.
Australian Energy Council	Energy	Climate Change Authority's Special Review Second Draft Report (2016). Independent Review into the Future Security of the National Electricity Market (2017). Retirement of Coal Fired Power Stations (2016, Nov)	3
Energy Supply Association of Australia (ESAA)	Energy	Climate Change Authority's (CCA) review of the Renewable Energy Target (2012, Sept). Climate Change Authority's (CCA) review of the Renewable Energy Target (RET) discussion paper (2012, Nov). Climate Change Authority's (CCA) draft report into reducing Australia's greenhouse gas emissions – Targets and Progress review (2013, Dec.). Climate Change Authority's (CCA) Caps and Targets Review Issues Paper (2013, June). Climate Change Authority's (CCA) special review into Australia's future emissions reduction goals (2015, March)	6
The Energy Retailers Association of Australia (ERAA)	Energy	Renewable Energy Target Review - Discussion Paper (2012, Nov) Renewable Energy Target Review - the Issues Paper (2012, Sept)	2
Energy Networks Australia (ENA)	Energy	Independent Review into the Future Security of the National Electricity Market (2017, March). Retirement of Coal Fired Power Stations (2016, Nov)	1
Energy Networks Association (ENA)	Energy	Climate Change Authority Review of the Renewable Energy Target (2014) Renewable Energy Target Review Issues Paper (2012, Sept) Response to the Climate Change Authority Review of the Renewable Energy Target (2014, Nov) Climate Change Special Review Second Draft Report on Australia's Policy Options (2016, March)	4
BHP Billiton	Mining	Submission on the Renewable Energy Target Review Issus Paper (2012) Independent Review into the Future Security of the National Electricity Market (2017).	2
Australian Chamber of Commerce and Industry	Business	Submission to the Climate Change Authority regarding the Caps and Targets Review Issues Paper (2013, June) Response to the Climate Change Authority's Second Draft Report: Australia's Climate Policy Options (2016, Feb). Submission to the Independent Review into the Future Security of the National Electricity Market (2017, March)	3
Business Council	Business	Submission to the Climate Change Authority Review of the Renewable Energy Target (2012, Sept.) Discussion paper on the Renewable Energy Target by Climate Change Authority (2012, Nov) Submission to the Climate Change Authority regarding the Caps and Targets Review Issues Paper (2013, June)	7

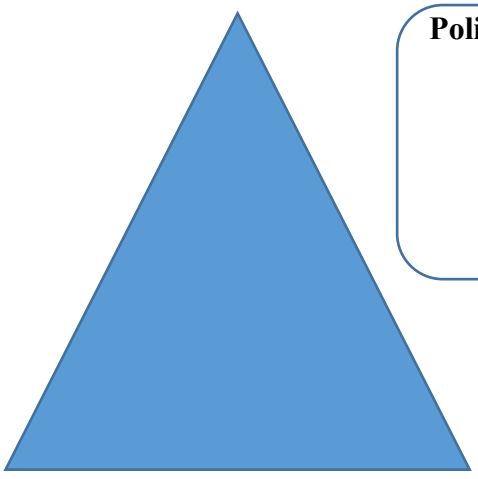
		Submission to the Climate Change Authority on the Reducing Australia's Greenhouse Gas Emissions: Targets and Progress Review Draft Report (2013, November). Modelling illustrative electricity sector emissions reduction policies: consultation paper (2015, June) Australia's Climate Policy Options, (2016, March) Independent Review into the Future Security of the National Electricity Market (2017, March).	
Australian Coal Association	Mining	Submission to the Review of the Renewable Energy Target (RET) Scheme's Discussion Paper (2012, Nov)	1
Minerals Council of Australia (MCA)	Mining	Renewable Energy Target Review (2012) Submission on the Issue Paper for the Climate Change Authority's 2014 Caps and Targets Review (2013, May) Submission to the Review of the Renewable Energy Target (2014, May) Letter in relation to upcoming review of RET (Oct, 2014) Submission to the Climate Change Authority's Special Review (2015, March) Report by Trading Nation prepared for the MCA in relation to Climate Change Authority's Special Review (2015, March) Submission to the Climate Change Authority's Special Review Second Draft Report (2016, Feb) Submission to the Inquiry into the Retirement of Coal Fired Power Stations (2016, Nov). Submission to the Independent Review into the Future Security of the National Electricity Market (2017, March)	9
Rio Tinto	Mining	Submission to the Climate Change Authority's Review of the Renewable Energy Target (RET) Issues Paper (2012, Sept). Feedback on the Climate Change Authority's Renewable Energy Target (RET) Review Discussion paper (2012, Nov). Special Review – Australia's Climate Policy Options (2016, Feb).	3
Stanwell	Energy	Submission to the Climate Change Authority's 2014 Renewable Energy Target (RET) Review (2014). Renewable Energy Target (RET) Review Discussion Paper (2012, Nov).	2
Ergon	Energy	Climate Change Authority's – Renewable Energy Target Review Issues Paper (2012, Sept)	2
	Total number of submissions:		45

Table 2: Key themes relating to climate change and energy policy

Theme	Description	No. of references	Exemplary quotes
Economic burden	An energy transition is too costly for industry, reduces competitiveness and increases electricity prices. Australia has comparative advantages in fossil fuels and gas. Coal is essential to Australian economy.	136	The "transition from the mining investment boom" narrative resonates among the public as a transition away from mining full stop. This is incorrect and emboldens the opponents of resources whilst providing public misinformation that resources and mining are not important to Australia's economic future (Association of Mining and Exploration Companies, 2017, p.1)
Policy framework	Investment in energy is hampered due to inconsistent policy and failures in government energy policy, need for technology-neutral approach. Calls to repeal renewable energy targets.	99	Recent price and reliability events are not the result of the electricity market failing, but the result of sustained policy interference. The market has been signalling new generation to enter the market, but this investment remains impaired by sustained national policy uncertainty and arbitrary constraints on gas supplies (Australian Energy Council, 2017, p.1)
Climate change	Support for the Paris Climate Agreement; criticisms of the global agreement, proposals and strategies relating to emissions reduction	46	We believe the world must pursue the twin objectives of limiting climate change to the lower end of the IPCC emission scenarios in line with current international agreements, while providing access to reliable and affordable energy to support economic development and improved living standards (BHP Billiton, 2017, p. 9)
Energy security	Fossil fuels are a way of protecting the nation's energy security and help overcome the intermittent nature of RE	36	Recent concern has emerged about how characteristics of renewable energy come at a cost to system security. The levelised cost of electricity from renewable projects does not factor in external costs, and hence investment decisions continue without regard to the impact on system security (The Australian Chamber of Commerce and Industry, 2017)
Technological progress in fossil fuels	Australia should support the testing and deployment of Carbon Capture and Storage (CCS) technology or HELE (high efficiency, low emissions technology) technology (i.e., clean coal).	22	Carbon capture and storage is essential to reducing emissions from the use of fossil fuels – including both coal and gas – yet it is discriminated against by the RET and other complementary measures such as the Clean Energy Finance Corporation (Australian Coal Association, 2012, p. 1)
Technological progress in renewable energy and	Technological progress will solve some of the current problems in Australia's energy sector	21	Innovation in the electricity market has tended to focus around new types of generation and opportunities for storage. This has resulted in the exploration of

wider energy sector			new zero or low emissions technologies including, but not limited to, wind, solar PV, solar thermal, geothermal, wave energy, carbon sequestration, new chemical storage technologies and a range of physical storage technologies including molten salts and pumped hydro. These reflect the growing need to provide reliable and cost-effective electricity at scale with reduced greenhouse emissions… More broadly, the potential for innovations to impact the electricity market are almost limitless (The Australian Energy Council, p. 9)

Figure 2: Market and political dimensions of social acceptance



Political and market acceptance

* of zero- and reduced-emissions energy technologies
* of policies (eg., Paris Agreement, RE targets, carbon pricing) and institutional change (reform of NEM, sustainability norms in addition to energy security and affordability norms)
* by key stakeholders – government, mining, business, utilities, energy

Source of resistance/arguments

* priority placed on energy supply security
* priority placed on safeguarding the economy
* perceived lack of understanding on economic costs of transitioning away from fossil fuels
* perceived need for modelling of the costs-benefits of transitioning to a low carbon economy
* perceived fairness of process, e.g., technology-neutral, access to R&D funding, sharing the carbon burden
* mechanisms for industry to give feedback on emissions targets (i.e., to avoid overshooting the target)
* perceived ignorance of public on electricity generation
* perceived ignorance of the role played by coal in energy security
* recognition of complexity of electricity system
* recognition that coal provides essential technical services to grid
* recognition of coal's positive contribution to economy
* recognition of Australia's uniqueness in global climate change agreements
* perceived limitations of RE targets at state level and federal/state inconsistency
* mechanisms for input into setting of RE targets (e.g., percentage figure of national generation or fixed GWH figure)
* perceived limitations of Paris agreement
* measured energy transition
* cautious action on climate change adaptation
* appropriate balance between energy affordability, security and low emissions objectives (energy trilemma)
* support for a broad-ranging emissions trading scheme and lowest cost emissions-abatement policy
* priority placed on a consistent policy framework
* perceptions of low security for private investors due to uncertain government policy (e.g. returns)
* claims that innovation and expert knowledge will address emissions (i.e., HELE)
* claims that prior investments (i.e., coal gasification, CCT) shows commitment to climate change mitigation

Source: Adapted from Wolsink (2012) and Wüstenhagen, Wolsink & Bürer (2007)

[i] The Minerals Council of Australia (MCA) also includes the Australian Coal Association (ACA), which ceased its operations and was integrated with the MCA in 2013.
[ii] The Energy Supply Association of Australia (ESAA) ceased operating in 2016 and merged with the Australian Energy Council and Energy Networks Australia.
[iii] Certain types of power plants and energy storage systems provide "inertia" which helps to maintain power when supply and demand become unbalanced, or unequal over short time periods (Climate Council, 2017b).
[iv] A 'stranded asset' is defined as an "asset that has suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities, and it can be caused by a range of environment-related risks". For example, carbon pricing, changing demand patterns in China and lower coal prices can increase the risk that infrastructure could become stranded assets (Caldecott et al. 2013, p. 7).