

Coal Exists, Therefore it Must be dug up: The Non-Imagining of Socio-Technical Change in the Hunter Valley, NSW, Australia

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Abstract

As one of the world's largest exporters of coal, Australia has been notoriously reticent to facilitate the technological transitions required to alleviate climate change. The influence of the mining lobby has been well documented, as have the machinations of successive governments, who have had little success in overcoming this influence, or determination to do so. Yet communities in coal mining regions of the Hunter Valley are increasingly, and actively, questioning the morality of the industry. From conflicts over land use, to the impacts that burning coal has on climate change, the coal industry is aware of the tenuous nature of its social license to operate. In response it has invested in campaigns which emphasise the role of the industry in building the local ecology: not only of the local regional economy, but also in building historical and cultural value, in an attempt to 'lock-in' mining's particular values and ethics. As the pressure on coal from international forces increases, this restrictive view is challenged, with the nation committed to the technologies of the past and left behind as others move towards cleaner sources of energy. Power and ethics shape not only visions of the future, but the capacity to engage with the likely social and physical outcomes of those actions.

Keywords: Climate Change, Risk Society, Socio-Technical Change, Imaginary, Australia

Introduction

Whether one is observing international negotiations, following domestic politics, or more localised initiatives, debates over climate change policy seem indomitable. Tensions arise over the imposition of restraints on greenhouse gas intensive production, attempts to increase costs for polluting activities, and even developments of cleaner, renewable, sources of energy. At the same time, annual reports such as those from the World Meteorological Organisation (2021) show ongoing increases in global temperature trends, intense

weather patterns, and the beginnings of what are known as tipping points. These tipping points are of particular concern as they indicate worsening trends and are somewhat difficult to model. While uncertainties are inherent in a complex system such as the Earth's climate, the indications are increasingly dire; the time for humanity to adjust the greenhouse intensity of our economy is running out.

A key question of concern is how it got to this point. We know that the long history of climate



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negotiations has been countered with industry denial – for example, the first World Climate Conference was held as far back as 1979, around the same time that it's now known Exxon Mobil had been hiding evidence of its knowledge of climate change and mobilising industries against potential regulation (Supran and Oreskes, 2020; World Meteorological Organization, 1979). As these international debates were successfully slowed by industry, in Australia, where this research was carried out, the key industry to campaign against action on climate change has been the coal industry, which was revealed to have been drafting government policies in the 1990s (Pearse, 2007). While many of the debates about the veracity of climate science have since been subdued, how to respond to the increasing urgency of the issue is yet to be resolved (Wright et al., 2021). Using data collected at the height of what is now known as the first wave of climate policy debates in Australia, this paper reflects on the positioning of industry within the public discourse on climate responses. I argue that the industry representatives articulated a moral and technical position which obscures the ability to reimagine the future, carbon-constrained world required to respond to climate change.

The research presented here was carried out between 2010 and 2011, a period of intense debate over the implementation of a price on carbon. Attempts to implement the policy were controversial from the start, with the first proposed emissions trading scheme being rejected by the Australian parliament in 2009. The second scheme was in place for only two years before being repealed in July 2014, alongside a wide range of other government initiatives aimed at reducing Australia's greenhouse gases (Chan, 2012). A primary driver of resistance to both policies came from business – in particular those which are greenhouse intensive, and therefore were likely to be pushed to change practices or suffer economic consequences. Precisely because of its emissions intensity, the coal industry had been the focus of both environmental campaigns and government policies aimed at curbing greenhouse gases. It is, of course, this fact which landed the industry at the centre of the debates around implementing a price on carbon in Australia. Supported by the

broader business community, these industries – primarily coal and aluminium – engaged in intense lobbying and public relations campaigns to argue that, because they were trade exposed, they would unfairly have to bear the cost of a price on carbon (Drape, 2011; AAP, 2009). Relying on a moral position of the need to maintain the comforts that have come to be expected in rich, Western nations through continued economic growth (Dahlgren, 2021), the industry set much of the terms of the debates which are yet to be resolved (Wright et al., 2021; Hamilton et al., 2023).

Following the arguments of industry leaders reveals an epistemological position which emphasises the complexities and uncertainties of responding to climate change, sometimes to the point of denial (Norgaard, 2011). These tensions over the level of certainty required in order to be able to calculate the risks of climate change play out in the ethical positioning of the debate, with the fossil fuel industry arguing that any limitations on its use will result in dire economic consequences. As Daggett (2019: 11) has shown, these assumptions – of an inherent linkage between economic growth, “the comforts and pleasures of modern life”, and productivity – have a historical and ideological basis in the dominance of Western trade and industry. Understood through the lens of the Protestant work ethic, the use of fossil fuels to produce energy is seen in light of God's beneficence – to leave them in ground, as some environmentalists might have one do, would be a waste (Daggett, 2019). These positions play out in climate policy discussions ad nauseam — a dynamic which leads to public fatigue and policy initiatives remaining in limbo. In this regard, the debates reveal a lack of both a shared imagination of the future and of a moral cosmology; a vast space of difference which undoubtedly needs to be overcome in order to avoid the worst consequences of climate change.

While the neoliberal program appears to have become established consensus among Western nation leaders, risks such as climate change threaten to challenge many of the moral and technical assumptions within this way of thinking. As outlined by Beck (1992; 2009), the processes of industrialisation, assisted and sped up within the

context of neoliberalism, have been so successful as to create what he called the ‘risk society’:

One can virtually say that the constellations of risk society are produced because the certitudes of industrial society (the consensus for progress or the abstraction of ecological effects and hazards) dominate the thought and action of people and institutions in industrial society.... Cumulatively and latently, [autonomised modernisation processes] produce threats which call into question and eventually destroy the foundations of industrial society. (Beck, 1994: 5)

Beck argues that climate change signals a need for a green modernity that “will have to include a new vision of prosperity which will not be the economic growth held by those worshipping at the altar of the market” (Beck, 2010a: 262) and that “the dynamic of the world risk society must count as a historical refutation of the neoliberal conception of the minimal state” (Beck, 2009: 63). At the same time, however, Beck and proponents of ecological modernisation (Mol and Spaargaren, 2000) argue that it is possible to decouple economic growth from environmentally damaging practices; a moral positioning which suggests that it is only the kind of consumption and production which needs to change, rather than economic growth per se. Through this conception, then, the possibility for socio-technical change becomes a key focus.

Imagining sociotechnical change in Australia: competing conceptions of risk

A key part of the framework for the transition to a low-carbon economy involves the creation of new ‘sociotechnical energy imaginaries’ – a term which describes “collective visions of desirable and feasible (technoscientific) futures” (Ballo, 2015: 9). These imaginaries are embedded in national history, culture, politics and technological structures (Ballo, 2015; Jasanoff and Kim, 2013). The difficulties of such transitions are well recognised. They relate not only to the technical, physical infrastructure – which itself is just as enmeshed in landscapes and the social imagination as it is in the physical requirements of energy generation and distribution (Urry, 2014). Sociotechnical

energy imaginaries also present the potential of changes to everyday patterns of economic and social life. These changes, argue Jasanoff and Kim (2013: 189), involve a reconfiguration of the “physical deep structures of civilisation [and our] social infrastructures”, and become enmeshed in political and ethical struggles. In Australia, these struggles have involved a challenge to the prominent – and dominating – coal industry. The industry is so deeply enmeshed in the energy imaginary of the nation that competing views have been fiercely contested by both the industry as well as conservative politicians (Brett, 2020). These power relations have ultimately brought Australia’s climate policy to a ten year impasse, with even the smallest changes and support for renewables fiercely resisted (Crowley, 2017; Crowley, 2021).

There is little doubt that any moves towards a low-carbon society require a shared vision of the future of energy generation in which coal plays a minimal and steadily decreasing role. Numerous environmental organisations, academics, and left-leaning think tanks have produced models intended to show that this is possible. The general pattern is a slow downwards trajectory for coal, often with gas as a transitional source of electricity, while renewable energy, energy efficiency measures and the required technical changes to the electricity grid are rolled out to eventually replace coal (Garnaut, 2008; Teske et al., 2016; Spratt and Sutton, 2008). These models overwhelmingly argue that the economic benefits of following such a program are clear – primarily pointing out that there are more jobs in renewable energy per kilowatt of electricity produced, and that the costs of climate change impacts will become worse the longer the issue is ignored. These arguments are framed to counter concerns about the economy under a new electricity regime, providing what is seen (by the proposers) to be a rational voice in an attempt to shift the framings of the environment movement (which is often accused of being overly emotive and dystopian). Perhaps with the exception of *Climate Code Red* (Spratt and Sutton, 2008), which argued for an ‘emergency response’ from government, the overall narrative of these models is a steady,

gradual and measured change which will have minimum impact on people's everyday lives.

These contrasting narratives within the environment movement reveal the moral imperatives within climate change, whereby some feel a need to reconcile environmental hazards with existing expectations of the economy, while others see the two as fundamentally opposed. One aspect of this may be that the notion that the transition to a low-carbon economy will be as painless and smooth as sometimes claimed is often contested, even from those concerned about climate change (see, for instance Trainer, 2007; Leahy, 2008). In this way, these sections of the environment movement support the moral stance put forward by business – that the avoidance of any 'pain' involved in mitigating climate change is not worth the trouble. However, the winding back of climate mitigation legislation in Australia suggests that neither argument has been successful in engaging the kinds of leadership necessary for even a small step towards this change.

The difficulty may be that while some parts of the environment movement maintain that climate change can be mitigated without impacting on the lifestyle expectations within rich, Western nations, powerful sections of business and industry have historically suggested that it cannot. This view has been heavily promoted by the coal industry, with advertising campaigns which imply that even the everyday basics of survival in Western societies are not possible without coal. For instance, campaign slogans over the past decade have included; 'Life. Brought to you by coal' emphasising the ways in which every day appliances make use of coal fired electricity (Frew, 2007), "Coal. It's an amazing thing" attempting to link coal to jobs, the economy and the future by claiming it is becoming more efficient (Milman, 2015) – and later in 2017 "Coal: Making the future possible" (Remeikis, 2018). This discourse, combined with any level of doubt about the science of climate change, situates the decisions of leaders – and those who vote for them – within a moral conundrum; it argues that people are likely to suffer if we make changes, that those suffering most will be the worst off, and, importantly, that this suffering may, in fact, be for no reason at all. As former Australian prime

minister (then Opposition leader) Tony Abbott said, the price on carbon is "a so-called market in the non-delivery of an invisible substance to no-one" (in Cubby, 2013).

These debates are inherently linked to broader conceptions of justice, risk and technology, with differential outcomes dependent on these. For instance, as Jasanoff and Kim argue, in US government policy, risks are perceived as manageable, while "technology's benefits are seen as unbounded" (Jasanoff and Kim, 2013: 190) while the transition in Germany – which has been much faster – was steeped in a stronger risk aversion discourse that saw climate change as increasingly dangerous (Jasanoff and Kim, 2013: 192). It is the latter perception of risk which led Ulrich Beck to argue that modernity is turning on itself, with climate change being one of the more insidious outcomes (2009; 2010a; 2010b). This perception, of course, is also reflected in environmental concerns. Yet Beck appears to have underestimated another perception of risk – the risk of losing a comfortable lifestyle and the possibility of a painful transition – which manifests, with participants in this research at least – in a strong defence of the (destructive) coal industry. This position inevitably emphasises short term, social (economic) comfort and fairness over the longer term aims of protecting the environment. These kinds of statements are used to frame a moral position of 'energy justice' (Mundaca et al., 2018) – suggesting that the historical reliance on coal must continue in order to allow everyone access to energy, while on the other hand relying on the uncertainties of climate change to delay mitigation policies.

A fossil fuelled nation

The argument that Australia's economic prosperity is linked to coal is not something which has happened by accident; rather, it is a cornerstone of the industry's promotional strategy (Bowden, 2018). Australia is among the world's largest exporters of coal, a statistic made great use of by the industry to argue that the "coal industry plays a vital role in Australia's economy, energy security and community...", noting the "tens of millions of dollars" it contributes "annually

to fund community social infrastructure” (Minerals Council of Australia, n.d.) – despite the fact that the industry is also heavily subsidized (Parry et al., 2021). The coupling of the coal economy with community and social infrastructure is a strategy often deployed by mining industries to build community support for their social licence to operate and to build trust within the regions in which they operate.

In addition to investment in community projects, industry funded campaigns have sought to argue that the lifestyles people have come to expect in rich Western nations is dependent on coal (‘Life. Brought to you by Coal’), reframe coal as a modern technology (‘Coal: Making the future possible’) and perhaps most interestingly that ‘#coalisamazing’ (Milman, 2015). While the latter was pilloried on social media, the success of these strategies is evident in the ways in which coal is romanticised, not only by the industry itself, but by mainstream media, political leaders, unions and often workers (Pearse et al., 2013). Arguably, Australia’s response as the international community began to try and respond to the challenges of global climate change, was a prime example of the industry’s ability to intervene in the social and political landscape to make coal appear both inevitable and ethical (Bowden and Leahy, 2014; Bowden, 2018). The coal economy depends on political intervention and struggle.

In line with international negotiations, advocacy in defence of the Australian coal industry started in earnest under then Prime Minister John Howard, who argued that signing the Kyoto agreement was against the economic interests of the nation (Bulkeley, 2001). More recently, a number of politicians have revealed their preference for coal, sometimes in dramatic ways. In early 2017 the Federal treasurer (and now also former Prime Minister), Scott Morrison, gave a speech in parliament holding a lacquered lump of Hunter Valley coal (so he would not get coal dust over his hands and suit) and taunting his political opponents to not ‘fear’ it (Murphy, 2017a). Earlier the same year, Environment and Energy Minister Josh Frydenberg mounted a significant discursive campaign around the phrase ‘technology-neutral’ as means of shifting policy priorities away from renewable energy and back towards coal (Murphy,

2017b). This support for the industry can also be seen in the push from some conservatives for government support to build a new coal-fired power station (Clennell, 2017; Benson et al., 2018), and fierce opposition to the closing of existing ones for economic reasons (Crowe, 2017). These debates suggest that investment of the industry’s economic capital, in not only public relations and advertising, but also political donations and ‘social infrastructure’, has permeated the public and political discourse to the extent that imagining life without coal is seemingly impossible – it is in the ‘nature’ of the Australian national economy and its politics. The success of such strategies can be seen in the ongoing lack of effective climate policy in Australia.

This article uses a case study of business leaders in the carbon intensive region of the Hunter Valley, New South Wales, Australia to outline the key discourses engaged by the business community to resist action on climate change. It finds a strong, ingrained resistance to moving away from coal, which goes beyond articulations about the need for sociotechnical change and towards a nostalgic view of the burning of coal as essential to the well-being of the nation, the economy and beyond.

Methodology

Making use of interviews with business leaders in the Hunter Valley, New South Wales, Australia, the research identifies key discourses in relation to climate change, climate mitigation, politics, and environmentalists. The Hunter Valley is a large coal-producing region which, in Australia, has been at the forefront of these debates. The region has a prominent, well-organised and varied environment movement while at the same time many workers and local businesses have links to the coal and aluminium industries. The aim of the study was to involve a representative sample of business leaders from various industries that are likely to have different priorities in relation to how climate change may affect their business practices. 31 business leaders were interviewed, including representatives from carbon intensive industries (including coal and aluminium); representatives from renewable industries or those seen as ‘at risk’ from the impacts of climate change

(water, insurance, wine growers, farmers); and other locally prominent business sectors which might be seen as neutral in relation to climate change (health, education, service industries). Participants were identified through regional business associations, submissions to government processes, involvement in government programs around sustainability and coverage in local and national media. This meant that a number of participants knew each other, and some spoke openly about their engagement in lobbying the Federal government. Participants have been given pseudonyms in order to prevent them being identified.

Participants were asked about their views in relation to climate change, including the science and policy responses. Inevitably, these discussions turned to coal, which is both a major export product of the region and nation, as well as Australia's primary source of electricity generation. On the other hand, the coal industry has also marked the land making what is often described as a 'moonscape' of active and abandoned mines, as well as impacting the agriculture industry (Cottle and Keys, 2014). Indeed, over the past decade, the industry has faced resistance from the wine and horse-breeding industries, as well as local residents concerned about the ongoing encroachment of the industry for the development of new and expanded coal mines. These conflicts bring to light the moral choices being made about not only the approval of individual mining projects (or extensions to existing ones), but the broader policy context of climate change in which these ethical decisions occur. That is, on the one hand, an argument for a diversified economy, while on the other an argument for 'business as usual', or an economy dominated by the coal industry.

A prominent feature of participant interviews was this emphasis on the economy, which seemed to be particularly guided by the fact that interviews were specifically identified as being about climate change. This is clearly in part a result of the surrounding policy debates about the carbon tax, as this too was a dominating topic of conversation. Participants regularly expressed concern about the need to balance the economy and environment in a way that, more often than not, favoured the growth economy, supported

by a neoliberal framework. That is, participants took the moral position that the economy was more important than the environment. These arguments were framed in a number of narratives, outlined below: that the region's abundance of coal was an important part of its historical and social fabric; that there were questions about the science of climate change which meant that the minimal response was preferred; and that the economy was intrinsically linked to coal, resulting in a moral imperative to continue to exploit the resource.

"A carbon challenged area"

The Hunter Valley region has a strong connection with the coal industry and an accompanying historical narrative which reaches back to colonisation. When European colonists first arrived in Australia, coal was a prominent feature of the landscape. Newcastle itself was named after England's major coal producing town and the nearby Hunter River was then known as Coal River (Baer, 2008; Connor et al., 2008). Coal mining began not long after colonisation, and Newcastle is well known as "Australia's first industrial town" (Minerals Council of Australia n.d.-b). It was not long after colonisation, in 1799, that the first international export of coal left Newcastle, headed for Bengal (NSW Minerals Council Ltd., 2013).

Enmeshed in these practices are colonial logics of paternalism, evoking the idea that 'others' – in this case, Aboriginal Australians – are not only different, but inferior and needed to be guided or ignored. The notion of land as a resource, and that of 'terra nullius' on which the theft, commodification and destruction of the land was based, underpins the practice of destroying the natural environment – and landscape – for profit (Neale and Vincent, 2017). The proliferation of mining and commodification of the environment is but one important aspect of the moral choices made in this process; the imposition of colonial power also imposed a utilitarian view of the landscape, legitimising the concurrent destruction of place, culture and pre-existing social systems of Aboriginal Australians (Evans, 2008; Baer, 2008). While there is little doubt that voices of resistance remain – and arguably are primed to be revived

by current environmental demands – these logics are still dominant. For instance, the regional port, the Port of Newcastle is promoted as the ‘world’s largest coal port’ – a reputation which is, perhaps not surprisingly, noted with both pride and anxiety (Sydney Morning Herald, 2017).

These narratives play out in discussions of both the history and potential futures available to the region. As the history of coal development is seen as intrinsically (and, often, uncritically) linked to notions of progress and the success of the nation, the region’s narrative becomes increasingly locked in to both the past and the present. This is articulated even by those who support change in the region and are aware of the social processes by which coal has become so central:

I guess years ago when I was going to school in the valley – they’re all dairy farmers, right? Then the power generation industry came, and that came because the coal was here to fire up the Bayswater and Liddell power stations and the power stations there around Lake Macquarie. So the fact that the power stations were here, that attracted the aluminium industry, because it needed enormous amounts of power. And then the world wanted coal, and the coal was here and that grew and then the steel industry cut back, but the economy of the others still grew. And so here we are sitting today, and we have such an imbalance focus of our original economy on coal, I’d suggest. It does attract a lot of servicing, but the core business is really coal. – James, renewable energy consultant

As a renewable energy advocate, James is not uncritical of the coal industry. His description is a retelling of the European history of the region which, while factually correct, is ensconced in a range of cultural and ethical assumptions. It entails a ‘logical progression’ from the very existence of coal, to the development of power stations, to aluminium, and eventually coal exports. The narrative is linear, aligned with the story of modernity itself, the result of the ever-developing ability of humanity to ethically change and make use of our ‘natural resources’, extend our mastery of both machine and environment. It aligns, too, with the spread of the globalised economic system – ‘the world wanted coal’ – and, because it is here, we are obliged to ‘give’. Interestingly,

however, the narrative ends abruptly at coal. As James notes, we are now stuck with an ‘imbalance focus of our original economy on coal’ which seems both inevitable and difficult to change, even if morally dubious.

James’ explanation of the development of the coal industry sits well alongside what has been described as the Australian “state/coal industry nexus” (Baer 2016) – a historical narrative which began with the European invasion of the nation and which, over time, has solidified to the extent that successive governments are unable to decouple their hold on power from acquiescing to industry demands (McKnight and Hobbs, 2013; Pearse, 2007).

We have a challenge in the region – that’s, that we’re a carbon challenged area, a lot of the industry we’re involved with is related to coal mining, to power production, aluminium smelting and related industries, so if there is risk here, that these industries will change, there is a risk to our members and to the industry that work will change, industries will go away etc. I think our competitive advantage is more the niche, the support products, the technology and so forth and that’s related to coal, and it’s related to clean coal, and we’ve got to make the most out of that.
– Mack, business advocacy

Mack here turns to what is often seen as the ‘win-win’ scenario – the idea that technological developments will allow the continued use of ‘clean’ low polluting coal. A key and longstanding argument of the industry in response to this challenge has been the idea of ‘clean coal’, usually in the form of geo-sequestration – which has no to-scale commercial operations, raises concerns about leakage, and can only be used in very specific geological formations (Marshall, 2016). For this reason, Marshall (2016) argues that ‘clean coal’ is a fantasy, defensive solution to the issue, designed to avoid the problematic impacts of using coal for electricity.

In addition to the concerns about climate change, the coal industry has also been opposed for its intensive use of land and water resources, pollution of aquifers, as well as dust and noise impacts from mining (Connor, 2012; see also Askland, 2024; Connor, 2016). In the Hunter Valley,

there has been a strong focus on whether the industry can be maintained alongside the wine and horse-breeding industries which make up another important part of the regional economy (Connor, 2016). Dennis, as a representative of the horse-breeding industry shows an awareness of this attitude, but was cautious about being seen to be 'anti-coal':

We've said it right from the start and we mean it, we're not against coal mining, you know we're not fighting the coal miners per se, we're just asking for a bit of reason, a bit of thought. It's been going on for 20, 30 years, their sort of escalating encroachment, it's to the point where we're at now where towns like Muswellbrook are just completely enveloped in mines. – Dennis, thoroughbred industry

While there is a growing view in the community that the industry has gone too far, and is impacting on other businesses, there is a clear division being made by Dennis between his stance as a representative of the horse breeding industry and that of environmentalists – he goes to some pains to outline this. These comments show a level of solidarity with the coal industry – an acknowledgement that, as a large industry in the region, the coal industry's voice is important and, perhaps even more important than others – with the others being those who really are against the coal industry (environmentalists). In this way, participants might make minor criticisms of specific actions of the coal industry, but avoid fracturing the ethical framework – as business leaders – under which they all operate.

Some participant comments resonate as moral empathy for the situation in which the coal industry finds itself – related not only to climate change, but to conflicts over land use. Ryan goes as far to say that the coal industry is 'picked on':

...you've got to think about the different countries and economies. And that's like a lot of these issues around – let's pick on coal. You know, there's a whole, and you think about it just in that one issue, there's just so much stuff going on, so – what's the price who's going to pay what in terms of taxes or whatever it happens to be. – Ryan, aviation

Such an argument was also being advanced by the industry itself in the media at the time over the carbon tax as the coal industry tried to seek exemptions, with claims such as those from the Queensland Resources Council that the industry is "being singled out for an unjustifiable tax grab with significant, long-term implications" (Roche, 2009: 82). Ryan's discussion of this viewpoint is embedded in the broader context of the impacts of national – versus global – action. That is, if other countries are not moving forward then why should Australia – action is not fair or just. This notion of what is 'fair' is often supported with claims that it is the 'average consumer', in this scenario, who will suffer. In making these arguments then, participants not only legitimize the coal industry's complaints – the government (and others) should not be interfering with the right to carry on business and needs to consider compensating or other measures for any moves it might make that will impact on profits and general comfort and wellbeing. This emphasis carries strong moral weight prominent in neoliberal (Harvey, 2007) doctrine – that national, capitalist economies should be prioritized over changes to the environment and (problematic) global welfare.

Climate v change

To some extent then, it is to be expected that climate mitigation policies would raise concerns about the economic future of the region. It is worth noting, however, that this is not only a regional issue, and much of the national debate has reflected this concern (Bowden, 2018). At the time of the research, while the Labor government had been elected in part because it had promised to take action on climate change, the public debates were extremely heated (Crowley, 2013). This was reflected in participant comments, which were often sceptical about the science of climate change. It was commonplace for participants to express literal, interpretive and implicatory denial (Norgaard, 2011). That is, they would either outright refute the science (*literal*), question the details of the science (*interpretive*), or dispute proposals about how it should be responded to (*implicatory*). In this framing, participants

emphasised their concerns (and interests) that the economy should take ethical priority.

In the first case – participants commonly invoked the uncertainties around the science of climate change, claiming that scientists were just trying to make money off the issue, and that those who disagreed were silenced. This is an attempt to discredit opponents through ethics. Anthony, for instance, argues that the majority of the scientists who support claims that climate change is cause for concern, are just taking up their own moral position as ‘believers’:

I’m a sceptic and I’m a sceptic for sound – for technically scientifically trained reasons. ... if you start analysing these hundreds of thousands of scientists – who believe in all this – if you start looking at them and peeling them away one by one, you’ll find that none of them have actually done any work in this space, they’re all believing it and all passing on, saying ‘Oh I believe in it, and I’m a scientist’ but they haven’t actually partaken in the research, they don’t actually understand the non-linear mathematics involved in these computer models. – Anthony, consultancy

Anthony’s comments are interesting in light of the moral positioning which was occurring within the media debate at the time, where environmentalists were often accused of following emotional rhetoric and ‘believing’ in climate change (see, for example Bolt, 2009; Devine, 2008). Such claims-making positions those who are sceptical of climate change as the more reasonable, informed and cautious participants in the debate.

More common was the view that there were flaws in the interpretations of climate science. This was often expressed in terms of questioning not whether climate change is happening, but the extent to which human activity is the cause:

I believe in anthropogenic climate change, it’s whether it’s the five percent of the fringe of climate change or whether it’s the 90 percent driver is where I disagree with people I guess. My view is it’s at the fringe. – Steven, coal

Here Steven was not necessarily denying the existence of climate change, but the interpretation of the science explaining the cause. Importantly,

however, his suggestion that ‘it’s at the fringe’ diminishes the idea that humans are responsible. Such a view is a common manifestation of interpretive denial, whereby perceptions of various flaws or uncertainties in the voracity of climate science function to avoid making any changes (Connor, 2016: 65-86).

The final position, one which is arguably more amenable to the science, but disputes how it should be responded to, is that of implicatory denial. That is, participants would agree that climate change is happening, and that it is caused by human activity, but they would dispute what should be done. Simon brought the issue to the fore:

Personally, and this is from a – certainly I know [company] has the same view that – the science is pretty clear to me. That there’s a manmade contribution to the issue; that the CO₂ emissions will need to be abated. It’s how we do it that’s the issue of course, and the complexity of the issue. It’s one of those issues that you start paying the price now for a return in a generation plus. Plus, it requires very strong collaboration across the globe between different nations with those facets, humans have demonstrated to date that they’re not particularly good at. – Simon, aluminium industry

Simon, then, was not taking a literal stance against the notion that climate change is happening – rather, he was suggesting that there is little that can be done without a broad international agreement and that the Australian government should not lead on the issue.

To differing extents, the vast majority of participants in the research took up one or more of these positions, thus setting up the moral framework within which they understood risk. Each position functions to minimize the risks which are outlined by climate science. The first, literal denial, is to argue that the science is entirely wrong and unethical. Interpretive denial argues that the ways in which the information is interpreted is wrong. All three forms cast levels of doubt over the climate science, and therefore the risks and ethical challenges that climate change might impose. To that end, these levels of doubt provides justification for inaction on

climate change in favour of the ethical priority of economic growth.

The 'nature' of our economy?

The notion of being locked in to coal mining is inherently linked with a perceived need for economic growth as an ethical good. Within this framework, participants argue it is impossible to maintain economic growth without using coal for both electricity and export. This discourse comes from an a priori position which states: 1. The globalised economy is beyond any nation states' control; 2. A certain level of economic growth is necessary and, finally, 3. That this level of growth is not possible without coal. While the first two points have been the focus of debate for a long time by environmental and social justice advocates, for the purposes of this discussion it is this final point which is of particular interest. That is, there is an uncritical leap towards the notion of an intrinsic connection between economic growth, virtue, and the coal industry, which is advocated in opposition to environmentalist and scientific calls to mitigate climate change. This idea is clearly put forward by Natalie, who is an advocate for the industry:

Australia's actually a country that does produce – that is actually quite emissions intensive *because that's what we export, that's the nature of our economy*, and then so I think the problem's just a lot more complicated. – Natalie, industry advocate

Leaving aside the fact that national emissions do not actually include those from coal which is exported, Natalie's claim – that being emissions intensive is 'the nature of our economy' recalls, again, the proposition of the impossibility of anything being different, and hence the current position as not only ethically acceptable, but one in which the notion of *not* making use of the resource as non-sensical.

This discourse is picked up not only by participants who represent emissions intensive industry, but those who are concerned about climate change. Jonathon is a partner in a prominent local law firm. He surfs, rides his bike to work, and is generally concerned with sustainability, including climate change.

I do think that the coal industry, whether we like it or not, is a major economic player in terms of our living standards, in terms of you know as a sustainable economic place, the coal industry plays an important part of that. And that's just a feature of the fact that we've got those resources on our doorstep. – Jonathon, lawyer

Jonathon's comments – much like Natalie's combined use of 'nature/economy' – incorporate a curious telling coupling of the terms 'sustainability/economy' again implying the economy is more important and ethical than the environment. These layers, whether deliberate or not, are multiple. For Jonathon, sustainability, usually used by environmental advocates to describe the need to slow down our use of resources, becomes about maintaining our current economy in the long term. For Natalie, the 'nature' of the economy cannot be changed; it locks us in to the burning and export of coal. These discursive couplings reveal a framing of the economy as inevitably and unchangeably bound to the coal industry, a moral cosmology which is set in opposition to the arguments of intergenerational or environmental responsibility emphasised by those concerned about climate change (Daggett, 2019).

Participants commonly identify the globalised economy as part of the problem with putting a price on carbon. These arguments range from the issue of 'carbon leakage' – whereby it's put forward that greenhouse intensive industries will just move operations overseas – to statements about the rights of people in other nations to develop and use as much energy as those in richer, Western nations. In this way, the issue is framed as a social justice concern, albeit with tones of ethnocentrism. Simon, for instance, argues that the production of coal for exports will help alleviate poverty and disease in Africa:

Africa for example ... is a huge issue for mankind [sic] I think – and the poverty and the disease – going forward ... and part of that's going to have giving them energy too, and where that's going to come from? – Simon, aluminium industry

While Australian coal is not actually exported to Africa, Simon's comments reflect the resonance of the reputation of coal as a key driver of

industrialisation, and prosperity. Such statements dramatically underplay the risks of climate change and can be seen as particularly problematic as they ignore the impacts that climate change is having on those with fewer resources. In this way the moral position being advocated is an extension of the paternalism under which Australia was colonised.

The notion that coal is needed to maintain a particular prosperous lifestyle have been a strong argument for supporting the industry. As Dahlgren (2021: 28) found with coal lobbyists, it is “precisely the integration of the moral and ethical concerns of their work into their every-day lives as they responded to moral accusations that produced and reinforced their complicity with anthropogenic climate change”. A similar dynamic can be observed here, where those involved with the industry construct it as central to prosperity. The reach and efficacy of such narratives is evident among participants. For example, Luke is an advocate for renewable energy, working as a consultant in the industry. His comments echo the industry’s 2007 ‘Life. Brought to you by Coal’ campaign:

I don’t think we’ll stop mining or exporting coal for a long, long time – the world needs coal, there’s no doubt about it, we cannot stop the coal train tomorrow and expect life to go on as normal, we’re going to need substantial amounts of coal, there will be a viable coal mining industry for a long, long time. – Luke, consultant

Luke’s comments refer to a key tension around the issue of climate change, outlined above and related to the frame of risk – whether or not one can ‘expect life to go on as normal’. The levels of risk to be concerned about are not only in relation to the danger of climate change, but the corresponding risk of having to lessen current levels of consumption. For Luke, the difficulty inherent in this debate means that we will be mining coal ‘for a long, long time’. This is not only about the requirements of the national economy – in fact, Luke argues that ‘the world needs coal’. Yet research shows that 90% of the world’s coal will need to be left in the ground in order to have even a 50% chance at limiting climate change to an increase of 1.5 degrees (Welsby et al.,

2021). Here, it seems then, Luke’s concern about climate change is countered by his view of the coal; by coal’s very existence as a cheap form of power, which will assist ever expanding economic growth, there is no other ethical option but to make use of it – our current levels of comfort demand that this continue.

Given the prominence of the industry in the region, it is certainly possible that participants who are more concerned about climate change are simply resigned to the idea that the coal industry will continue. Indeed, there are some participants (in industries like research, shipping, small businesses) who benefit indirectly from the industry. Yet these narratives are not endemic to the Hunter region; they have been a major factor in debates about climate change from conservative columnists, and politicians from both of the major political parties. In opposition to the environmental and social consequences of climate change, then, participants emphasise the importance of coal to the national economy, as well as to the ability of other nations to develop in the same way – indeed with the same technology – as Australia. In this, participants shut down any alternative visions of technological change. Rather, they argue that because Australia’s economy has been built on coal fired power, so too should others. What was good here in the past is good for everyone.

Imagining a world without coal...

This research suggests, then, that a large part of the challenge to a low-carbon future is the ways in which coal itself is perceived as intrinsic to the success of the nation and the nation’s economy. With a few exceptions, participants argue that the history and development of the region has come from coal, that current economic prosperity is linked to coal and the future of the region is coal. There is very little suggestion from any that this will change.

Between the competing versions of risk identified by participants – an economy in which the coal industry is significantly smaller, versus the risk of climate change – the coal industry is seen as immutable and good. Hesitations, doubts and outright scepticism of climate change provide a

moral framework in which economic growth, seen to be fundamentally linked to the coal industry, is ethically more important than environment. Here, it seems that the risks opened up by climate change, rather than bringing about a 'new modernity' à la Beck (2010a), are minimised, if not outright dismissed.

This perceived intrinsic link of the economy with the coal industry speaks clearly to the success of those industries in perpetuating their own mythology and can be seen clearly in the interview data. In their resistance to finding alternative forms of investment in the region and considering the development of a diversified economy, these participants held tightly to coal, rather than imagining socio-technical change. Participants mobilise a moral position in which the comforts offered within rich, Western nations, depends upon economic growth and coal. In doing so they deny both the observation that even within a nation such as Australia, these so-called comforts are not, indeed, shared by all and that climate change itself may well take these away.

It is important to point out that, as business leaders in the region, participants are not only reflecting their personal views. Rather, they are actively perpetuating the notion that the region – and nation – is not able to transform its energy mix, or export portfolio without negative consequences. These views border on the reification of coal. Embedded in a fantasy of misrepresentation of the industry (Marshall, 2016), the ways in which participants speak of coal being 'picked on', needed by the rest of the world, or even, as some comments imply, necessarily used simply because it exists, forecloses on the possibility of a low-carbon future. In doing so, the social imaginary is shut off, trapped in time at the beginning of colonisation. The potential for science and technology is admitted – but only if it is to involve coal.

While Beck (1994) foresaw a potentially exciting transition to a green modernity, where risk society functioned to undermine existing power structures, such a change requires the *recognition* of risk as he conceives it. Beck argues that risks such as climate change are both incalculable and yet increasingly urgent to act upon; these

dynamics are played out within the relations of definition – the ways in which risks are defined and socially constructed (Beck, 2009: 194-195). Such risks will, he argues, force society to become radically self-critical. It is worth noting, however, that Beck's framework, although strongly worded, suggests that current comforts can continue – we need only implement a new type of modernity. As can be seen above, this claim is rejected by many participants in this research, and the recognition of climate change as serious, incalculable risk has not occurred in any meaningful way. Rather, participants minimize the risks of climate change and attempt to frame the issue within existing logics and ethics of economic growth and rationalism. Whether this is, as Beck (1992; 2009) would have it, an example of our current institutional inability to respond to risk, or a revelation which casts doubt over the idea of the risk society as a whole is part of the remainder of the story which is yet to be seen.

Conclusion

In June of 2023, Australia's key gas lobby – the Australian Petroleum Production & Exploration Association (APPEA) – released an advertising campaign titled 'Natural Gas – Keeping the Country Running' emphasising the need for gas to fuel the lifestyles that Australians have come to expect. It includes a television ad which highlights a diverse workforce, industry support for communities, and the centrality of gas to the manufacturing. It shows a worker saying that "as Australia shuts down coal, gas is picking up the load" (APPEA, 2023). Indeed, in the decade since this research was initially carried out, a number of coal-fired power stations have closed (Burke et al., 2019). The accompanying materials for the APPEA campaign go on to talk about how devastating it would be if the nation did not have access to gas. These events tell us two important things about the ongoing state of climate change in Australia. The first is that the unimaginable decline of coal is happening. It might be happening slowly, but there is now an acceptance that it will eventually occur. The second is that the linkage between fossil fuels, energy use, and continued economic growth and prosperity, at the expense of the

climate, is still being reinforced by those in industry – it is only that now, it appears that the gas industry is taking up that call.

Discussing climate change, Urry claimed “the future has arrived” (Urry, 2017: 42); that the impacts of a changing climate were here and apparent. He also noted, though, that economic and social changes are rarely linear – the changes depend on the interaction of unpredictable complex systems. These observations highlight the urgency and problematic dynamics of climate change. The failure to recognise, or act upon, the risks of climate change is a moral position which prioritises the wealthy, who have more resources to manage climate change, greater access to technology, increased ability to move, and, who are overwhelmingly more responsible for climate change itself. This moral choice, in Australia at least, has been influenced by the coal industry, which has been able to convince many of the participants in this research, that it is central to the economy.

Even in the face of conflicting moralities, whereby business leaders show concern for

sustainability and climate change, the participants in this research appear unable or unwilling to take initiative in creating a new socio-technical imaginary. Rather, participants emphasise the threat of socio-technical change to the economy and the uncertainties of climate science. This epistemological standpoint leads them to a moral position whereby it is near impossible to support anything but gradual, small-scale changes. Yet even mildest predictions of climate science suggest this will not be enough and we may, indeed, need an ethics that is more able to navigate the uncertainties in a way that builds towards a much stronger socio-technical imaginary. While Daggett (2019: 12) has argued, “that which is bound can be picked apart, untied, set free”, it seems that the leadership needed for the kinds of transformation necessary will need to come from elsewhere; from those who are less bound to old industrial technologies, more willing to sacrifice economic advantage and more able to envision a low-carbon society.

References

- AAP (2009) Business wants emissions trading delayed. *The Age*, February 26. Available at: <https://www.smh.com.au/national/business-wants-emissions-trading-delayed-20090226-8ixt.html> (accessed 02.12.2023).
- APPEA (2023) *Media Release: Gas key to Australia's cleaner energy future: Industry launches public awareness campaign*. Available at: https://www.appea.com.au/all_news/media-release-gas-key-to-australias-cleaner-energy-future-industry-launches-public-awareness-campaign/ (accessed 05.06.2023).
- Askland H H (2024) Lost Futures: Eritalgia, Sacrifice and Suffering at the New South Wales Coal Frontier. *Science & Technology Studies* 37(2): 13-30.
- Baer H (2008) Global Warming as a By-product of the Capitalist Treadmill of Production and Consumption—The Need for an Alternative Global System. *The Australian Journal of Anthropology* 19(1): 58-62.
- Baer HA (2016) The nexus of the coal industry and the state in Australia: Historical dimensions and contemporary challenges. *Energy Policy* 99: 194-202.
- Ballo IF (2015) Imagining energy futures: Sociotechnical imaginaries of the future Smart Grid in Norway. *Energy Research & Social Science* 9: 9-20.
- Beck U (1992) *Risk Society: towards a new modernity*. London: Sage.
- Beck U (1994) The Reinvention of Politics: Towards a Theory of Reflexive Modernisation. In: Beck U, Giddens A and Lash S (eds) *Reflexive modernization: politics, tradition and aesthetics in the modern social order*. Cambridge, England: Polity Press in association with Blackwell Publishers, pp. 1-27.
- Beck U (2009) *World at Risk*. Cambridge: Polity.
- Beck U (2010a) Climate for change, or how to create a green modernity? *Theory Culture Society* 27(2-3): 254-266.
- Beck U (2010b) Remapping social inequalities in an age of climate change: for a cosmopolitan renewal of sociology. *Global Networks* 10(2): 165-181.
- Benson S, Kelly J and Packham B (2018) Frydenberg eyeing new coal for NEG. *The Australian*, June 26.
- Bolt A (2009) Putting the burning question to global-warming alarmists. *Herald Sun*, June 9, 30.
- Bowden V (2018) 'Life. Brought to you by' ... coal? Business responses to climate change in the Hunter Valley, NSW, Australia. *Environmental Sociology* 4(2): 275-285.
- Bowden V and Leahy T (2016) Don't shoot the messenger: How business leaders get their bearings on a matter of science. *Journal of Sociology* 52(2): 219-234.
- Brett J (2020) The Coal Curse: Resources, Climate and Australia's Future. *Quarterly Essay* 78: 1-76.
- Bulkeley H (2001) Governing climate change: the politics of risk society. *Transactions of the British Institute of Geographers* 26(4): 430-447.
- Burke PJ, Best R and Jotzo F (2019) Closures of coal-fired power stations in Australia: local unemployment effects. *Australian Journal of Agricultural and Resource Economics* 63(1): 142-165.
- Chan K (2012) Legislation of a historic but politically unpopular carbon tax in Australia. *Carbon Management* 3(3): 243-247.
- Clennell A (2017) Nats push for new coal-fired power station. *The Australian*, November 28.
- Connor L (2012) Experimental publics: activist culture and political intelligibility of climate change action in the Hunter Valley, Southeast Australia. *Oceania* 82(1): 228-249.
- Connor L (2016) *Climate Change and Anthropos: Planet, People and Places*. London: Routledge.
- Connor L, Higginbotham N, Freeman S, et al. (2008) Watercourses and Discourses: Coalmining in the Upper Hunter Valley, New South Wales. *Oceania* 78(1): 76-90.

- Cottle D and Keys A (2014) Open-cut mining in Australia's Hunter Valley: Sustainability and the industry's economic, ecological and social implications. *International Journal of Rural Law and Policy* 1: 1-7.
- Crowe D (2017) PM spars with AGL to keep lights on. *The Australian*, September 6.
- Crowley K (2013) Irresistible Force? Achieving carbon pricing in Australia. *Australian Journal of Politics and History* 59(3): 368-381.
- Crowley K (2017) Up and down with climate politics 2013–2016: the repeal of carbon pricing in Australia. *Wiley Interdisciplinary Reviews: Climate Change*. DOI: 10.1002/wcc.458. n/a-n/a.
- Crowley K (2021) Fighting the future: The politics of climate policy failure in Australia (2015–2020). *WIREs Climate Change* 12(5): e725.
- Cubby B (2013) A so-called market in invisible stuff': the meaning of Tony Abbott's carbon rhetoric. *Sydney Morning Herald*, July 15. Available at: <https://www.smh.com.au/politics/federal/a-so-called-market-in-invisible-stuff-the-meaning-of-tony-abbotts-carbon-rhetoric-20130715-2q00e.html> (accessed 20.07.2013)
- Daggett CN (2019) *The Birth of Energy: Fossil fuels, thermodynamics, and the politics of work*. Durham and London: Duke University Press.
- Dahlgren K (2021) The moral case for coal: The ethics of complicity with and amongst Australian pro-coal lobbyists. *The Australian Journal of Anthropology* 32(1): 19-32.
- Devine M (2008) Greenies go ga-ga over emissions. *Sydney Morning Herald*, December 18. Available at: <https://www.smh.com.au/national/greenies-go-ga-ga-over-emissions-20081218-gdt6ym.html> (accessed 01.12.2023)
- Drape J (2011) Business talks tough ahead of tax meeting. *Sydney Morning Herald*, April 6. Available at: <https://www.smh.com.au/national/business-talks-tough-ahead-of-tax-meeting-20110406-1d3ps.html> (accessed 01.12.2023)
- Evans G (2008) Transformation from "Carbon Valley" to a "Post-Carbon Society" in a Climate Change Hot Spot: the Coalfields of the Hunter Valley, New South Wales, Australia. *Ecology and Society* 13(1): 1-39.
- Frew W (2007) Industry closes anti-coal website. *The Sydney Morning Herald*, March 5.
- Garnaut R (2008) *The Garnaut Climate Change Review: final report*. Port Melbourne, Victoria Australia: Cambridge University Press.
- Hamilton O, Nyberg D and Bowden V (2023) Elements of power: Material-political entanglements in Australia's fossil fuel hegemony. *Environment and Planning E: Nature and Space* Epub ahead of print 27 February 2023. DOI: 10.1177/25148486231159305.
- Harvey D (2007) *A brief history of neoliberalism*. Oxford: Oxford University Press.
- Jasanoff S and Kim S-H (2013) Sociotechnical Imaginaries and National Energy Policies. *Science as Culture* 22(2): 189-196.
- Leahy T (2008) Discussion of 'Global Warming and Sociology'. *Current Sociology* 56(3): 475-484.
- Marshall J (2016) Disordering fantasies of coal and technology: Carbon capture and storage in Australia. *Energy Policy* 99: 288-298.
- McKnight D and Hobbs M (2013) Public contest through the popular media: The mining industry's advertising war against the Australian Labor Government. *Australian Journal of Political Science* 48(3): 307-319.
- Milman O (2015) Mining industry's new 'coal is amazing' TV ad labelled desperate. *The Guardian*, September 6. Available at: <https://www.theguardian.com/environment/2015/sep/06/mining-industrys-new-coal-is-amazing-tv-ad-slammed-as-desperate#:~:text=Australia's%20mining%20industry%20has%20launched,will%20drastically%20slash%20its%20emissions> (accessed 01.12.2023)

- Minerals Council of Australia (n.d.) *Contribution to the economy*. Available at: http://www.minerals.org.au/resources/coal/coal_the_community/contribution_to_the_economy (accessed January 7, 2018).
- Mol APJ and Spaargaren G (2000) Ecological Modernisation Theory in Debate: A Review. *Environmental Politics* 9(1): 17-49.
- Mundaca L, Busch H and Schwer S (2018) 'Successful' low-carbon energy transitions at the community level? An energy justice perspective. *Applied Energy* 218: 292-303.
- Murphy K (2017a) Scott Morrison brings coal to question time: what fresh idiocy is this? *The Guardian*, February 9. Available at: <https://www.theguardian.com/australia-news/2017/feb/09/scott-morrison-brings-coal-to-question-time-what-fresh-idiocy-is-this> (accessed 01.02.2023)
- Murphy K (2017b) Josh Frydenberg rules out carbon trading in electricity sector. *The Guardian*, May 29. Available at: <https://www.theguardian.com/australia-news/2017/may/29/josh-frydenberg-rules-out-carbon-trading-in-electricity-sector> (accessed 01.02.2023)
- Neale T and Vincent E (2017) Mining, indigeneity, alterity: or, mining Indigenous alterity? *Cultural Studies* 31(2-3): 417-439.
- Norgaard KM (2011) *Living in Denial: Climate change, emotions and everyday life*. Cambridge, Massachusetts: The MIT Press.
- NSW Minerals Council Ltd. (2013) *NSW mining history*. Available at: <http://www.nswmining.com.au/industry/nsw-mining-history> (accessed December 12).
- Parry I, Black S and Vernon N (2021) *Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies*. Washington DC: International Monetary Fund.
- Pearse G (2007) *High and Dry: John Howard, Climate Change and the Selling of Australia's Future*. Camberwell, Victoria: Penguin Group (Australia).
- Pearse G, McKnight D and Burton B (2013) *Big coal: Australia's dirtiest habit*. Sydney, NSW: NewSouth Publishing.
- Remeikis A (2018) Minerals Council of Australia kicks off coal power campaign despite BHP threat. *The Guardian*, January 11. Available at: <https://www.theguardian.com/environment/2018/jan/11/minerals-council-of-australia-kicks-off-coal-power-campaign-despite-bhp-threat> (accessed 01.12.2023)
- Roche M (2009) Feds tax grab might cook the golden goose. *Townsville Bulletin*, October 24.
- Spratt D and Sutton P (2008) *Climate code red: the case for emergency action*. Carlton North, Vic: Scribe Publications.
- Supran G and Oreskes N (2020) Addendum to 'Assessing ExxonMobil's climate change communications (1977–2014)' Supran and Oreskes (2017 Environ. Res. Lett. 12 084019). *Environmental Research Letters* 15.
- Sydney Morning Herald (2017) World's largest coal export port Newcastle has 'urgent need' to diversify. *Sydney Morning Herald*, December 17.
- Teske S, Dominish E, Ison N, et al. (2016) *100% Renewable Energy for Australia - Decarbonising Australia's Energy Sector within one Generation*. Report for GetUp! and Solar Citizens, March 2016.
- Trainer T (2007) *Renewable Energy Cannot Sustain a Consumer Society*. Dordrecht: Springer.
- Urry J (2014) The problem of energy. *Theory Culture Society* 31(5): 3-20.
- Urry J (2017) Accelerating to the future. In: Wajcman J and Dodd N (eds) *The sociology of speed: digital, organisational, and social temporalities*. Oxford: Oxford University Press.
- Welsby D, Price J, Pye S, et al. (2021) Unextractable fossil fuels in a 1.5 °C world. *Nature* 597(7875): 230-234.

World Meteorological Organization (1979) *Declaration of the World Climate Conference, WMO Proceedings of the World Climate Conference: A Conference of Experts on Climate and Mankind*. Secretariat of the World Meteorological Organization Geneva, February 1979.

World Meteorological Organization (2021) *State of the Global Climate 2020*. World Meteorological Organization report no WMO-No.1264.

Wright C, Nyberg D and Bowden V (2021) Beyond the discourse of denial: The reproduction of fossil fuel hegemony in Australia. *Energy Research & Social Science* 77: 102094.