13 Mining a fractured landscape

The political economy of coal in Australia

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Introduction

Australia's coal reserves underpin the nation's electricity supply, and Australia is the world's largest exporter of metallurgical coal and second-largest exporter of thermal coal. Yet Australia's landscape for coal production is fractured. The national political terrain is split: fossil fuels are promoted by the Liberal National Coalition parties ('the Coalition' or LNP), opposed by the Greens, with Labor wavering in between. Australia's subnational States and Territories are divided between coal-producing and non-coal producing states, with contrasting energy policies, capacities, requirements, and ambitions. Responses to climate change are also refashioning demand and affecting supply. Australia's coal output is divided between local and export markets, with the first declining, the second still growing.

This chapter aims to examine the existential challenges confronting Australia's coal sector and to answer the question: what is the future of coal in Australia? To examine these fractures, this chapter first describes the salient characteristics of Australia's coal sector. Second, it outlines the historical and current drivers reshaping coal production and use, focusing on institutional features such as Australia's federated political system, ideologically driven political hostilities around climate and energy policy, and the impacts of corporatization, privatization, and technological innovation. The chapter concludes by considering trajectories and projections for Australia's coal sector.

Methodologically, it is influenced by the AOC (actors, objectives, context) analytical framework used by Jakob et al. (2020) covered in Chapter 1 and draws on insights from literature on historical institutionalism (e.g. Thelen and Mahoney 2010). Applying this framework includes identifying the societal and political actors and factors most relevant for the formulation of energy and climate policies; spelling out actors' underlying objectives; and assessing the economic, institutional, and environmental contexts which determine how certain objectives matter for certain societal actors. The framework is amended here to concentrate on interactions within and between four clusters of factors: actors, political institutions, economic and technological influences, and broader (ecological and economic) context. This occurs to better accommodate the

perceived strong influence of institutional and economic/technological factors in this narrative.

The complex interrelationship between discursive contests and ideational shifts – the ‘work’ of actors in specific settings – and the influence of political-legal institutions, and of disruptive economic/technological and climatic shifts, in a federal system like Australia’s – produces a kaleidoscopic tale with multiple storylines (Christoff 2013). It also creates a substantial methodological challenge: in this chapter, the record of actors’ views and objectives has primarily been drawn from published statements, reports, and documents – tested, where necessary, through interviews.

Australia’s coal sector

With 10% of the world’s black coal reserves, Australia’s coal resources rank fifth behind the United States, Russia, China, and India in size (GA 2021) and hugely exceed what can be burnt if global warming is to be held to the goals of the Paris Agreement.

In 2017, Australia produced 6% of global output of black coal, including 54% of global metallurgical coal exports (17% of total global production), and some 20% of global thermal coal exports (OCE 2019, 34, 43). Its coal production has risen significantly over the past four decades (Figure 13.1) (DISER 2020a) with roughly four times as much Australian coal now exported as is used domestically (Table 13.1).

Figure 13.1 Australian energy production, by fuel type (1979–2019).

Source: DISER (2020a, Figure 3.2).

Table 13.1 Australian coal production (2018–2019)

	<i>Domestic use</i>	<i>Export</i>	<i>Percent of Australian coal production</i>	<i>Qld (Mt) (%)</i>	<i>NSW (Mt) (%)</i>	<i>SA (Mt)</i>	<i>Tas (Mt)</i>	<i>Vict (Mt)</i>	<i>WA (Mt)</i>
Black coal (thermal) (262.3 Mt)	52.5 20%	209.8 Mt 80%	58%						
Black coal (metallurgical) (191.2 Mt)	7.7 Mt 2%	183.5 Mt 98%	42%						
Total black coal (453.8 Mt)	60.2 Mt 13%	393.6 Mt 87%	90%	250.6 55%	196.6 43%	0	0.3		6.2
Brown coal (43.3 Mt)	43.3 Mt 100%	0%	10%	0	0	0		43.3	

Source: OCE (2019); DISER (2020b).

Coal production

Australia's coal sector is dominated by a small number of export-oriented multinational companies, the composition of which has changed significantly over the past decade. Pearse et al. (2013), writing about Big Coal in Australia in 2013, referred to the dominance of four major producers – BHP Billiton, Rio Tinto, Xstrata, and Anglo-American. By 2020, Rio Tinto had sold all its coal (and gas and oil) assets globally, citing them ‘high risks’ for a low-carbon future. The lead group now includes BHP Billiton, Glencore, Yancoal, Anglo-American, and Peabody Energy Australia (Table A.13.1). Anglo-American has indicated it intends to exit thermal coal by 2025. BHP is heading in that direction.

Queensland (Qld) (with 51 mines) and New South Wales (NSW) (42 mines) together account for 98% of black coal production and over 90% of coal mining employment (ABS 2019). Over the past decade, employment in coal mining has fluctuated between 40,000 and 60,000 jobs in total (full-time and part-time), having risen from around 18,000 jobs in 2000.

Some 36,000–58,000 people worked directly in the sector in May 2019 (ABS 2019), mainly concentrated in the Bowen Basin (Qld) and Hunter Valley (NSW) (Table A.13.2). This represents only 0.7% of total national full-time employment. However, coal mining provides a significant concentration of economic activity in a handful of regions which in several instances also have electoral power sufficient to influence policies that affect them. By contrast, in 2019 there were some 14,700 jobs, dispersed across Australia, in construction of renewable energy capacity (CEC 2020, 13–14).

Sizeable revenue streams from mining royalties underpin strong state support for coal in coal-producing states. Such revenue fluctuates also by changes in demand and in prices, and also by the impacts of natural events on output. In 2018–2019, Queensland's coal royalties totaled some \$4.4 billion (Zhou 2020) and were the largest source of income growth and 7% of total income for that state (Qld Govt 2019, 77). In NSW, total mining royalties amounted to \$2.1 billion that year – 2% of total revenue – and were forecast to deliver an annual average of \$2 billion per annum for years to come (NSW Govt 2019, 4–4).

At the same time, coal mining companies are recipients of substantial subsidies – including through tax arrangements discounting investment costs, diesel fuel rebates, and ‘deferred’ subsidies associated with the substantial costs of mine rehabilitation, which will fall to the public given current arrangements.

Australia's domestic coal use

As noted earlier, approximately 20% of Australia's coal production is for domestic use. In 2020, 90% of ‘domestic coal’ was burned to produce electricity, the remainder was used for steel production.

In 2018–2019, thermal coal provided 58.5% of Australia's electricity supply (gas produced 20%, and oil 2%). Coal's contribution to electricity generation has fallen dramatically, from 83% some two decades earlier. Renewable energy

Figure 13.2 Australian energy sources for electricity (2010–2020).

Source: Australian Energy Market Operator (AEMO 2020b).

sources provided almost 20% – a rate doubled over the past decade (DISER 2020a). Renewable energy is displacing ‘domestic coal’ (Figure 13.2) and is expected to meet around half of Australia’s electricity demand by 2025, with coal’s share of power generation falling to 28% (Edis and Bowyer 2021).

The mix of fuels used for electricity varies greatly across Australia (Figure 13.3). In effect, the country splits into two blocs – the coal-producing, and non-coal producing states. Of the three coal-producing states – NSW, Queensland, and Victoria – the first two are both heavily dependent on coal for electricity and also major contributors to Australia’s coal export economy. Victoria is not a ‘coal exporter’.

The non-coal producing states – the Northern Territory, South Australia, Tasmania, and Western Australia – are neither dependent on coal for power generation nor coal exporters (Western Australia and the Northern Territory are heavily dependent on natural gas for domestic power and as an export).

Coal-fired electricity generation

In 2021, 22 coal-fired power stations operated in Australia. In that year, Australia’s coal-fired power generation fleet had an average age that varied between States – from 38 years for NSW, 35 years for Victoria, and 25 years in Queensland (Table A.13.3). The age of these plants defines the path toward their closure: most of Australia’s coal-fired power stations will come to the end of their working lives by 2035 unless regulatory obstacles are created to their closure or subsidies are provided to slow their retirement. Given the falling profitability of coal- and gas-fired power generation in Australia and the surging support for renewable

Figure 13.3 Australia: electricity generation, fuel mix by subnational states (calendar year 2019).

Source: DISER (2020a, Figure 2.9).

energy, substantial new investment to maintain or upgrade fossil fuel-based power generation is unlikely.

Twelve coal-fired stations have closed since 2010, and no new ones have been commissioned. Five additional closures have been flagged between 2021 and 2035, involving almost half the remaining coal-fired generation capacity in the National Energy Market (NEM) that supplies the populous east coast.

Australia's coal exports

Australia is the world's largest exporter of metallurgical coal by volume and value (Ball et al. 2020, Figures 5.6 and 5.8), with exports of 184 Mt, worth AUD \$43 billion (fob) in 2018–2019 (OCE 2019, Table 2.2). Almost all of Australia's metallurgical coal, used for steel making, is produced from mines clustered in Queensland and NSW.

It is also the world's second-largest exporter of thermal coal (20% of total in 2020), after Indonesia (41%) and followed by Russia (17%) (Ball et al. 2020, 53). Exports of thermal coal totaled 210 Mt in 2018–2019 and were worth \$26 billion (fob) (OCE 2019, Table 2.2).

Australia exports most of the fossil fuels it produces – including some 87% of its thermal and metallurgical black coal and 74% of its liquid natural gas (LNG) output in 2018–2019 (DISER 2020a, 33). Australia's coal exports have expanded substantially in recent years (Figure 13.4). Between 2000 and 2019,

Figure 13.4 Australian energy exports, by fuel type (1978–2019).

Source: (DISER 2020a, Figure 4.2).

Table 13.2 Coal exports by major destination, coal type, and volume: 2018–2019

Export destination	Thermal (Mt)	Metallurgical (Mt)	Total (Mt)	Percentage of total coal export (394 Mt) (%)
China	47	41	88	22
India	4	47	51	13
Japan	79	35	114	29
South Korea	32	18	50	13
Taiwan	24	11	35	9
Total			338	86

Source: OCE (2019, Table 38).

thermal coal exports increased by 140% by volume, while exports of metallurgical coal increased by 66% (OCE 2019, Table 1).

However, the real boom for Australian coal began a decade ago, with the rapid growth in demand from China. On average, coal exports have grown by 3% a year over the past decade (DISER 2020a, 33). As Pearce et al. (2013, 30) noted, the consequences for regional Australia were dramatic, with rapid and massive investment in mine, port, and rail expansions – some \$55 billion in 2010–2011 alone – to facilitate export of coal and gas.

Australia's coal exports mainly go to Japan, China, India, South Korea, and Taiwan (Table 13.2). India is expected to overtake China as Australia's major market for both thermal and coking coal by 2025, and South East Asia is also

expected to become a major market. While coal imports by China, South Korea, Taiwan, and the EU27 are expected to decline over the next decade, the volume of Australian export-oriented coal production is still projected to increase slightly by 2025–2026 (DISER 2021).

In the year before the COVID pandemic depressed global economic activity, fossil fuels comprised Australia's largest bloc of exports by value. Worth some \$120 billion in combination, those exports generated over a quarter of Australian export earnings by value in 2018–2019. Coal exports alone were worth AUD \$69.6 billion (15% of total exports by value, but only 0.35% of GDP, in 2018–2019). The size of these earnings and their apparent importance to the Australian economy are facts used by the coal mining industry to bolster their rhetorical case for protecting the sector.

Australia's coal and greenhouse gas emissions

In 2019, Australia produced 1.1% of total global emissions (OMS 2021), making it the world's 14th largest national emitter of greenhouse gases (CO₂-e). Australia's electricity sector contributed one-third of those emissions, and coal-fired power stations produced 90% of this sectoral contribution (CCA 2016, updated for this chapter). Coal mining is separately responsible for 6 Mt of fugitive emissions leaking from open cut and underground mines.

Given the transition to renewables, emissions from electricity production are expected to diminish by a third over the next decade (Figure A13.1). However, government sources nevertheless estimate that Australia's domestic emissions reduction efforts will be insufficient to meet its 2030 Paris Agreement obligations (DISER 2020b) (Figure A13.2).

In 2019, Australia's thermal coal exports embodied around 500 Mt of emissions (CO₂-e), while its metallurgical coal exports embodied a further 450 Mt CO₂-e. Coal exports alone contained double Australia's domestic contribution to global warming in that year (DEE 2019, Figure 13).

When domestic emissions and emissions related to exported fossil fuels (including LNG, embodying some 165 Mt CO₂-e) are combined, Australia is responsible for approximately 5% of total global emissions, making it the world's 5th largest producer of greenhouse gases (CO₂-e).

The political economy of coal

Domestic coal

Several clusters of factors are driving Australia's transition away from domestic coal use. These include subnational policy dynamism which is compensating for the decades' long failure of national climate policy, privatization and grid expansion, threats to the security of electricity supply, and changing technological capacities and market conditions in the electricity sector.

The relationship between these factors is complex but, by way of brief summary of the following argument, it involves a sequence of developments.

Political conflict over climate change at the national level and consequent failure to establish an enduring and coherent national path toward decarbonization forced Australia's subnational states, in response, to take up the burden of mitigation in an uncoordinated manner. Meanwhile, the corporatization, part-privatization, and national integration of the electricity generation sector, coupled with the rise of highly price-competitive renewable technologies, have eroded the capacity of coal-fired electricity utilities to maintain their quasi-monopoly over the sector. Alongside the fact of an aging fleet of coal-fired plants, these factors in combination have ruptured Australia's long reliance on domestic coal.

National climate and energy politics

Five groups of actors have been evident in contests over Australian climate and energy policies. These include political actors (politicians and political parties), knowledge brokers (including climate scientists, economists, and other academics), national environmental NGOs, the mass media, and energy industry representatives and lobbyists (Table A.13.4).

In 1996, the Coalition won national government, led by a professed climate skeptic, John Howard. Until the Howard Coalition government was defeated in 2007, national climate and energy policies were guided and sometimes scripted by the fossil fuel industry, whose access to and influence over relevant policy arenas was so powerful as to suggest 'state capture'. This access is best exemplified by the success of the industry lobby group, the Australian Industry Greenhouse Network (AIGN), which nicknamed itself the 'Greenhouse Mafia' (Pearse 2007, 228ff). Influential supporters of the fossil fuel sector moved between political, bureaucratic, and industry positions, blurring accountability and responsibility, and consolidating a homogeneity of views about the vital importance of coal for Australia's economic health.

Their aligned perspectives were reinforced publicly by the Murdoch media, and internally by advice from key agencies and departments such as Foreign Affairs and Trade, Resources and Energy, Treasury, and Prime Minister and Cabinet, and the Australian Bureau of Agriculture and Resource Economics – as evidenced by critical policy statements such as the 2004 White Paper, *Securing Australia's Energy Future* (ETF 2004). Meanwhile, Prime Minister Howard also ensured his government's enduring opposition to the Kyoto Protocol and resistance to mitigation measures such as carbon pricing.

These factors – along with the absence of an effective industry voice promoting renewable energy interests, and the national environmental non-governmental organizations (ENGOs)' weakness on energy-related issues – ensured that a hegemonic discourse supporting coal prevailed in the national political sphere until around 2007.

The Howard Government enacted only two climate laws of consequence during its 11 years in office: the *Renewable Energy (Electricity) Act* 2000 and the *National Greenhouse and Energy Reporting Act* 2007. Under the Renewable Energy Act, a modest national renewable [electricity] energy target (RET) was set, expanded in 2009, but then reduced – to 33000 GWh per annum (around

23.5% of total generation) – in 2020. This target has been surpassed but no amendment to it is anticipated before 2030 (CER 2018).

By 2007 and the election of the Rudd Labor government, the hegemonic discourse about fossil fuels was fraying, replaced by bitter national political contestation over ratification of the Kyoto Protocol, emissions reduction and renewable energy targets, carbon pricing and emissions trading, and associated legislated measures. Called the ‘Climate Wars’ by some (Butler 2017), this ideologically driven conflict cost five Prime Ministers their jobs and caused national climate policy to advance slowly and retreat chaotically for the next ten years, ‘the lost decade’ (Chubb 2014; Crowley 2013, 2017; Warren et al. 2016; Wilkinson 2020).

Only for less than three years, between 2011 and 2014, did Australia have a national carbon price, national advisory committees on emissions targets, and two public funds to boost investment in renewable energy. The Abbott Coalition government repealed the Gillard government’s carbon price mechanism in 2014 (the other measures survived in much-diminished form).

The Climate Wars were largely won by the fossil fuel sector’s supporters. They left domestic resource and energy policy settings largely undisturbed. As a consequence, corporate willingness to invest in renewable technologies cooled for that decade while also eroding corporate confidence in the future of coal-fired power. Paradoxically, the Gillard carbon price nevertheless provoked large corporate energy users to undertake cost-saving efficiency measures regardless of immediate policy settings.

During the second decade of the 2000s, fossil fuels’ challengers became more effective. Corporate support for coal began to fracture. Multinational resource companies with diverse portfolios and only a partial reliance on energy, and non-Australian energy companies domiciled in countries with more progressive climate/energy policies, began to publicly acknowledge the science on climate change and split ranks from ‘pure coal’ players. BHP-Billiton and Rio Tinto assessed the longer term consequences of climate change for their assets and began to exit thermal coal. Meanwhile, former corporate allies in the finance sector – major banks, superannuation funds, and insurers – began to distance themselves from the coal sector as they took stock of the prospective economic impacts of climate change for their businesses and portfolios and began to formally account for such liabilities.

Critically, Australia’s nascent renewable power sector began to coalesce into a lobbying bloc of its own, establishing effective representation through the Clean Energy Council, formed in 2007, and supported by independent media such as *ReNewEconomy*, since 2012. The influence of the Murdoch media perhaps declined with respect to views about climate change. The environmental lobby also began to change: older environment groups were displaced by new climate groups with a younger membership and more media-versatile campaigning and outreach – such as GetUp, the Australian Youth Climate Coalition, and most recently, the School Climate Strike movement. Activists frustrated with all political parties stood for Parliament as Independents – most notably, Zali Stegall, who defeated former Prime

Minister Tony Abbott, capturing the seat of Warringah in the 2019 national election.

Even so, national-level lobbying by allies of the carbon sector continued unabated. In 2019, the Business Council of Australia (BCA) *Plan for a Stronger Australia* still demanded ‘existing energy sources be improved and upgraded’, with its head, Jennifer Westacott stating,

we’ll make sure that the existing coal-fired power stations, which represent 60 per cent of all energy use, stay open. And that there are incentives for people to invest in those, and that we’ve got supply of coal coming into those power stations.

(Gocher 2019)

Given these realignments, in 2021 the Coalition is less likely to proper aggressive support for domestic coal but maintains its enduring allegiance to fossil fuels in all other respects. The Morrison Coalition government’s plan for emissions reduction – the Technology Investment Roadmap – outlines ongoing government support for mature ‘existing, proven technologies’ such as coal and gas ‘where there is a clear market failure, like a shortage of dispatchable generation’, alongside clean renewable energy sources and, potentially, nuclear power (DISER 2020c, 15).

The National COVID-19 Coordination Commission supports gas to drive the economic recovery, and fossil fuel industries and associated groups have applauded the Morrison government’s endorsement of recommendations from an independent panel on low-cost abatement – chaired by Grant King (former President of the Business Council of Australia and former long-serving Managing Director of the major gas company Origin) and including Ms Susie Smith (CEO of the Australian Industry Greenhouse Network) – for carbon capture and storage measures, strongly funded by national government, which they hope will extend the life of their industries.

Subnational policy dynamism

The institutional complexity of Australia’s federal political system provides multiple forums and opportunities to circumvent these policy failures in the national sphere, especially as State and Territory governments have constitutional responsibility for governance of energy resources and key services such as the provision of water and electricity.

While Coalition governments have predominated nationally for the past three decades, Labor governments have held power in most States and Territories for much of that time. These subnational governments have driven the decarbonization of Australia’s electricity sector, with consequent impacts for coal production and use. Initially, only the governments of non-Coal States (South Australia, Tasmania, and the Australian Capital Territory [ACT]) were involved, with the notable early exception of Victoria. But NSW and Queensland have now also joined this trend.

In 2006, SA and Victoria established the Council for the Australian Federation (CAF), a forum for all subnational political leaders to discuss common concerns in the absence of national-level leadership. It was the CAF that called for a national emissions trading scheme (ETS), in 2007 (CAF 2007, principle 5) and then commissioned the Garnaut Review (Garnaut 2008), which shaped national Labor's subsequent ETS initiatives.

The South Australian Rann Labor government was the first government in Australia, in 2007, to introduce framework climate legislation and also the first government in the world to enshrine a 2050 target in legislation. Following Germany's example, it was also the first government in Australia to introduce solar feed-in tariffs (in 2008), and streamlined land-use planning regulations to attract windfarms.

By 2010, every subnational government barring the North Territory had implemented generous feed-in tariffs. These tariffs meant that by 2020, over 2.5 million Australian households, and then businesses, invested in rooftop solar (CEC n.d.) and in 2020, the IEA reported that Australia is the world leader for installed solar photovoltaic (PV) per capita (IEA 2020, 11).

Most States and Territories now have renewable energy targets exceeding the national RET, and most have already outperformed against their targets. Moreover, by 2020, every Australian State had committed to a 'net-zero emissions by 2050' goal. By the close of 2021, five – NSW, Queensland, South Australia, Victoria and the ACT – have mitigation strategies with emissions targets exceeding Australia's nominated national 2030 goal of -26% to -28% below 2005 emissions levels. Tasmania has already reached net-zero emissions.

Five factors have made this powerful subnational counter to national policy trajectories possible. First, subnational Labor governments have long evinced greater concern for environmental and social outcomes. This normative orientation encouraged their greater attentiveness and responsiveness to public opinion about global warming.

Second, subnational governments generally have more direct legislative and regulatory responsibility for and involvement in resource development and environmental issues than the Commonwealth government, especially since the mid-1990s and the rise of 'cooperative federalism'. As Christoff and Eckersley (2021) indicate, the development of state climate policy action began with States and Territories – South Australia, Tasmania, and the ACT – that had relatively small economies, low reliance on fossil fuel-generated electricity and no coal exports, and therefore faced low political risks in this policy space.

Victoria, by contrast, faced greater hurdles, being a major fossil-fuel power-dependent manufacturing economy – but not a coal exporter. Here, the antiquity and emissions intensity of its brown coal-fired power stations made them economically unviable and ecologically indefensible. The oldest, known as Hazelwood, was 53 years old and one of the highest emitting power stations in the developed world, producing 14% of Victoria's and 3% of Australia's emissions, when it was abandoned by its owner the French company Engie and closed in 2017.

Third, altruism and policy activism by individual political actors such as South Australian Premier Mike Rann, collective political reactions to the

absence of national climate leadership, economic self-interest, and rivalry over climate targets between subnational Labor governments, have combined to produce virtuous competition over emissions reduction targets and measures at the subnational level. This has resulted in legislative and policy innovation, followed by political learning and policy transfer which strengthened support for and investment in dispersed solar, concentrated wind and solar, and energy storage (Christoff and Eckersley 2021).

Fourth, the Greens' gradual erosion of Labor's urban electoral base, winning Lower as well as Upper House seats (leading to two Labor-Green governments, in Tasmania and the ACT, since the early 1990s) has been perceived to be a greater threat subnationally rather than nationally by Labor. At the same time, environmental organizations have been more effective at lobbying on climate/energy issues at the subnational level, where the sharp focus on specific mines and specific coal-fired power stations has enabled more effective community-based campaigning. In combination, Greens' parliamentary pressure and ENGO lobbying have generated greater political attention to climate-related issues and policies at the subnational than at the national level.

Last, lobbying by the fossil-fuel power sector at the subnational level appears to have been under-resourced, fragmented between a plethora of companies and relatively ineffectual in protecting their interests, compared to concentrated lobbying efforts at the national level.

As a consequence, subnational policy innovations and public funding have provided a launching pad for renewable power, subsidizing and supporting the establishment of an accelerating transition away from coal which is now largely autonomous of government support.

Privatization

The trajectory for domestic coal was also reframed by the various unintended outcomes of corporatization and privatization of this sector. Throughout most of the 20th century, the state in Australia dominated investment in, and ownership and control of power generation and distribution networks. Then in the early 1990s, a period of vigorous reform of the state-owned energy sector, allied to national 'competitiveness reforms' (Warren et al. 2016), saw much of this capacity corporatized, with components of generation, distribution, and transmission disaggregated.

Some States partially or wholly privatized these components, selling to local and/or overseas commercial interests. In general, this represented a shift from a supply-side to a demand-side orientation in energy policy, breaking with the 'logic' and often unaccountable behavior of state-owned energy agencies investing heavily in generating capacity in the hope and expectation that increased supply would lower electricity prices and therefore stimulate demand by attracting industry investment.

Privatization was bitterly contested politically. Some States – such as Victoria – wholly privatized their power sector; others did not. As a

consequence, the power sector now reflects a mixture of public and private ownership that varies across States. While, as this chapter will suggest, state encouragement of renewable energy production has increased over the last decade, privatization has inevitably diminished regulatory control over the infrastructural investment decisions of private and often international corporations operating in the electricity sector. This has made the sector vulnerable to rapid shifts in capacity (as per the retirement of Hazelwood in Victoria) and security of supply.

In all, the consequence of privatization, and subsequent investment and ownership by multinational power companies, has made the Australian power generation system more vulnerable to the vagaries and the tipping points of market forces and therefore more difficult to govern. But it has also accelerated the transition away from coal.

Grid expansion and regulation

The States once maintained discrete power grids. Grids in eastern Australia were joined up in 1998 to create the NEM. This produced the largest wholesale electricity market in the country, covering Australia's eastern and southern-eastern coasts and supplying some 10 million customers (see DISER [n.d.] and AEMO [2020a]). A smaller, geographically isolated grid – the SWIS (South West Interconnected System) – services southwest Western Australia.

The creation of the NEM was intended to increase market efficiency and enhance security of supply, thereby lowering electricity prices, but it also created new problems. For instance, the retirement of major generating plants and the addition of renewable energy capacity now have an impact on supply, reliability, and electricity prices beyond the borders of individual States. As a result, three national bodies were established to regulate and govern the NEM: the Australian Energy Market Commission (AEMC), the Australian Energy Market Operator (AEMO), and the Australian Energy Regulator (AER).

The rise in national planning institutions has not, however, yet led to an effective integration of State-based or corporate activities, or to coordinated governance over investment in existing coal-fired capacity, new renewable generating capacity, and storage. The most recent attempt to do this is the AEMO's updated Integrated System Plan, which is seen as a 'dynamic roadmap for Australia's complex energy Transition' (AEMO 2020b). However, this overarching attempt has failed to supplant the more localized dynamics in Australia's energy system noted in this chapter and elsewhere (e.g. Parer 2002).

Market forces and new technology

The core logic of capitalism, searching for profit and allergic to loss, is now driving the domestic energy transition. The LCOE (levelized cost of electricity) has shifted in favor of renewables over the past decade. Investment in solar and wind power has grown very rapidly – solar by 50% in 2018–2019 alone – with

much of this growth coming from rooftop solar and the establishment of large-scale PV power plants (DISER 2020c, 29–30; CEC 2021). At the same time, reliance on coal for electricity generation has fallen (Figure 13.2). Given current rates of private investment in electricity generation, various States are now seen to face problems such as projected shortfalls in security of power supply (AEMO 2020c).

The rapid uptake and the falling costs of renewable power have led to a crisis of value and profitability among coal-fired power producers. The value of coal-fired power stations, including new ones, has fallen quickly over the past decade with some now being written down off by their parent companies as low or worthless. These factors drove decisions by the French company Engie to shut Hazelwood in 2017, and AGL and EnergyAustralia, to announce closures of, respectively, Liddell in 2023 in NSW and Yallourn W in 2028 in Victoria.

In Western Australia, the Japanese energy conglomerates Sumitomo and Kansai, joint owners of Australia's newest power station (Bluewaters 1 and 2, built in 2010 and barely ten years old), wrote down the value of this asset to zero in December 2020 in the face of competition from renewable energy, mainly solar (Mercer 2020). Queensland's three generator companies in 2021 wrote down the value of their power stations by over \$1 billion (QAO 2021, 7–8) while two major Australian energy companies, Origin Energy and AGL, have downgraded returns, earnings before interest, taxes, depreciation and amortization (EBITDA) by 8.6%, and written down assets by over \$2.7 billion, because of falling wholesale energy prices. Edis and Bowyer (2021) conclude that the emerging energy mix will lead to a reduction of coal plant revenue by 44–67% by 2025.

Security of electricity supply

The last source of pressure on coal comes from the need to secure electricity supply. Australia's electricity market faces three forms of insecurity – the uncoordinated exit of operators, the uncoordinated introduction of intermittent renewables, and plant breakdown.

Policy interventions and state funding, alongside technological innovation – specifically the development of large-scale energy storage technologies, such as lithium mega-batteries and pumped hydro – are consolidating the prospect for energy security using renewable technologies. This will enable a faster transition away from fossil fuels. State-sponsored and part-financed development of 'Renewable Energy Zones' not only includes a focus on gridded renewables, but also on battery and pumped hydro storage to bridge low renewable generation periods.

Several examples underscore this trend. Following a grid failure in South Australia caused by climate change-impelled extreme weather, Elon Musk offered to build the world's then-largest battery to enable storage to bridge power shortages or surges in demand. In 2017, Tesla and Neoen then partnered to build what was then Australia's first and the world's biggest mega-battery (150 MW) – a global show project following a power outage in South Australia earlier that year.

This successful initiative has been followed by a flood of investment in battery storage that will prove the most economic means to undergird renewable power and deal with reliability during summer periods of peak demand in the NEM. This flood is marked by competition to install the ‘world’s largest battery’ (see Hutchens and Terzon 2021; Toscano et al. 2021). Origin’s proposed 700 MW battery and Neoen’s 500 MW battery, both in NSW, will be the two largest storage devices in the world and will be worth a combined \$1 billion.

Also in March 2017, Coalition Prime Minister Turnbull unveiled a plan to publicly fund a major expansion of the Snowy Mountain Scheme, Australia’s largest and iconic hydro-generation complex, by adding Snowy 2.0, a major pumped hydro-project (DISER 2020d).

Graham et al. (2020, viii) suggest that when these technologies are added to renewable generation, wind and solar PV ‘are the least cost generation technologies for the [Australian] electricity system for any expected level of deployment’. Even in the absence of subsidies and assistance, assessments of the capital costs of generation technologies indicate that coal has been priced out of the market since 2018, compared with gas, solar thermal, rooftop solar, large-scale PV, and wind (Graham et al. 2018, Figure 2–1).

These measures have substantial benefits for utilities, for grid operators and for guaranteeing the security of power supply. They further increase the opportunities for a fast exit from coal.

Export coal

By contrast, the larger, more lucrative export coal sector seems immune to domestic pressures for decarbonization. The cast of national actors supporting coal export is smaller in number, economically more substantial, more unified, and more politically effective than its counterparts in the domestic coal sector.

As a consequence, Australia’s export coal sector is driven by international economic and political influences. These include international demand and associated market conditions, as determined by the energy and climate politics and policies of importing countries, and the risk appetite of funders and owners of existing and new mines, as determined by investing institutions.

Overwhelming political support

The coal export industry lobby’s narrative has reinforced an enduring politically bipartisan ambition – strongly expressed since the 1990s by both Labor and the Coalition in successive Energy White Papers – to exploit Australia’s comparative advantage in fossil fuel resources, and to use trade as a means to integrate Australia into the Asia-Pacific region, in particular with Japan and South Korea and more recently with China, for economic and security.

None of the major political parties – Liberal, National or Labor – has openly challenged fossil fuel exports. The giant Carmichael (Adani) Mine has become the bellwether of political support for export coal.

Labor, caught between wishing to appeal to rural resource-based electorates and to fend off pressure from inner urban Greens, is struggling to determine its position on Adani and export coal mining expansion in the Galilee Basin. Labor believes its failure to support Adani contributed to losing critical Queensland ‘mining seats’ and to its defeat in the last national election (a position disputed by Tranter and Foxwell-Newton [2020]). Possibly disciplined by this interpretation, and by pressure from retiring Labor backbencher Joel Fitzgibbon, its resource spokeswoman Madeleine King in April 2021 announced that Labor will not stand in the way of new mines and that she believes Australia will export coal beyond 2050 (Brown 2021).

This same ‘anxiety’ and policy paralysis is also evident in the policy stances of subnational governments in the two major export coal states, NSW and Queensland. Both continue to support growth in export mining while promoting domestic decarbonization. For instance, the NSW Liberal government has committed to enabling the opening of ten new coal mines in the Hunter Valley, despite its simultaneous commitment to local and global emissions targets of net zero by 2050 and evidence of majority community support for a moratorium on new mines.

Until around 2015, opposing Australia’s existing fossil fuel export industries was also deemed too difficult by Australia’s national environment organizations, such as the Australian Conservation Foundation, given the coal sector’s perceived contributions to the national economy. Now, the proposed Adani mine provides a galvanizing and unifying focus for actors opposing export coal, including ENGOs, farmer organizations, and the Greens. This opposition has been amplified by concerns about ‘unburnable carbon’ (CTI 2011; CC 2015).

Geopolitical tensions

Australian trade in thermal and metallurgical coal is facing potential economic and political pressures from two sources. The first arises from growing geopolitical tensions afflicting Australia’s relationship with its main market – China.

China is the world’s largest importer of metallurgical coal and also Australia’s largest market for thermal coal. Australia, a major regional ally of the United States, is susceptible to ‘trade wars by proxy’. The Morrison government’s intransigence on a range of political differences with the Chinese government has also chilled this trade relationship. These factors have led to informal import restrictions (bans and port slowdowns) on a wide range of Australian exports, including thermal and metallurgical coal, and the suggestion that China may seek alternative suppliers (Canada and Russia, for instance).

This situation may be transient, but if it endures for a decade, it may have a profound impact on Australian energy exports given the larger context of global moves toward renewable energy sources. Reduced demand may depress the price of Australia coal, which would either increase its competitiveness in other markets, or reduce profitability to the point where existing production declines

as companies withdraw or collapse (the exchange value of the Australian dollar is also a factor here).

Climate change and decarbonization by trading partners

The second pressure is more generalized and enduring. Major importers of Australian thermal and metallurgical coal – China, India, Japan, South Korea – are seeking to increase energy efficiency, reduce greenhouse emissions, modernize their steel production processes or lower steel output (as per Japan [Ball et al. 2021, 45]), and enhance their energy security.

Australia's short-term trade in thermal coal has fallen, led by declining import demand from China, India, and the European Union (EU). Much depends, in particular, on whether or not China and India continue construct coal-fired power stations, and how they intend to fuel them. Developments in China's domestic coal market, growth in renewable energy provision and use, and its climate policies, pose 'risks' to Australia's coal export future. China has vowed to peak its use of coal by 2025, and to achieve net-zero emissions by 2060, which will require it to unwind its dependence on domestic and imported coal.

India has announced it will stop importing thermal coal by the 2023–2024 fiscal year. Meanwhile, the EU is moving steadily toward decarbonization of its power sector. As the global transition to cheapening renewable energy accelerates, Australia's trade in thermal coal can be expected to decline with increasing speed, probably over the next 10–20 years.

By contrast, Australia's metallurgical coal exports may prove slightly more durable. India is just beginning to produce steel, has limited domestic metallurgical coal resources, and is beginning to import coking coal. Australia is its main source. When and how India will develop its steel industry, and how it will seek to leap over the carbon dependency trap technologically, remain to be seen. These factors have variable implications for Australian coking coal trade.

Outlook

Domestic coal

A range of possible futures has been envisioned for Australian domestic coal. For instance, Jotzo et al. (2018) consider two scenarios for domestic coal-fired power. Their 'moderate' scenario has coal power plant capacity and coal use declining rapidly through the 2020s and 2030s. Coal use would be less than half the present level by 2030 and declines by over 90% by 2040. This scenario is based on average plan lifetimes gradually declining as renewables become still cheaper than they already are and comprising a quickly rising share of power generation. Their second 'faster' scenario has plant lifetimes diminishing more quickly, with coal use 'reduced by around 30 percent compared to today by

2025, reduced by two thirds by 2030, and falling to very low levels during the 2030s' (Jotzo et al. 2018).

By contrast, the AEMO's more recent *Integrated System Plan* contains five scenarios¹ developed through consultation with those closely involved in the power generation sector. Its 'fast change' and 'step change' scenarios project a reduction in coal-fired capacity by between 60 and 80% by 2040, with renewables and storage having substantially supplanted the role of coal-fired (and gas-fired) power generation (AEMO 2020b, 44, Figure 10).

However, recent events, including the announced early retirement of Yallourn-W by 2028, suggest the transition is already moving quicker than the fastest expectations of the above scenarios. Given the confluence of pressures and influences described in this chapter, the end of coal-fired power in Australia is highly likely by 2035, and possibly will occur earlier.

At present, without the benefit of an integrated and orderly national strategy, this transition is likely to occur in a chaotic and uncoordinated fashion with, problems arising for electricity supply security and for the social and economic stability of regional communities supporting power generation. In Victoria, this will most likely lead to the end of brown coal mining; elsewhere, thermal coal currently destined for domestic use could possibly be exported – depending on Australia's coal export markets.

Export coal

Meanwhile, it is likely that Australia will continue to export substantial volumes of thermal and metallurgical coal over the next decade, with existing mines unimpeded by political or policy intervention at either the national or subnational levels. However, it is unlikely that new mines will open, and exports will be into a diminishing global market which will cause the sector to contract by 2040.

Although the Commonwealth Government has a capacity to restrict trade for environmental reasons, its powers have not been used against fossil fuel exports. Attempts using national and subnational environmental laws to encourage or force national governments to close existing coal mines or stop the development of new ones, on the basis of direct harm to individual species and ecosystems (including aquifers), and indirect harm caused by exported emissions, have failed.

There is currently no international mechanism for ensuring an orderly withdrawal from coal trading (although the WTO or even the UNFCCC could perhaps be utilized to establish such a process or measure). Disorderly withdrawal – involving uncoordinated unilateral bans on fossil fuel exports by the national governments of coal-producing states – is seen as merely encouraging substitution from other exporting countries which would be advantaged by that withdrawal. In Australia, calls for unilateral withdrawal have been regarded as fanciful and politically unsaleable.

Discussions toward the establishment of an international mechanism such as a Coal Ban Treaty, to regulate and fairly distribute the economic burden of withdrawal from coal and gas markets are progressing in academic circles but are nascent at best.

Nevertheless, analysts consider that investment in coal exploration and mine development has peaked in Australia, in anticipation of these declines. Cunningham et al. (2019) suggest that Australian coal production and exports are expected to grow fairly slowly, driven by productivity improvements, the restart of some existing mines, and completion of investment projects. However, mining companies generally maintain a cautious approach to any expansionary investment.

Ball et al. note (2020) that there are 42 metallurgical coal projects in the pipeline with a total investment value of \$23–31 billion. Of these, 30 are at the feasibility stage ‘but progress has slowed’ (Ball et al. 2020, 49). Some 53 thermal coal projects in the pipeline which would have a total investment value of \$64–74 billion. While 34 of these projects at the feasibility stage, most have not progressed for years. ‘Only six projects have committed investment, two are new “greenfields” projects and four are mine expansions’ (Ball et al. 2020, 65).

Over the medium/longer term, export markets for Australian coal will contract as power generation and steel production are decoupled from coal use, and demand for thermal and metallurgical coal declines, and as global efforts to counter over climate change intensify. This chapter suggests that Australian coal exports will begin a steep decline by 2035 given these factors.

Conclusions

This chapter finds a rupture occurred in domestic coal-related politics and policy around a decade ago, driven by a conjuncture of political, economic, and ecological factors.

Before then, pro-coal actors in industry and government maintained a hegemonic discourse about the benefits of fossil fuels for Australia’s economic future. The national political sphere was seen by pro-coal actors to be where the greatest influence would lie for ensuring favorable outcomes for coal both domestically and for trade. These actors have continued to dominate fossil fuel export policy but failed to recognize the importance of the subnational sphere of governance for domestic energy policy.

The layering of Australia’s federal system provided opportunities for subnational policy experimentation unhindered by the deep political schisms and policy paralysis over climate change which affected the national sphere. Nationally, it is still the case that ‘neither the Labor Party nor the Coalition, which together account for close to 80% of the vote, offers a strong, reflexive, ecologically modern vision’ (Warren et al. 2016, 10) that would lead to an orderly and rapid exit from export coal.

At the subnational level, however, game-changing decisions have established an ‘autonomous’ track for domestic coal, leading to its accelerating decline.

From the mid-2000s onwards, Premiers of subnational States, acting as policy entrepreneurs, produced the greatest impetus for change. Novel climate laws and targets were transferred from South Australia to other non-coal producing States through processes of political competition, and policy and legislative mimicry and learning.

Meanwhile, a unique combination of considerations – including environment-related interests (ENGOS, the Greens, popular opinion favoring action against climate change), the high levels of emissions from aging power plants burning lignite, and economic factors (such as market-competitive renewable energy alternatives) – led Victoria, a coal producing State, to break ranks and begin to decarbonize in 2010. NSW and Queensland eventually followed.

Subnational measures promoting renewable power initiated a rupture that has led to an emergent alternative energy policy regime that is displacing coal. Whereas subnational political leaders opened the door to mitigation and promoted renewables onto the States' agenda through preferential policy measures, market forces are now irrevocably in control. Initially, policy-assisted, the uptake of cheaper, reliable renewable technologies – now driven almost purely by commercial considerations – is spelling the end of investment in domestic coal- and gas-fired power generation in Australia's electricity sector. There is little that national or subnational governments could now do to stop or even slow the accelerating decline and probable demise of domestic coal over the next decade.

This transformational trajectory is also influencing, albeit much more slowly, the export coal sector. The close relationship between the Australian state, Coalition and Labor political actors, and national and multinational corporate elites, still protects and prefers the interests of carbon capital in that sector. This chapter has argued that coal (and gas) exports have to date grown without significant policy obstruction, despite their massive contribution to greenhouse emissions and to global warming. However, it is now only a matter of time before Australia's coal exports – and its substantial exported embodied emissions – become targets for concerted international and domestic action.

In all, Australia's coal sector can be seen as fractured – temporally, institutionally, geographically, and economically – and in decline. It is divided between the period before and after about 2010. It is split between national and subnational political spheres, and between coal-producing and non-coal producing states. Australia's national climate and energy resource policies run along two separate and increasingly contradictory paths – one domestic and the other export-oriented, a split most clearly evident in relation to coal. The forces reducing the distance between these tracks remain international and subnational rather than national – including the slowly refashioning of demand for Australian coal as importing countries and Australia's subnational states recognize the economic and ecological opportunities that renewables offer, and as growing public alarm at the accelerating threat of global warming reshapes the political landscape 'from below'.

Appendix

This chapter contains supplementary online material at <https://www.mcc-berlin.net/pecoal/ch13>.

Note

- 1 These are central, slow, and fast change, step change and High DER (Distributed Energy Resources). ‘The Central scenario is determined by market forces and current federal and state government policies. The other scenarios vary in the pace of the transition – a Slow Change scenario with slower economic growth and emission reductions, a High DER scenario with more rapid consumer adoption of DER, a Fast Change scenario with greater investment in grid-scale technology, and a Step Change scenario where both consumer-led and technology-led transitions occur in the midst of aggressive global decarbonisation’ (AEMO 2020c, 11).

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