EXHIBIT 44

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File Number 2017/383563

~~Gloucester~~ Gloucester Resources v Minister for Planning

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Expert Report

COURT DETAILS

Court	Land and Environment Court of NSW
Division	Class 1
Registry	Land and Environment Court Sydney
Case number	2017/00383563

TITLE OF PROCEEDINGS

First Applicant	Gloucester Resources Limited ACN 114162597
First Respondent	Minister for Planning
Second Respondent	Groundswell Gloucester Inc.

FILING DETAILS

Filed for	Groundswell Gloucester Inc., Respondent 2
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ATTACHMENT DETAILS

In accordance with Part 3 of the UCPR, this coversheet confirms that both the Lodge Document, along with any other documents listed below, were filed by the Court.

Expert Report (20180620 Tim Buckley IEEFA report FINAL with annexures.pdf)

[attach.]

Rocky Hill Coal Mine Proposal

Expert Report

NSW Land and Environment Court

(Proceedings 2017/383563)

20 June 2018

Tim Buckley

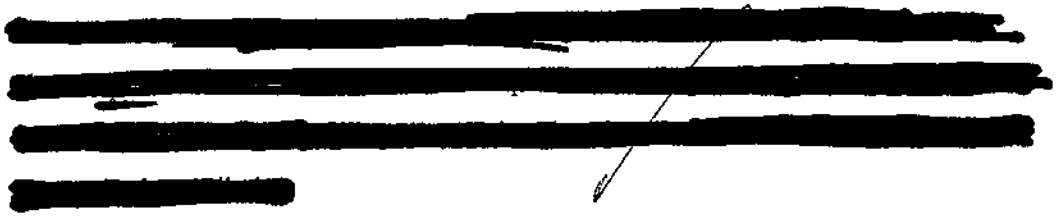
Director Energy Finance Studies Australasia

Institute of Energy Economics and Financial Analysis (IEEFA)

1. I have prepared this report in response to an expert brief provided to me by EDO NSW acting on behalf of Groundswell Gloucester Inc, dated 8 June 2018 (Annexure 1). I have reviewed Division 2 of Part 31 and the Expert Witness Code of Conduct under the *Uniform Civil Procedure Rules 2005* and I agree to be bound by their terms.
2. In this report, I have addressed the following questions:
    a. In your opinion, are there any market-based measures, including new technologies, or government policies sufficient to limit global temperature increases to less than 2 degrees Celsius (°C) above pre-industrial levels?
    b. In your opinion, are current policies (including within Australia) and market-based measures around the world consistent with limiting global temperature increases to less than 2°C above pre-industrial levels?
    c. In your opinion, are there alternative sources of coking coal currently available?
    d. In your opinion, will there be any changes to financial markets or carbon financing as a result of international commitments to ensure that global temperature rise will not exceed 2°C above pre-industrial levels?
    e. Provide any further observations or opinions which you consider to be relevant, having regard to the circumstances of this matter.
3. My professional experience and qualifications as a financial analyst with over 30 years experience including a decade focused on the international energy sector are detailed in Annexure 2.

Executive Summary

4. In my opinion, the Rocky Hill Coal Project (Project) proponent's expectation or presumption that the Project will operate for its full economic life is questionable. As witnessed with the recent cancellation of the long proposed $5 billion proposed new coal terminal at Newcastle Port in May 2018, in my opinion there is a high probability of significant technology, energy and environmental policy, and corporate and financial market changes at the state, national and global levels that will combine to challenge this presumption. In my opinion, there is a material risk that the Project will become a stranded asset during the course of its operating life.
5. Based on the evidence of Professor Steffen, it is my understanding that there is a relatively small remaining global carbon budget if the world is to have a reasonable chance of limiting global temperature rises to between 1.5-2.0°C above pre-industrial levels. Current energy policies globally are inconsistent with this target, so, assuming that countries will endeavour to honour their mutual commitments in the Paris Agreement, there is a clear need for, and likelihood of, continued policy tightenings when it comes to carbon emissions intensive products. As one of the largest sources of carbon emissions, coal will most likely be one of the products most impacted by such a policy tightening.
6. I have prepared this report for the NSW Land and Environment Court with reference to the most recent modelling and scenario analysis of the International Energy Agency (IEA). The IEA provides the most comprehensive global scenario modelling of global energy markets, with associated documentation showing their technology, policy, investment and economic analysis and assumptions.
7. The IEA's central New Policy Scenario (NPS) articulates that the current global policy settings collectively put the world on track for an approximate 2.7°C temperature rise above pre-industrial levels by the end of this century, given the current trajectory and the collective global energy policies as they stand today.
8. The IEA has an alternative scenario – the Sustainable Development Scenario (SDS) – that outlines the needed policy, technology and investment outcomes sufficient for the world to have some chance of limiting global warming to 2.0°C above pre-industrial levels.
9. [redacted]



10. There is a range of market-based measures, new technologies and government policies that, collectively, can provide the framework for finance and industry to implement investment plans that are very different to those historically pursued and which would suffice to allow the world to limit global temperature increases to 2 or 1.5°C above pre-industrial levels.
11. The Paris Agreement represents a global consensus on the need to act collectively to deliver on this objective. Australia signed the treaty commitment.
12. Notwithstanding that commitment, rather than following the required path of a progressive reduction in carbon emissions, Australia's domestic carbon emissions are again rising (up 1.5% in 2017), and the embedded emissions in Australia's fossil fuel exports are rising even faster. In this context, adding new greenfield coal mine capacity only serves to exacerbate this critical disconnect between Australia's current energy policy relative to the policy needed to ensure Australia delivers on its Paris Agreement commitments.
13. In my opinion, the inconsistency between the current insufficient policy framework and the commitments made by the international community to limit global temperature increases to between 1.5-2.0°C above pre-industrial levels means there will be a material global market disruption to historic practices as energy markets and industries are forced to re-align. The magnitude of this disruption is evident in the IEA SDS, which models a more than halving of global coal demand by 2040. Included within this overall coal decline forecast is a 40% decline in coking coal use from 2015 to 2040.
14. Given the implications of the IEA's scenario forecast for a 40% or more decline in global coking coal demand by 2040, in my opinion there is sufficient existing production capacity, in operation or already approved and under development, to meet current and likely future market demand for coking coal, particularly as there is some scope for substitution between various grades of coal.
15. An increasing number of countries, financial institutions and industry participants are progressively implementing measures and precautions to avoid stranded asset

risk and transition to lower emissions alternatives, and as the prevalence of such measures continues to lift, there is likely, in my opinion, to be a material adverse impact on the ongoing viability of the project.

16. According to the Office of the Chief Economist, Australia exports 98% of its domestic coking coal production, and Australia is the top export country for coking coal, accounting for 60% of world seaborne coking coal volumes. In my opinion, there is little scope for Australia to gain significant new market share. As such, there is more than enough existing Australian production capacity to supply the global market needs as mapped in the SDS.

17. Adding more capacity into a market that faces the clear potential of structural decline would increase stranded asset risks and lower the price Australia receives for a key export commodity, undermining the proposed project's viability and lowering the projected benefits in terms of royalties and corporate tax. Lower prices would likely lower the value of employee entitlements given lower prices generally result in additional cost down measures to attempt to maintain profit margins.

18. [redacted] With coal demand having peaked in 2013 and with the IEA SDS projecting a more than halving in global demand over the project development consent period, there is more than enough existing production capacity to supply the market needs.

19. In contrast, the Commonwealth Government's forecast is that Australian coking coal production and export volumes will rise more than 18% between 2017-2023. In my opinion, this continues a Commonwealth Government position of excessive optimism of ongoing growth that appears to ignore international technology, economic and policy changes. With actual demand for Australian coal exports down in volume terms over the last four years, forecasts for strong growth ignore the inevitable response of import buyers to lower demand in the face of a return to record high prices.

20. The advent of new technology developments could well see the need for coking coal in steel production removed within the life of the proposed project . Actions needed to deliver on the Paris Agreement (such as a wider adoption of an

emissions trading scheme (ETS) and / or a wider application of a coal tax and / or new restrictions on the supply of coal) would accelerate this technology innovation by enhancing its commercial viability.

Section 1: Honouring the commitments made at Paris

21. Coal mining is an industry that has historically justified its continued use through the need for coal in the production of electricity and steel in order to underpin economic growth. [redacted] NR

22. The Paris Agreement of 2015[1] is made under the United Nations Framework Convention on Climate Change (the UNFCCC). The central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 Celsius (°C) above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C.

23. The Paris Agreement entered into force on November 2016[2] and to-date 197 Parties have signed the agreement. Whether or not the US actually leaves,[3] in my opinion it is a reasonable assumption to make that the commitments enshrined in the Paris Agreement will be honoured in full.

24. Key to this assumption is that, while each country's direction is determined individually, the aim is for a collective whole to provide a sufficient global solution, and to encourage consensus, ambition and peer pressure, accelerating technology development in the process to develop low emissions alternatives.

25. The ratchet mechanism that is part of the Paris Agreement requires each country to revisit its NDC in 2020 with the aim of lifting the collective effort to move to a level of carbon emissions reductions consistent with a 1.5-2.0°C above pre-industrial levels climate outcome.

26. Australia ratified the Agreement in 2016.[4]

27. The International Energy Agency (IEA) is one of the most comprehensive and widely cited global entities assessing the state of energy markets, climate

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[1] "Paris Agreement", United Nations, 2015, https://unfccc.int/sites/default/files/english_paris_agreement.pdf

[2] "Paris Agreement – Status of Ratification", United Nations Climate Change, 5 October 2016, https://unfccc.int/process/the-paris-agreement/status-of-ratification

[3] "Climate change: Trump says US 'could conceivably' rejoin Paris deal", BBC, 11 January 2018, https://www.bbc.com/news/world-us-canada-42642331

[4] The Paris Climate Agreement entered into force on 4 November 2016. Australia announced its ratification of the Paris Agreement on 10 November 2016. Under Article 4, each country's commitment will be reviewed and updated every five years, with the priority on a progression on the previous contribution and to 'reflect the highest possible ambition'. https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1718/Quick_Guides/ParisAgreement

emissions, climate change and more broadly pollution impacts of energy policy. For this reason in this report I will focus on the IEA analysis and scenario analysis.

28. In May 2018 the IEA articulated that the world is currently failing to collectively deliver on the 1.5-2.0 °C target, suggesting a current trajectory more like 2.7°C.[5]

29. According to the IEA's World Energy Outlook 2017 report (WEO2017), coal mining and use is one of the largest sources of carbon emissions globally.[6] There is a range of technologies that are substitutes to coal and fossil fuels more generally that are increasingly cost competitive and are increasingly being commercially deployed. Assuming new policies are implemented that lead to significant emission reductions and investment flows respond, the IEA's Sustainable Development Scenario (SDS) models a scenario that sees total coal more than demand halve by 2040.[7] While demand for lignite and thermal coal for power generation is the primary market for coal, within the total coal forecast under the SDS, the IEA forecasts global demand for coking coal to decline by 40% relative to 2015.

Figure 1.1 The IEA Coal Forecast: 2040 compared to 2015 and 2016

	2015	2016	NPS 2040	NPS Chg vs 2016	SDS 2040	SDS Chg vs 2016	SDS Chg vs 2015
Total Coal (Mtce)	5,531	5,271	5,613	6.5%	2,539	-51.8%	-54.1%
Coking Coal (Mtce)	994	967	806	-16.6%	595	-38.5%	-40.1%

Source: IEA WEO2017, page 644-645

30. A May 2018 study suggests a very different logic for why the Paris Agreement commitments are likely to be met. This study examines the potential economic costs of climate change and concludes there is a reasonable assumption that policy shifts will accelerate once it becomes clear that economic costs will likely be lower as a result: "*... limiting warming to 1.5 °C would reduce economic damages relative to 2 °C, and a more than 60% chance that the accumulated global benefits will exceed US$20 trillion under a 3% discount rate (2010 US$).*"[8]

[5] The IEA's "Where are we on the road to clean energy?" was released 4th May 2018 http://www.iea.org/newsroom/news/2018/may/commentary-where-are-we-on-the-road-to-clean-energy.html?mc_cid=5ecd57f1ab&mc_eid=ca5790291b

[6] "The World Energy Outlook 2017," IEA, 14 November 2017, page 123

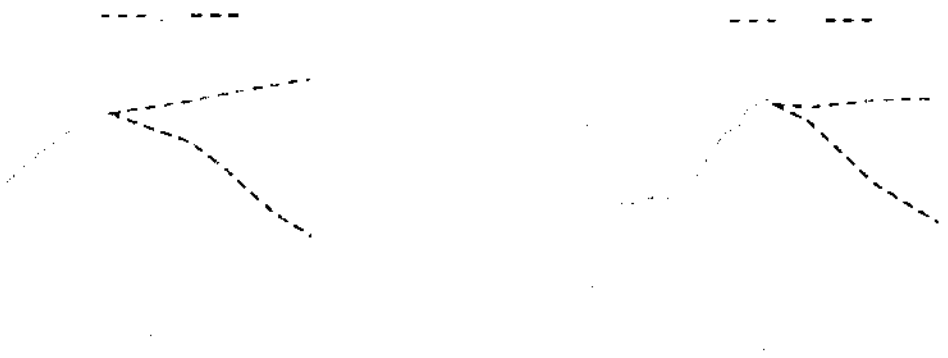
[7] "The World Energy Outlook 2017," IEA, 14 November 2017, pages 644-645

[8] "Large potential reduction in economic damages under UN mitigation targets" Marshall Burke, W. Matthew Davis & Noah S. Diffenbaugh, Nature Volume 557, 24 May 2018, https://doi.org/10.1038/s41586-018-0071-9

Section 2: Current global emissions trajectory is insufficient

31. The WEO2017 maps out various energy and emission trajectory scenario analyses predicated on different parameters. In this report I will reference the IEA's New Policies Scenario (NPS) and the SDS, which map the change in trajectory of emissions reduction relative to the do-nothing Current Policy Scenario (CPS), which provides the base-line as per Figure 2.1.[9] The chart on the right hand side of Figure 2.1 also shows the relative demand profile for global coal consumption for the period to 2040 in each scenario.
32. The three main IEA scenarios are:
    a. The first is the CPS, which models energy demand and carbon emissions assuming only existing energy polices remain in effect.
    b. The second and central NPS shows the current trajectory of global emissions and is broadly consistent with the collective outcome of the Nationally Determined Contributions (NDC) presented in the Paris Climate Agreement.
    c. The third policy, broadly consistent with the world having a 50% chance of limiting climate change to 2°C above pre-industrial levels, is detailed under its SDS.

Figure 2.1: The IEA's Emissions and Coal Paths under Different Scenarios



Source: IEA World Energy Outlook 2017 (Annexure A & Figure 5.1)

[9] "Climate Horizons Report", Centre for Policy Development 2018. Sam Hurley & Kate MacKenzie https://cpd.org.au/wp-content/uploads/2018/06/Climate-Horizons-report-2018.pdf

33. In Bonn in 2016, the United Nations Climate Change Secretariat reported that governments are not on track to achieve the Paris Agreement goals, and that the SDS was also proposing an insufficient energy path to achieve these goals.[10]

34. In May 2018 the IEA released a new paper "Where are we on the road to clean energy?" to assess the state of energy policy and investment globally. The IEA noted that in 2017, energy-related CO_2 emissions rose 1.4% after remaining flat for the three prior years, reaching an historic high of 32.5Gt, and concluded:[11]

> *"Increased ambition is greatly needed: the IEA estimates that current NDCs will set us on a path consistent with about 2.7°C warming by 2100, greatly overshooting the Paris Agreement goals of limiting temperature rise to well below 2°C and pursuing efforts towards 1.5 °C."*

35. The IEA's key aim is to raise ambitions to better align global energy policies with those required to deliver on the Paris Agreement.

36. Given there are a range of inputs and assumptions on economic growth, energy intensity of economic activity and the cost and speed of new technology development in any energy and emissions system modelling effort, there are different views about the magnitude of change from the current path that is required. In this report, I have relied on the IEA to set out some base modelling scenarios given their comprehensive peer reviewed modelling and documentation efforts.

37. [redacted] The IEA has also underestimated the associated rapid price reductions on lower emissions technologies that have resulted, as well as underestimating the level of policy response to air and water pollution pressures. In contrast, the IEA has overestimated the likely rate of development of new fossil fuel technologies such as carbon capture and storage. The net result is a systemic overestimation of fossil fuel demand by the IEA. In

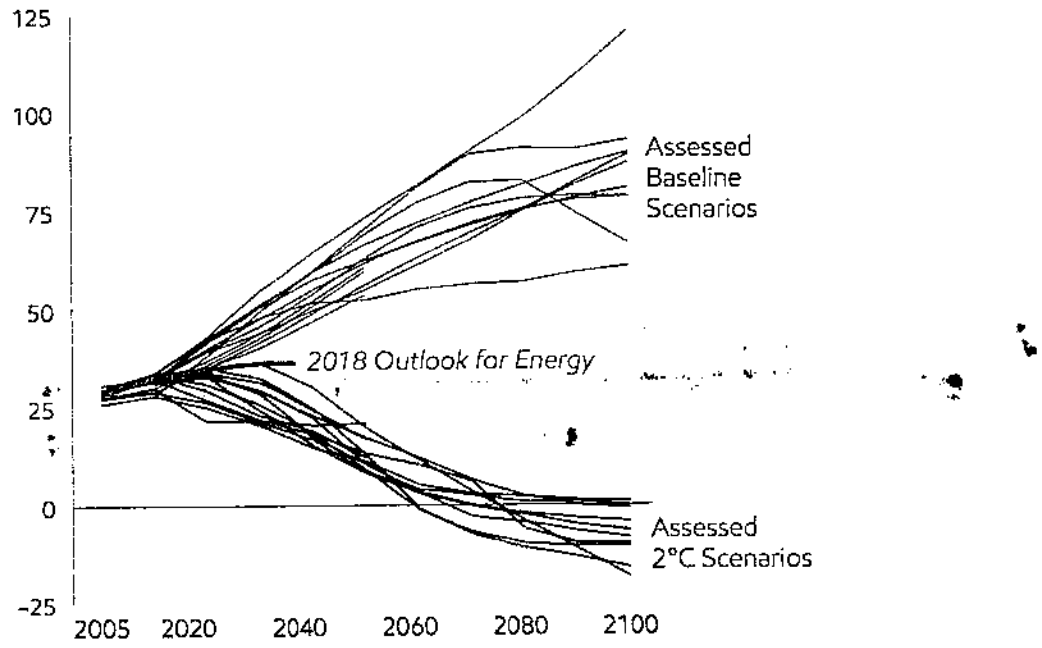
[10] UNFCCC ARTICLE / 20 MAY, 2016 "IEA: Governments Not on Track to Achieve Paris Agreement Goals", refer https://unfccc.int/news/iea-governments-not-on-track-to-achieve-paris-agreement-goals. Note INDCs changed to NDCs after the Paris Agreement was ratified in November 2016.

[11] May 2018 the IEA paper by Caroline Lee "Where are we on the road to clean energy?" http://www.iea.org/newsroom/news/2018/may/commentary-where-are-we-on-the-road-to-clean-energy.html?mc_cid=5ecd57f1ab&mc_eid=ca5790291b

my opinion, this suggests an even faster rate of decline in global coal demand from now to 2040 is possible.

38. ExxonMobil's "2018 Energy & Carbon Summary" provides one fossil fuel company's view that forecasts a level of high emissions energy demand to 2040 which is entirely inconsistent with a 2°C above pre-industrial levels outcome – Figure 2.2.[12] I note their historical forecasts made progressively over the last decade (purple) are consistently wrong i.e. above the actual (red). This highlights the stranded asset risks inherent in the fossil fuel industry, meaning firms continue to justify investment in new fossil fuel reserve exploration and development despite IEA modelling that shows global policy efforts will have to change from the current position for the world to deliver on its Paris Climate commitments.

Figure 2.2: The Paris Agreement Emissions Path vs ExxonMobil 2018



Source: ExxonMobil 2018 Energy & Carbon Summary

39. In another example, a research team from China published an analysis in May 2018 that forecasts the global climate could increase by 4 °C, compared to pre-

[12] "Exxonmobil 2018 Energy & Carbon Summary", ExxonMobil, 2 February 2017, page 7, http://cdn.exxonmobil.com/~/media/global/files/energy-and-environment/2018-energy-and-carbon-summary.pdf

industrial levels, before the end of 21st century on current global policy settings.[13] This assessment would indicate that even more radical policy changes need to be made by countries in their endeavours to ensure that the world will meet the Paris Agreement commitment of limiting global warming to between 1.5-2.0°C above pre-industrial levels. Based on this assessment, the decline in coking coal demand will be more than the IEA's estimate of a 40% fall by 2040.[14]

40. Accelerating international energy and environmental policy change is most evident in recent years in China, India, Taiwan and South Korea, which are Australia's top destinations for coal exports – refer Figure 6.2. If the world is to honour its Paris Agreement commitments, I would expect a further acceleration of energy and environmental policy shifts in these countries, and for this to be replicated across other countries experiencing high pollution such as Indonesia, Vietnam, Thailand and the Philippines. This means coal demand forecasts by the IEA would prove too high, even as forecast in the SDS. In contrast, Bloomberg New Energy Finance forecasts that by 2050, coal will produce just 11% of world electricity generation, down from 38% in 2017, a two-thirds market share loss in just over 30 years.[15]

[13] Advances in Atmospheric Sciences, May 18, 2018: https://link.springer.com/article/10.1007/s00376-018-7160-4

[14] This was detailed in the April 2018 report by Oil Change International (released in conjunction with IEEFA) titled "Off Track: How the IEA Guides Energy Decisions towards Fossil Fuel Dependence and Climate Change", Oilchange International & IEEFA, April 2018 http://priceofoil.org/content/uploads/2018/04/OFF-TRACK-the-IEA-Climate-Change.pdf

[15] "Batteries boom enables world to get half of electricity from wind and solar by 2050", Bloomberg New Energy Finance, 19 June 2018, Seb Hendvest, https://about.bnef.com/blog/batteries-boom-enables-world-get-half-electricity-wind-solar-2050/

Section 3: Continued technology change, financial market and corporate shifts must and are likely to continue

41. In my opinion there is a range of new developments across the financial and corporate markets, as well as in terms of the rate of deployment in newer technologies and an increasing number of government policies, that are collectively moving towards an emissions profile more consistent with that required to meet the Paris Agreement.

42. [redacted] NP

43. As the IEA SDS modelling shows, the level of change required in aggregate goes beyond a rapid decarbonisation of the electricity sector. In my opinion the policy changes and technology learnings of the electricity sector will accelerate technology change and decarbonisation of manufacturing industries, including the steel industry – refer Section 7.

44. In my opinion, should the collective global political will be applied in full to the aim of reducing carbon emissions, the speed of technology adoption and technology convergence would accelerate and this will have an exponential effect on high emissions intensive industries, including power generation, steel manufacturing and transportation, particularly as the global financial markets will move to more fully factor in climate risk and carbon pricing.

45. In my opinion, this would in turn drive an immediate repricing of assets – heavy emissions asset values would decline or even collapse (as was seen with Peabody Energy US in 2016), and the global capital flow to low emissions alternatives would accelerate. This is already happening in a growing number of electricity markets around the world, and is starting to happen in the automotive sector with an accelerated uptake of electric vehicles. These changes would have a material negative impact on the demand for and hence price of coal, including coking coal, during the lifetime of the project.

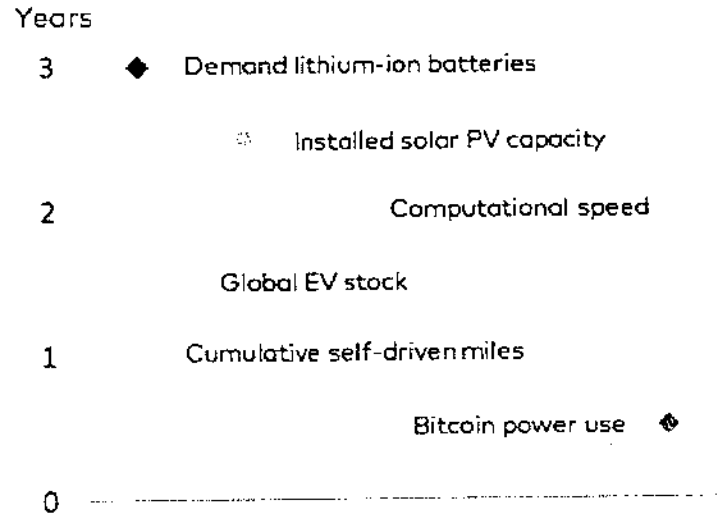
Technology Change

46. In my opinion, the speed of technology change, turning points and market disruptions is hard to predict and to incorporate in forecasts based on models built using historical evidence. [redacted] Whilst this is most clear in the electricity sector, I expect a technology-led convergence to have a very material impact across a wide range of other sectors, particularly transportation (with renewable energy-powered lithium-ion batteries driving an acceleration in the global deployment of electric vehicles, led by China).

NR

47. As per Figure 3.1, the most recent observed doubling time (in terms of volume use) of six new technologies in the energy sector is less than 3 years. This is very pertinent to the risks of the steel industry moving to less or even zero carbon emissions intensive steel manufacturing processes using new technology innovations that could remove the need for coking coal entirely.

Figure 3.1: The Most Recent Doubling Time of New Technologies



Source: Statoil / Equinor, "Energy Perspectives 2018"[16]

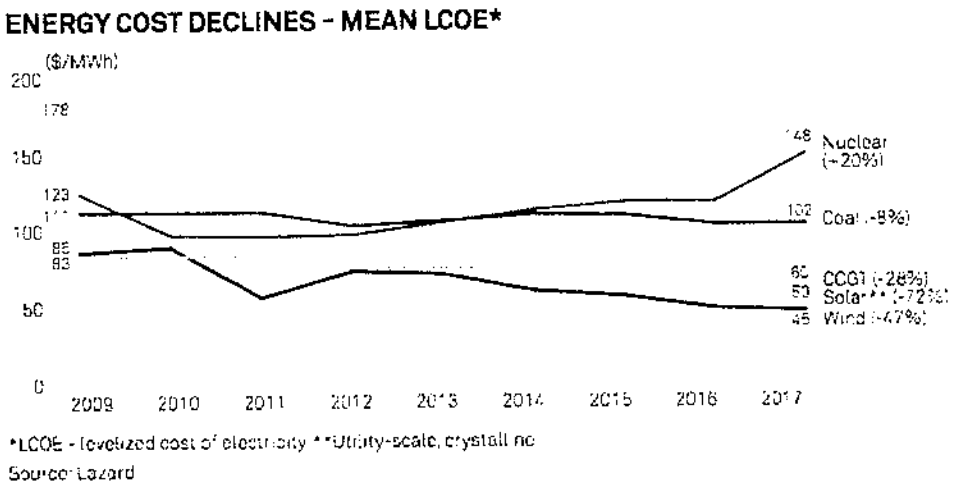
48. The UN's International Renewable Energy Agency (IRENA) published a report in April 2018 titled "Global Energy Transformation: A Roadmap to 2050". The report models that "*renewable energy and energy efficiency can, in combination,*

[16] Equinor, "Energy Perspectives 2018: Long-term macro and market outlook", May 2018 refer https://www.equinor.com/content/dam/statoil/documents/energy-perspectives/energy-perspectives-2018.pdf#page4

provide over 90% of the necessary energy-related CO_2 emission reductions" needed to achieve the world's decarbonisation and climate goals using technologies that are affordable and widely available today.

49. Renewable energy has seen rampant cost deflation over the last few years – as detailed by the global investment bank Lazard, refer Figure 3.2. This illustrates the rapid impact of technology change and development of alternatives in the energy sector.

Figure 3.2: Energy Cost Deflation (2009-2017)[17]



50. While the rapid decline in the relative cost of renewable energy electricity generation primarily affects the use of oil, gas and thermal coal rather than coking coal, there is some substitution between the various grades of coal in terms of end use. So while the project is predominantly targeting the coking coal for steel market, and for example Shenhua's Watermark project is primarily targeting the thermal coal for power generation sector, there is some degree of end use substitution depending upon relative demand and relative pricing.[18]

51. In my opinion the electricity sector has better and commercially low cost scope for relatively rapid and immediate emissions reductions gains, but, as the IEA models, reductions in thermal coal use are not sufficient to meet the Paris

[17] https://www.lazard.com/perspective/levelized-cost-of-energy-2017/

[18] Pulverised coal injection (PCI) has become a standard practice in many of the worlds major steelworks. Finely ground coal is injected with the hot blast directly into the raceway of the furnace to provide energy and reductant in addition to that from the coke bed, thus replacing some of the coke with cheaper non-coking or weakly coking coal. Hence the PCI process increases the economic efficiency of steel-making by using lower cost coals to reduce consumption of higher cost prime coking coals. – Refer "Queensland high energy coals for the PCI market", Queensland Government Natural Resources and Mines, https://www.dnrm.qld.gov.au/?a=267495

Agreement commitments, and the technology gains in electricity are therefore going to need to be applied to industry sectors including steel. As such, it is relevant that the IEA models a more than 50% total coal reduction by 2040 in the SDS, and within this, forecasts a 40% reduction in coking coal use.

52. The convergence of the electricity and transportation sectors is being brought about by the rapid development of new technologies relating to lithium ion batteries and electric vehicles, which an accelerating, technology driven disruption not forecast by the IEA and with significant emissions reductions potential.

53. India is the best illustration of this, where the cost of renewables is now 10-20% below the cost of existing thermal power generation. India's National Electricity Plan 2018 is firmly on-track for a fivefold expansion of renewables capacity by 2027 to a total of 275 gigawatts. This would see coal's share of the Indian electricity market generational capacity drop from 59% in 2017 to just 39% by 2027.[19] In June 2018 India flagged a 25% uplift in its renewable energy target for 2022, showing the rate of positive change in its energy policies.[20]

Financial Market Changes

54. In addition to the use of a direct price on carbon emissions or coal use (discussed further below), plus tighter policy frameworks to reduce demand and curtail supply of coal - generally starting with thermal coal, the size of emissions reductions required to meet the Paris Agreement requires a focus on all high carbon emissions sectors including steel. In my opinion the rising probability of negative policy actions impacting the global coal markets will see an acceleration in financial market initiatives that will work against continued use of coal.

55. An increasing number of the world's largest financial institutions have introduced lending, insurance and investment policies to restrict or outright ban their involvement in the coal industry, both the upstream mining as well as downstream use of coal e.g. utilities, mining contractors and service providers to avoid the stranded asset risks of the highest emissions intensive sectors.

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[19] Government of India Central Electricity Authority, National Electricity Plan 2018 refer https://www.scribd.com/document/377133985/National-Electricity-Plan-for-India-2018-Power-Generation

[20] "Renewable energy target now 227 GW, will need $50 billion more in investments", Nishtha Saluja, Sarita Singh, ET Bureau, 5 June 2018, https://economictimes.indiatimes.com/industry/energy/power/india-will-add-225-gw-renewable-energy-project-capacity-by-2022-r-k-singh/articleshow/64461995.cms

56. A "2018 Global Investor Statement to Governments on Climate Change" was signed by 288 investors representing a combined US$26 trillion of assets, a reflection of the growing pressures investors are putting on financial institutions to better assess and price in climate risks. This statement calls for the utmost urgency in implementing actions to achieve the Paris Agreement, noting the "ambitions gap" between current policies and that required to limit climate change to 1.5-2.0°C.[21] In addition, the statement puts a strong emphasis on the likely impact of the Task Force on Climate-related Financial Disclosure (TCFD), which is referenced below.
57. The most visible of the global investor moves to-date has been that of the US$1 trillion Sovereign Wealth Fund of Norway, which has been progressively tightening its global investment policies to exclude high carbon emissions firms, starting with the divestment of coal mining and coal power companies.
58. The world's largest asset manager is Blackrock with US$6 trillion of assets under management. In 2017 a senior executive of Blackrock controversially stated "coal is dead" and that Australia is "denying gravity" by continuing to encourage coal investments.[22] Blackrock's CEO shareholder letter has called on companies to focus on the long term strategy,[23] and this group has called for a higher and global price on carbon emissions.[24]
59. In May 2018, Europe's largest Fund Manager with US$1.6 trillion of assets, Amundi SA, highlighted climate change as an issue that had reached a "*tipping point, ... it's changing, and its changing super fast.*"[25]
60. The Asia Infrastructure Investment Bank, which has a target of US$100bn of equity, has similarly targeted low emissions or green lending as its top priority,

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[21] "2018 Global Investor Statement To Governments On Climate Change", CDP, Ceres, IIGCC, PRI, UNEP Finance Initiative, 4 June 2018, https://igcc.org.au/wp-content/uploads/2018/06/GISGCC_FINAL_for_G7_with_signatories.pdf

[22] "BlackRock says coal is dead as it eyes renewable power splurge", The Australian Financial Review, Jenny Wiggins, 26 May 2017, http://www.afr.com/business/mining/coal/blackrock-says-coal-is-dead-as-it-eyes-renewable-power-splurge-20170524-gwbuu6

[23] "Larry Fink says BlackRock will take activism to a 'whole new level'", The Australian Financial Review, Tony Boyd, 31 October 2017, http://www.afr.com/business/larry-fink-says-blackrock-will-take-activism-to-a-whole-new-level-20171031-gzc2lt#ixzz51a1RGiju

[24] "BlackRock calls for higher carbon price to tackle climate change", Financial Times, Attracta Mooney, 27 October 2016, https://www.ft.com/content/bde6859a-9ac2-11e6-8f9b-70e3cabccfae

[25] "Europe's Largest Asset Manager Sees 'Tipping Point' on Climate", Bloomberg, Anna Hirtenstein, 31 May 2018, https://www.bloomberg.com/news/articles/2018-05-31/europe-s-largest-asset-manager-sees-tipping-point-on-climate

directing an increasing flow of infrastructure investment to low emissions sectors.[26]

61. In terms of global banks, there has been a run of announcements including Deutsche Bank,[27] HSBC,[28] RBS,[29] Bank of America[30] and Citigroup[31] as well as global development banks (The World Bank[32]) to curtail or outright exclude lending to the coal sector and / or accelerate investment in low emissions alternatives. Concurrent with this has been a significant lift in ambition in terms of lending to zero emissions alternatives, e.g. Citigroup's US$100bn of lending by 2020.[33] In 2017 JPMorgan (US) also committed to facilitating US$200bn in clean energy financing by 2025.[34]

62. Australia's five major banks have similarly announced coal lending restrictions and ambitious renewable energy lending targets, e.g. Westpac's coal restrictions, and $25bn of lending in climate change solutions by 2030.[35]

63. This global move to limit financial exposure to coal has extended into the insurance sector, with recent policy announcements to avoid stranded assets by restricting or excluding investing in or insuring to some or all financing of new

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[26] "China's Answer to the World Bank Wants Green, Clean Asian Infrastructure", Bloomberg, Brian Bremner & Miao Han, 8 April 2018, https://www.bloomberg.com/features/2018-asian-infrastructure-investment-bank-jin-liqun-interview/

[27] "Amended guidelines for coal financing", Deutsche Bank, 31 January 2017, https://www.db.com/newsroom_news/2017/medien/amended-guidelines-for-coal-financing-en-11466.htm

[28] "HSBC to promise an end to its financing of coal power stations", Financial Times, Martin Arnold, 20 April 2018, https://www.ft.com/content/a05e77e0-43ee-11e8-93cf-67ac3a6482fd

[29] "RBS introduces new energy financing policies to support low carbon transition", Royal Bank of Scotland, 29 May 2018, https://www.rbs.com/rbs/news/2018/05/rbs-introduces-new-energy-financing-policies-to-support-low-carb.html

[30] "Bank of America Coal Policy", 6 May 2015, https://about.bankofamerica.com/assets/pdf/COAL_POLICY.pdf and "Bank of America commits to $125 billion green funding", Julian Mylchreest, 5 July 2016, http://www.climatechangenews.com/2016/07/05/bank-of-america-commits-to-125-billion-green-funding-by-2025/ and https://about.bankofamerica.com/assets/pdf/Environmental-and-Social-Risk-Policy-Framework.pdf

[31] "Citi Announces $100 Billion, 10-Year Commitment to Finance Sustainable Growth", Citigroup, 18 February 2015, https://www.citigroup.com/citi/news/2015/150218a.htm

[32] "Signaling more independence from the US, the World Bank phases out its support for fossil fuels", The Conversation, Jason Kirk, 17 January 2018, https://theconversation.com/signaling-more-independence-from-the-us-the-world-bank-phases-out-its-support-for-fossil-fuels-89497

[33] "Citigroup Joins Corporate Climate Fight With Swift Energy Pledge", Bloomberg, Eric Roston, 21 September 2017, https://www.bloomberg.com/news/articles/2017-09-20/citigroup-joins-corporate-climate-fight-with-swift-energy-pledge

[34] "JPMorgan Chase to be 100 Percent Reliant on Renewable Energy by 2020; Announces $200 Billion Clean Energy Financing Commitment", JP Morgan Chase & Co, 31 July 2017, https://www.jpmorganchase.com/corporate/Corporate-Responsibility/document/jpmc-cr-sustainability-fact-sheet.pdf

[35] https://www.westpac.com.au/about-westpac/media/media-releases/2017/28-april/

coal mining and / or coal power generation from Allianz, [36] Swiss Re,[37] AXA,[38] Assicurazioni Generali[39] and Lloyds.[40]

64. In May 2018, Dai-ichi Life Insurance (the second largest insurer in Japan) announced a move to exclude coal from its insurance coverage universe.[41] Also in May 2018, Mitsubishi UFJ Group[42] and then, in June 2018, Mizuho Financial Group similarly announced an updated plan for socially responsible investing by increasing lending to renewables and to limit lending to coal in recognition of the environmental and social risks of coal-fired power generation.[43] I specifically mention changing financial practices here, given Japan is Australia's largest coal import customer and these are three of the largest financial institutions in Japan.[44] In my opinion this is indicative of a potentially material turning point in financial risk assessment on climate change, as flagged by Japanese Foreign Minister Taro Kono in January 2018, [45] which could accelerate policy change as a result.

65. Berkshire Hathaway's 2018 letter to shareholders identifies one aspect of rising climate change risk – extreme weather events. September 2017 saw three hurricanes hit Texas, Florida and Puerto Rico for a combined insured loss of some US$100 billion. Warren Buffett then warned of the risks of a U.S. mega-catastrophe causing $400 billion or more of insured losses and the likely

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[36] 4 May 2018: https://www.allianz.com/en/press/news/business/insurance/180504_allianz-announces-climate-protection-package/

[37] "Climate Change - from Strategy to Activity" Swiss Re http://www.swissre.com/about_us/about_our_business/asset_management/climate_change_from_strategy_to_activity.html

[38] "AXA launches new climate change actions", 12 December 2017 https://www.axa.com/en/newsroom/news/axa-launches-new-climate-change-actions

[39] "Generali Approves Climate Change Strategy. It Will Divest €2 Billion From Coal", Assicurazioni Generali, 21 February 2018, https://www.generali.com/media/press-releases/all/2018/Generali-approves-climate-change-strategy-It-will-divest-2-billion-from-coal

[40] "After the storms: Harvey, Irma and Maria", Lloyds, 31 May 2018, https://www.lloyds.com/news-and-risk-insight/risk-reports/library/natural-environment/afterthestorms

[41] https://www.bloomberg.com/news/articles/2018-05-11/cracks-emerge-in-coal-stronghold-as-insurers-mull-funding-curbs

[42] "MUFG Adopts Environmental Policy Statement, Human Rights Policy Statement, and Environmental and Social Policy Framework" Tokyo, MUFG, 15 May 2018 https://www.mufg.jp/english/vcms_lf/news/pressrelease-20180515-005-e.pdf

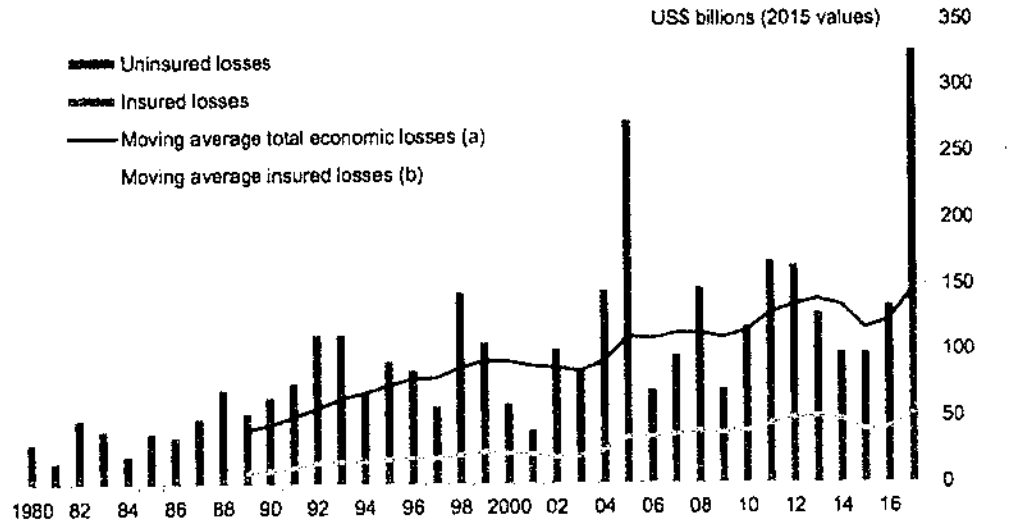
[43] "On strengthening the management structure of responsible investment and loans"; Mizuho Financial Group, Inc., June 13, 2018 https://www.mizuho-fg.co.jp/release/pdf/20180613release_jp.pdf

[44] "Overview of Banks in Japan", Corporate Finance Institute, accessed 19 June 2018, https://corporatefinanceinstitute.com/resources/careers/companies/top-banks-in-japan/

[45] "Foreign Minister Kono decries Japan's renewable energy policy" Jan 14, 2018, *KYODO NEWS*, https://english.kyodonews.net/news/2018/01/4f7d99f8630f-minister-raps-govt-energy-policy-vows-to-promote-renewables.html

consequence of bankrupting most re-insurers.[46] *The Economist* reported 2017 was a record loss year for insurers.[47]

Figure 3.3: Global Weather Related Insurance Losses



(a) Total Economic Losses = Insured + Uninsured losses. (b) 10-year moving average
Source: Munich Reinsurance Company, Geo Risks Research, NatCatSERVICE

66. In my opinion climate litigation risk and directors' fiduciary duties are likely to be re-defined to avoid legal, reputational and financial risks associated with climate change. In June 2018 it was reported that Britain's biggest asset manager, Legal & General, had written seeking removal of eight Chairs of fossil fuel companies over climate inaction.[48] This follows moves in January 2018 by two of the largest asset managers and New York City to sue fossil fuel majors over the current and future costs relating to climate change.[49]
67. In June 2018, the UK Pensions Office opened a consultation for Fiduciary Duties in Investing to address a common misunderstanding about the timeframe and

[46] Warren Buffett's Letters to Berkshire Hathaway Shareholders, 5 May 2018 http://www.berkshirehathaway.com/letters/2017ltr.pdf
[47] "Natural disasters made 2017 a year of record insurance losses. But the reinsurance industry emerged in good shape", The Economist, 11 January 2018, https://www.economist.com/finance-and-economics/2018/01/11/natural-disasters-made-2017-a-year-of-record-insurance-losses
[48] "Investor LGIM Seeks Removal of Eight Company Chairs Over Climate Change Inaction", Reuters, June 10, 2018 https://www.nytimes.com/reuters/2018/06/10/business/10reuters-l-g-funds-climatechange.html
[49] "New York City sues Shell, ExxonMobil and other oil companies over climate change", Chris Mooney and Dino Grandoni, 10 January 2018 https://www.washingtonpost.com/news/energy-environment/wp/2018/01/10/new-york-city-sues-shell-exxonmobil-and-other-oil-majors-over-climate-change/?utm_term=.a030fc0a3a87

scope of fiduciary duties and to ensure that "*trustees should take into account factors financially material to the performance of an investment, whatever their source.*" The proposal is to require trustees to specifically update their default strategy to address how they take financially material considerations like climate change into account.[50]

68. In my opinion, global financial markets moves to divest, reduce or cease financing high carbon emissions sectors (starting with coal) will accelerate, as the stranded asset risks of investing, lending or insuring coal projects and associated infrastructure, is increasingly priced into the capital markets. A June 2018 policy paper identified that "*large discrepancies persist between projections of the physical impacts of climate change and economic damage estimates.*"[51]
69. Several of Australia's largest coal ports are already in financial distress and finding increasing difficulties in securing refinancing, including Newcastle Port in NSW, together with Wiggins Island Coal Export Terminal[52] and Abbot Point Coal Terminal[53] in Queensland. Given Wiggins Island and Abbot Point are predominantly coking coal export facilities,[54] this highlights the flow-on implications of stranded asset risks. While to-date the most significant technology improvements and cost reductions have been made in alternatives to thermal coal, the coking and thermal coal sectors are largely interdependent for their workforce and supporting infrastructure, while coal deposits often provide a mix of thermal and coking coal output.
70. The last decade has seen a relatively solid correlation in the price of thermal and coking coal, reflecting similar end market demand characteristics but also the

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[50] "Consultation on clarifying and strengthening trustees' investment duties", The Occupational Pension Schemes (Investment and Disclosure) (Amendment) Regulations 2018, June 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716949/consultation-clarifying-and-strengthening-trustees-investment-duties.pdf

[51] "Recommendations for Improving the Treatment of Risk and Uncertainty in Economic Estimates of Climate Impacts in the Sixth Intergovernmental Panel on Climate Change Assessment Report", Thomas Stoerk, Gernot Wagner & Robert E T Ward, 4 June 2018 https://academic.oup.com/reep/advance-article/doi/10.1093/reep/rey005/5025082

[52] "Hopes fade for quick Wiggins Island Coal Export Terminal restructure", The Australian, Bridget Carter and Scott Murdoch, 10 August 2017 http://www.theaustralian.com.au/business/dataroom/hopes-fade-for-quick-wiggins-island-coal-export-terminal-restructure/news-story/9eae3ef6894a01f745c15e45ad04285e

[53] "Adani rethinks Abbot Point options after debt refinancing stalls", 8 March 2018, Reuters, Sharon Klyne and Prakash Chakravarti, https://www.reuters.com/article/us-australia-adani-ent-port/adani-rethinks-abbot-point-options-after-debt-refinancing-stalls-idUSKCN1GK0XO

[54] "A house of Cards in Australia: Adani's Abbot Point Coal Terminal Faces Escalating Financial Risk", IEEFA, Tim Buckley & Simon Nicholas, October 2017, http://ieefa.org/wp-content/uploads/2017/10/Escalating-Financial-Risk-of-Adanis-Abbot-Point-Coal-Terminal.pdf

scope for some grade substitution and coal processing / washing to refine the raw coal characteristics. The Queensland coal industry has seen the emergence of the pulverised coal injection (PCI) segment as a composite with characteristics blended across thermal and coking coal, where PCI has developed as a niche market to provide a lower cost alternative to reduce the use of coking coal in blast furnaces.[55]

Task Force on Climate-related Financial Disclosures

71. The Task Force on Climate-related Financial Disclosures (TCFD) was established by the Financial Stability Board and Governor of the Reserve Bank of England Mark Carney in 2016 with the aim of driving a dramatic improvement in global disclosure and assessment of climate-related financial risks in the context of corporates' existing disclosure requirements.
72. The TCFD is increasingly being used as the basis for risk assessment and reporting requirements in the financial sector, as referenced by APRA's Executive Director Geoff Summerhayes in his November 2017 speech "The Weight of Money: A Business Case for Climate Risk Resilience".[56]
73. This was reinforced by an April 2018 speech by Mark Carney, Governor of the Bank of England, highlighting how far a transition there has been in thinking and action since 2015 in understanding the physical, liability and disruption risks of climate change, but also on the increasing scope for technology to provide a solution in an orderly, effective and productive manner.[57]
74. In December 2017, Moody's Investor Services Inc. warned that its credit ratings on American cities and states would from then be impacted by their preparedness for climate change risks.[58]
75. In my opinion, even in the absence of necessary action on climate change at the national policy level, corporations and financial institutions will increasingly evaluate and act on the presumption of a price on carbon as a key input in any

[55] "Queensland high energy coals for the PCI market", Queensland Government Natural Resources and Mines, 2018 https://www.dnrm.qld.gov.au/?a=267495
[56] http://www.apra.gov.au/Speeches/Documents/CPD%20Speech%2029Nov2017.pdf
[57] "A Transition in Thinking and Action", Remarks by Mark Carney, Governor of the Bank of England, 6 April 2018, https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/a-transition-in-thinking-and-action-speech-by-mark-carney.pdf
[58] "Credit Rating Agency Issues Warning On Climate Change To Cities", National Public Radio, 1 December 2017, https://www.npr.org/2017/12/01/567843604/credit-rating-agency-issues-warning-on-climate-change-to-cities

investment decision involving material carbon emissions. Stranded asset risks are real, and rising.

76. In a letter published in the Financial Times on 18 May 2018, 60 fund managers with a combined $10.4 trillion in assets urged the oil and gas industry to be "*more transparent and take responsibility for all of its emissions*".[59]

77. In May 2018 Christopher Hohn, a hedge-fund manager, wrote an open letter to the Bank of England warning that investors lacked the information they needed to assess the "serious climate-related risks" British banks are exposed to through their loan books.[60]

78. In June 2018 the Australian Securities and Investments Commission (ASIC) gave a speech titled Climate Change that confirmed the Noel Hutley SC Opinion[61] by stating: "*We continue to see both internationally and in our own market an increasing focus on company matters that sit outside of traditional evaluative metrics and in particular, those matters concerning the environment, sustainability and/or governance. The evidence is very clear.*"[62]

79. In my opinion, a continued tightening of financial markets to carbon emissions risks is likely to materially affect the viability of the coal industry globally, and capital flight will dramatically reduce demand for thermal and coking coal in the medium term, well within the life of the proposed project.

Corporate shifts

80. Coal and gas power generation power plants have a useful life of 30-50 years and one way to track long term demand for coal and gas for power generation is to examine the amount of investment in new thermal power turbines. GE and Siemens are two of the largest manufacturers of such equipment, and the materially diminished outlook for their business is evident in the decline in their order books over the last year. With reduced investment in power plants, it

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[59] "Investors With $10.4 Trillion Assets Urge Big Oil To Tackle Climate Change". Oilprice.com, Tsvetana Paraskova, 18 May 2018 https://oilprice.com/Latest-Energy-News/World-News/Investors-With-104-Trillion-Assets-Urge-Big-Oil-To-Tackle-Climate-Change.html

[60] "Bank of England urged to act on lenders' climate change risks", Financial Times, Attracta Mooney & Nicholas Megaw, 22 May 2018 https://www.ft.com/content/b050c6ea-5cfc-11e8-ad91-e01af256df68

[61] Noel Hutley, SC and Sesbastian Hartford-Davis, Climate Change and Directors' Duties, Memorandum of Opinion, 7 October 2016

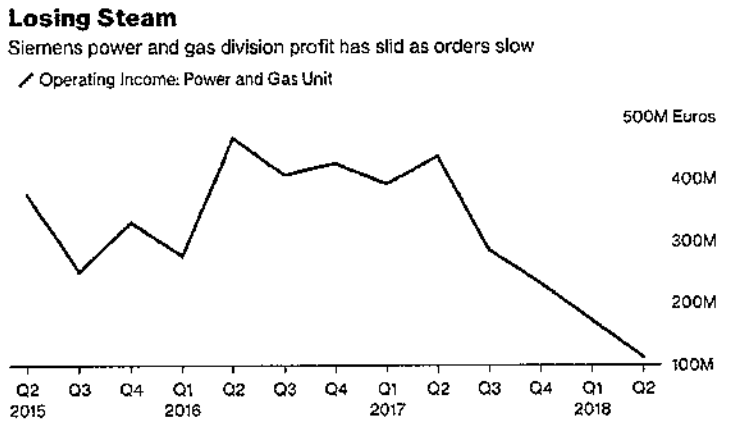
[62] "Climate change", ASIC Commissioner John Price, 18 June 2018, https://asic.gov.au/about-asic/media-centre/speeches/climate-change/

follows that demand for thermal coal and gas for power generation is likely to be reduced relative to earlier expectations.

81. Historically one of the world's largest thermal power equipment suppliers, General Electric reported in April 2018 its January-March 2018 quarter equipment orders declined 40% year-on-year after a 17% decline in 2017 orders saw the company cut staff 12,000.[63]

82. A key competitor in this sector is Siemens, which reported plans to cut 6,900 staff in the same timeframe after a similar major decline in orders and collapse in profitability – Figure 3.4.[64]

Figure 3.4: Siemen's Power and Gas Division Profitability Collapse[65]



Source: Siemens financial accounts, Bloomberg.

83. These announcements by two of the largest global thermal power equipment suppliers highlight the speed of technology change and its impact on high emissions energy sectors, which is being underestimated by leading industrial corporations. Given the rising cost competitiveness of renewable energy and rising carbon prices, Siemens has accelerated investment in developing commercially hydrogen production from renewable energy, which is a key prerequisite to making steel without use of coking coal (refer Section 7).

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[63] https://www.ge.com/investor-relations/sites/default/files/ge_webcast_presentation_04202018.pdf

[64] https://www.siemens.com/press/pool/de/events/2018/corporate/2018-Q2/2018-q2-earnings-release-e.pdf and "Siemens Said to Mull Sale of Flagship Gas Turbine Business", Oliver Sachgau and Eyk Henning, 13 June 2018 https://www.bloomberg.com/news/articles/2018-06-13/siemens-said-to-consider-sale-of-flagship-gas-turbine-business

[65] "Siemens Said to Mull Sale of Flagship Gas Turbine Business", Bloomberg, Oliver Sachgau and Eyk Henning, 13 June 2018, https://www.bloomberg.com/news/articles/2018-06-13/siemens-said-to-consider-sale-of-flagship-gas-turbine-business

84. The economic costs and risks associated with climate change are significant and in my opinion have been generally underestimated by the financial markets and key polluting companies. The decade long underperformance of many of the world's largest power utility firms relative to their national equity market benchmarks is a clear sign of the resulting shareholder wealth destruction.[66]

85. The "RE100" is an initiative by more than 100 of the most influential global firms to move to 100% reliance on renewable energy as a way of driving many of the world's leading companies to also implement zero emissions strategies.[67] In June 2018, Korea's leading Samsung Electronics committed to 100% renewable energy by 2020, citing the move as consistent with the positive change in South Korea's energy policy.[68] South Korea is one of Australia's top coal import customers.

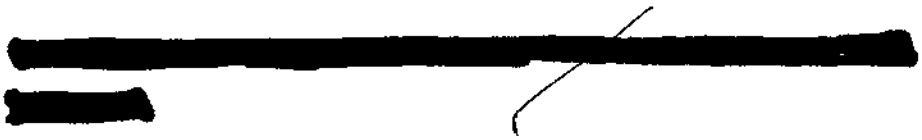
86. One June 2018 study by Thomas Stoerk et al in Oxford Academic concluded "*current economic models of the aggregate global impacts of climate change are inadequate in their treatment of uncertainty and grossly underestimate potential future risks.*"[69]

87. So on the assumption that the world will collectively aim to deliver on the Paris Agreement, a significant ratcheting up in collective global policy and corporate / market measures is inevitable.

Australia

88. [redacted]

[66] http://ieefa.org/wp-content/uploads/2017/10/IEEFA-Global-Utilities-in-Transition-11-Case-Studies-October-2017.pdf
[67] "About RE100" The Climate Group, CDP, accessed 19 June 2018, http://there100.org
[68] "Samsung Electronics to Expand Use of Renewable Energy" Samsung Electronics Korea, June 14, 2018 https://news.samsung.com/global/samsung-electronics-to-expand-use-of-renewable-energy
[69] Oxford Academic, 3 June 2018, Thomas Stoerk, Gernot Wagner, Robert Ward "Recommendations for Improving the Treatment of Risk and Uncertainty in Economic Estimates of Climate Impacts in the Sixth Intergovernmental Panel on Climate Change Assessment Report" https://academic.oup.com/reep/advance-article/doi/10.1093/reep/rey005/5025082
[70] "Advance Australia's fair share: assessing the fairness of emissions targets", The Australia Institute, Richard Merzian, Rod Campbell, 12 June 2018, http://www.tai.org.au/content/advance-australias-fair-share



Section 4: Emissions-related policy tightening is happening

89. Global leaders like Mark Carney and Christiana Figueres, the former executive secretary of the UNFCCC, have highlighted the need for economies to decarbonise to remain competitive.[71] Current global policy action is insufficient, and in my opinion this means emissions intensive industries will face a continued policy tightening environment globally.

90. Coal mining and burning is one of the largest sources of carbon emissions, and mining and the use of coal also creates a range of other pollution problems. As such, energy, climate and environmental policies have a significant degree of overlap, particularly in the key countries heavily reliant on coal as a source of energy – namely China, India, Japan, South Korea and Taiwan. Policy momentum in a number of these countries has shifted considerably in the last few years.

91. While Australia has not embraced many of these policies, 81% of thermal coal and 98% of coking coal production in Australia is exported,[72] such that a focus on policies already adopted, and likely to be adopted in the future in Australia's key export markets, is relevant to an evaluation of future coking coal demand.

Policy Frameworks

92. There is a range of frameworks for market based and policy initiatives to lower carbon emissions. The following section details six of the leading policies that have been used to reduce carbon emissions across various markets, including emissions trading schemes, carbon taxes, a coal tax, pollution controls, industry targets and supply restrictions. I examine each of these, with a particular focus on Australia's key coal export destinations across Asia.

A. Emissions Trading Schemes

93. In my opinion, the market is best able to find the least cost set of solutions required to deliver an overall reduction in carbon emissions. But a critical pre-

[71] "Economies have to decarbonise to stay competitive, says former UNFCCC chief", China Dialogue, Charlotte Middlehurst, 5 May 2018, https://www.chinadialogue.net/blog/10654-Economies-have-to-decarbonise-to-stay-competitive-says-former-UNFCCC-chief/en

[72] Office of the Chief Economist, March 2018 "Resources and Energy Quarterly report page 38

requisite for the market to do this is a government policy framework that accounts for what is currently an unpriced externality (i.e. carbon emissions).[73]

94. In my opinion a comprehensive emissions trading scheme (ETS)[74] is the least cost solution to reducing carbon emissions. A whole of economy pricing and trading of carbon emissions allows the market to decide which are the least cost options across all areas. Those businesses which can afford the cost of emissions can continue polluting but incur additional costs and hence likely see lower profitability; those businesses that cannot afford the cost of abatement will go out of business.

95. An ETS can incentivise currently known, commercially viable abatement or carbon free energy technology alternatives and can also incentivise a range of potential new technologies. Many of these options are not commercially viable in the absence of a price on carbon e.g. hydrogen as a store of electricity, and/or have ancillary benefits e.g. rooftop solar installation. As such, modelling efforts to quantify the economic costs of low emissions alternatives could be conservative (i.e. over-stated), given the possible failure to value or quantify the associated benefits of the investment. Having rooftop solar requires the cost of installing a smart meter, but this in turn can improve a household's information access regarding their electricity use, allowing improved energy efficiency and lower usage. A May 2018 paper evaluated modelling weaknesses in this context and concluded that overstating of costs could lead to material policy distortions.

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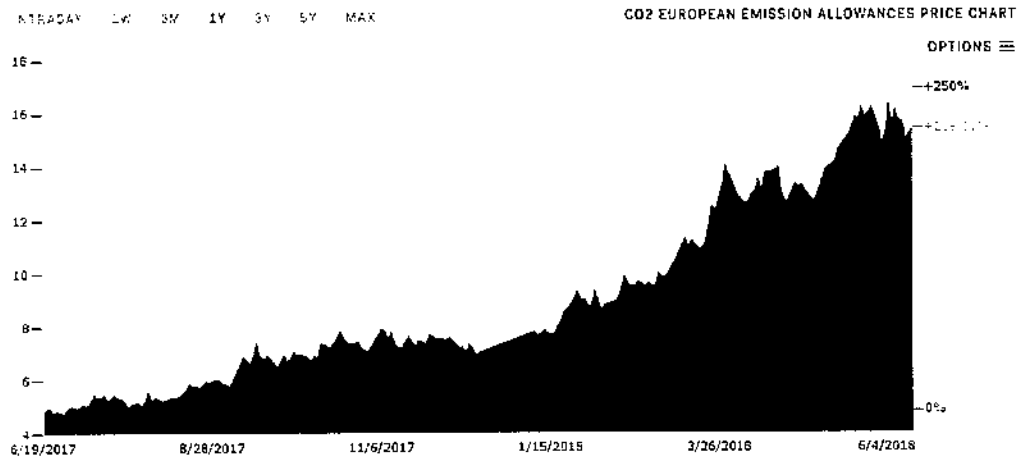
[73] An externality is a consequence of an industrial or commercial activity which affects other parties without this being reflected in market prices, such as the carbon emissions, air pollution, water pollution, particulate pollution and flyash pollution of coal mining and combustion, including the health consequences as well as any failure to rehabilitate coal mining sites. Harvard University published one such study that puts the life-cycle cost to the US economy at a third of trillion dollars annually - refer "Full cost accounting for the life cycle of coal", Annals of the NY Academy of Sciences, 2011, http://www.coaltrainfacts.org/docs/epstein_full-cost-of-coal.pdf

[74] An ETS works on the 'cap and trade' principle and is a market-based measure where participants are required to monitor and report their emissions and surrender sufficient emission allowances to cover their reported emissions in each year. Emission allowances can be traded to enable abatement to occur where it is most cost effective to do, thereby lowering the overall cost of tackling climate change. A 'cap' is an absolute quantity of greenhouse gases which can be emitted by the factories, power plants and other installations in the system, to ensure the emission reduction target is met. The cap corresponds to number of allowances put in circulation over a trading phase. – refer "European Union: An Emissions Trading Case Study", EDF, CDC & IETA, May 2015 https://www.ieta.org/resources/Resources/Case_Studies_Worlds_Carbon_Markets/euets_case_study_may2015.pdf

Resistance to change can prove unfounded and policy adoption to accommodate new technologies can accelerate.[75]

96. Businesses and individuals currently do not directly pay for the full cost of carbon emissions in the majority of countries. The absence of an explicit full price on carbon emissions creates an insufficient market signal to solve for the global impact of carbon pollution.
97. A comprehensive, global, globally traded carbon (and carbon equivalents) price that is long term in nature, transparent, well enforced and independently monitored would in my opinion provide a least cost solution to carbon emissions.
98. Emission Trading Schemes have been set up in the following regions:
99. **The European Union emissions trading scheme (EU ETS)**: The cornerstone of the EU's drive to reduce its emissions of man-made greenhouse gases is the ETS.[76] In June 2018 the EU carbon price reached €15.52/tonne,[77] a near decade high. [78]

Figure 4.1: European Union EAU prices (12 months to June 2018, Euros/t)



Source: Markets.BusinessInsider

[75] "Time to refine key climate policy models", Alexander R. Barron, Nature Climate Change, Vol. 8, May 2018. https://www.nature.com/articles/s41558-018-0132-y
[76] "The EU Emissions Trading System Fact Sheet", European Commission, 2016 https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf
[77] The Market Insider carbon pricing website was accessed 19 June 2018, http://markets.businessinsider.com/commodities/co2-emissionsrechte
[78] "Europe's $38 Billion Carbon Market Is Finally Doing Its Job", Bloomberg. Jeremy Hodges, Ewa Krukowska and Mathew Carr, 26 March 2018, https://carbonmarketinstitute.us14.list-manage.com/track/click?u=50ddb259e02df59545383e3e6&id=1899b6ef19&e=b662eb6f4b

100. **China's Electricity Sector ETS**: In December 2017 the National Development and Reform Commission announced a progressive move from seven regional pilot ETS to a national ETS. Initially China's ETS only applies to the power sector, the largest source of emissions. When fully implemented China's scheme could be twice the size of the EU ETS.[79]

101. **South Korea**: In 2015, the South Korea launched its national ETS, the first nationwide program in operation in East Asia. The ETS covers 599 of the country's largest emitters and accounts for around 68% of national green house gas emissions. In January 2018 the carbon price was Won22,000 (US$21/t).[80]

B. Carbon Taxes

102. The World Bank describes a carbon tax as a cost-effective economic instrument and details that fifteen jurisdictions currently have a carbon tax in place, with Denmark at US$31/t of CO_2 (introduced in 1992), Finland at €35/t and British Columbia at C$30/t (first introduced in 2008) three of the highest currently. Other countries range from Chile and Mexico to Ireland and Switzerland.[81]

103. **Singapore Carbon Tax**: In the February 2018 budget, Finance Minister Heng Swee Keat introduced a S$5/t carbon tax on emissions from all sectors, citing: [82]

"To improve our living environment, we must also address one of the most pressing challenges the world faces – climate change. As a low-lying island, Singapore is particularly vulnerable to rising sea levels. ... The carbon tax will be $5/t of greenhouse gas emissions in the first instance, from 2019 to 2023. We will review the carbon tax rate by 2023. We intend to increase it to a rate of between $10-15/t of emissions by 2030. In doing so, we will take into account international climate change developments, the progress of our emissions mitigation efforts and our economic competitiveness."

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[79] "Five things to know about China's national carbon market", China Dialogue, Lili PikeYao Zhe, 19 December 2017, https://www.chinadialogue.net/blog/10303-Five-things-to-know-about-China-s-national-carbon-market/en

[80] "Korea Emissions Trading Scheme", International Carbon Action Partnership, 9 March 2018, https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=47

[81] "Putting a price on Carbon with a tax", Background Note, The World Bank, accessed 19 June 2018, https://www.worldbank.org/content/dam/Worldbank/document/SDN/background-note_carbon-tax.pdf

[82] "Budget 2018, Together a Better Future", Singapore Government Department of Finance, 19 February 2018, https://www.singaporebudget.gov.sg/data/budget_2018/download/FY2018_Budget_Statement.pdf

104. **The UK**: the Carbon Price Floor (CPF) is a UK Government policy implemented in 2013 to support the EU ETS that taxes fossil fuels used to generate electricity. The floor price was capped at a maximum of £18/tCO_2 from 2016 to 2021.[83]

C. Coal Tax

105. The WEO2017 reports that coal is one of the top sources of man-made carbon emissions. Electricity sits equal to transport as the two top emissions sectors in the U.S.,[84] and coal is the largest and highest carbon pollution intensive source of electricity generation. A direct tax on coal use is simple to apply.

106. **Indian coal tax**: In 2011 India's Finance Minister introduced a coal tax. This was doubled in 2013, and then again in 2016 so it now sits at Rs400 or US$7/t.[85] This tax is imposed on all coal; thermal and coking coal, domestic and imported. India is the second largest producer, importer and consumer of coal in the world.[86]

107. **South Korean coal tax**: In January 2017 the coal consumption tax (of up to US$30/t) was raised for the third time to discourage coal-fired power generation and help drive down greenhouse gas emissions.[87]

D. Pollution Controls

108. In my opinion, reducing the allowable pollution limits on industry and power generation is a likely response to rising community concerns of rising pollution across Asia, following the lead of China. Pollution control measures applied to the combustion of coal directly raise the cost of coal use and encourage (or mandate) investment in clean alternatives, thereby reducing carbon emissions. The majority of these provides a clear differentiation on the type of coal, imposing restrictions or polices to reduce the use / competitiveness of less valuable thermal coal.

109. **South Korea**: Immediately upon his election in 2017, President Moon Jai-In introduced a number of policies and strategies to address chronic and rising air

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[83] "Carbon Floor Price (CFP) and the price support mechanism", House of Commons Library, UK Parliament, Briefing Paper Number 05927, David Hirst, 8 January 2018, http://researchbriefings.files.parliament.uk/documents/SN05927/SN05927.pdf

[84] https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

[85] "Union Budget 2016-17: Full text of Arun Jaitley's speech" Livemint, 29 February 2016, https://www.livemint.com/Politics/ztYrQRnXj02kDAg9TGwdcJ/Union-Budget-201617-Full-text-of-finance-minister-Arun-Jai.html

[86] Statistical Review of World Energy", BP, 15 June 2018, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

[87] "South Korea to increase taxes on coal use", Argus Media, 19 January 2017, https://www.argusmedia.com/pages/NewsBody.aspx?id=1388478&menu=yes

pollution in South Korea. This has involved banning 10 of the country's oldest coal power plants from operating in peak pollution months,[88] as well as banning the construction of new coal power plants.[89] In December 2017 South Korea's government also announced a complementary plan to increase its installed capacity of renewable power to 58.5 GW by 2030, from 11.3 GW this year.[90]

110. **India**: To deal with chronic and rising pollution, in 2015 India announced new emissions control regulations on its power sector to require progressive retrofitting of existing thermal power plants by 2022, and required all new power plants from 2017 to adhere to these standards.[91] India's National Electricity Plan 2018 targets the expansion to 275 GW of renewable energy capacity by 2027, a fivefold expansion from the 57 GW of renewable energy as of March 2017. The National Electricity Plan 2018 forecasts 48GW of end of life coal plant closures by 2027.[92]

111. **China**: In 2017 China consumed and produced almost half of the world's coal.[93] In March 2018 Chinese Premier Li Keqiang said that the country would aim to cut energy consumption per unit of GDP by 3% and continue to slash levels of major pollutants. It would cut sulphur dioxide and nitrogen dioxide emissions by 3%, and push polluting industries and diesel trucks to cut emissions. Speaking to 2,970 delegates from the National People's Congress, Mr Li vowed: "*We all need to join hands and take action to build a beautiful China where the skies are blue, the land is green, and the waters are clear*".[94] This follows the success of the Airborne Pollution Prevention and Control Action Plan 2013-

[88] "Moon orders temporary shutdown of aged coal power plants to reduce fine dust", The Korea Times, 15 May 2017, http://www.koreatimes.co.kr/www/nation/2017/05/371_229358.html
[89] "Fate of South Korea's new coal plants rests with its new president", S&P Global Platts, Michael Cooper, 31 May 2017, http://blogs.platts.com/2017/05/31/south-korea-new-coal-plants/
[90] "South Korea finalizes energy plan to boost renewable power generation", Reuters, Jane Chung, 29 December 2017, https://www.reuters.com/article/us-southkorea-energy-policy/south-korea-finalizes-energy-plan-to-boost-renewable-power-generation-idUSKBN1EN0KT
[91] "Challenges and Recommendations for Meeting the Upcoming 2017 Standards for Air Pollution from Thermal Power Plants in India, Brookings India, Rahul Tongia & Deborah Seligsohn, February 2017, https://www.brookings.edu/wp-content/uploads/2017/02/201702_pollutiontpp_rt-dsweb.pdf
[92] "National Electricity Plan (Volume I) Generation", Government of India, Central Electricity Authority, January 2018, http://www.cea.nic.in/reports/committee/nep/nep_jan_2018.pdf
[93] Statistical Review of World Energy", BP, 15 June 2018, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
[94] "NPC 2018: China to step up fight against emissions, pollution in bid to protect 'blue skies', 'green land'", The Straits Times. Danson Cheong, 5 March 2018, https://www.straitstimes.com/asia/east-asia/npc-2018-chinas-ramps-up-coal-steel-output-cuts-to-defend-blue-skies

2017.[95] China has also banned direct coal burning by industry and households in certain regions, and closed polluting industries including steel manufacturing in areas of high pollution.[96]

E. Industry Targets

112. A fifth alternative has been schemes like the renewable energy target (RET) to legislate a progressive decarbonisation of electricity markets by setting a target market share of electricity generation from zero emissions alternatives like solar and wind. In conjunction with other policies, in my opinion, the Australian RET[97] has been successful. In 2018 the Clean Energy Regulator reported that Australia is well on track to achieve this 23% of electricity by 2020 target.[98]

113. Automotive efficiency standards aimed at reducing emissions to improve air quality and reduce public health costs have materially reduced demand for oil and steel (and hence coking coal) by improving energy efficiency and encouraging light-weighting of vehicles, while also promoting alternatives like electric vehicles. This is best illustrated by the multi-decade progress to reduce air pollution and improve energy efficiency that have been delivered by the Californian Air Resources Board.[99]

Least Cost Solution

114. In my opinion, a whole-of-economy global carbon emissions price that optimises and incentivises the least cost form of global abatement in the context of the entire value-chain is the best direct policy measure to deliver on the Paris Agreement emissions reductions targets. Such a system is designed to prioritise the highest value use of emissions by making less-cost effective emissions

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[95] "The State Council issues action plan on prevention and control of air pollution introducing ten measures to improve air quality", China State Council, 12 September 2013, http://english.mep.gov.cn/News_service/infocus/201309/t20130924_260707.htm

[96] Given China's formal policy announcements are generally only available in Chinese, I have referenced key international press discussions on the implications rather than the original announcements e.g. https://www.bloomberg.com/graphics/2018-china-pollution/ and https://www.nytimes.com/2018/03/12/upshot/china-pollution-environment-longer-lives.html

[97] "The Renewable Energy Target (RET) scheme", The Australian Government, Department of Environment and Energy, accessed 19 June 2018, http://www.environment.gov.au/climate-change/government/renewable-energy-target-scheme

[98] "Tracking towards 2020: Encouraging renewable energy in Australia", The Clean Energy Regulator, 23 May 2017, http://www.cleanenergyregulator.gov.au/About/Accountability-and-reporting/administrative-reports/tracking-towards-2020-encouraging-renewable-energy-in-australia

[99] "Laws and Regulations", California Air Resources Board, 3 January 2017, https://www.arb.ca.gov/html/lawsregs.htm and https://www.arb.ca.gov/legis/as2017.pdf

intensive activities more expensive that their lower or zero carbon emissions alternatives.

115. With global emissions policy efforts tightening in order to achieve the Paris Agreement, the IEA's SDS forecasts coking coal demand to decline 40% by 2040. As I explain below in Section 8 of my report, there is more than sufficient current coking coal production and therefore the Rocky Hill project is not needed.

Section 5: Economic supply side measures

116. Supply side measures reduce the availability of fossil fuels to be burned, by restricting access to high extraction cost reserves or progressive closure of the industry, and through cutting subsidies for fossil fuel production, thereby limiting oversupply in a carbon constrained world.[100]

117. Additionally, reduced supply would increase the price of fossil fuels, everything else being equal. This would increase the value of Australia's existing coal resource supply and encourage market substitution into lower or zero emissions alternatives.

118. Supply side measures have been recently introduced with relatively rapid coal-fired power plant phaseout timetables. The UK[101], Italy[102] and Canada[103] commenced this supply side measure in 2017 for implementation by 2025, 2025 and 2030 respectively, with the Netherlands the most recent country to also adopt this policy.[104] This builds on the EU's May 2018 target to cut non-ETS sector emissions by 30% by 2030 from 2005 levels,[105] and the resulting forced closure of coal power plants well before the end of their commercial life is a clear illustration of the cost of stranded assets in the coal sector.

119. **China**: Over the last four years China has introduced a series of supply side measures by forcing the closure of existing coal mines, limiting the number of days worked per year to 276, banning direct coal use by residential and industrial

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[100] "Leaving Coal Unburned: Options for Demand-Side and Supply-Side Policies", DIW Roundup, 14 December 2015, https://www.diw.de/de/diw_01.c.522192.de/presse/diw_roundup/leaving_coal_unburned_options_for_demand_side_and_supply_side_policies.html

[101] "Implementing the end of unabated coal by 2025", UK Department of Business, Energy & Industrial Strategy, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/672137/Government_Response_to_unabated_coal_consultation_and_statement_of_policy.pdf

[102] "Italy proposed phasing out coal plants by 2025", Reuters, 24 October 2017, Stephen Jewkes https://af.reuters.com/article/commoditiesNews/idAFS8N1KP009

[103] "Taking action to phase out coal power", Government of Canada, Environment and Climate Change, 16 February 2018, https://www.canada.ca/en/environment-climate-change/news/2017/11/taking_action_tophase-outcoalpower.html

[104] "The Netherlands announces ban on coal, plans to close 2 power plants by 2024", Clean Technica, Joshua S. Hill, 22 May 2018, https://cleantechnica.com/2018/05/22/the-netherlands-announces-ban-on-coal-plans-close-of-2-power-plants-by-2024/ and the original statement in Dutch can be found at https://www.rijksoverheid.nl/actueel/nieuws/2018/05/18/kabinet-verbiedt-elektriciteitsproductie-met-kolen

[105] "Effort sharing 2021-2030: targets and flexibilities", European Commission, Energy, Climate Change, Environment, accessed 19 June 2018, https://ec.europa.eu/clima/policies/effort/proposal_en

users,[106] and restricting coal imports[107] with the policy intent to raise the price of coal to increase competitiveness of alternatives and deliver on its overarching policy of a 'return to blue skies'. These supply measures have collectively tightened the demand-supply balance sufficient to drive a doubling of both thermal and coking coal prices since 2016.[108]

120. In April 2018 China imposed restrictions on ports banning all coal imports.[109]

121. In May 2018 China proposed a new policy preventing the movement of coal in China by truck in a number of regions to curb pollution, putting coal imports at substantial cost disadvantage to domestic Chinese mines.[110]

122. **South Korea**: South Korea is currently Australia's third largest expert destination of coking and thermal coal.[111] However, in May 2018 South Korea introduced a new policy preventing the importation of coal with a sulphur content above 0.4%, which is reported to be likely to materially displace Australian coal exports in favour of low sulphur coal export countries like Russia, Indonesia and Columbia.[112]

123. **India**: In 2016 India launched a Green Power Corridor investment program to specifically build grid transmission capacity for renewable energy projects, while at the same time as giving free interstate grid transmission access for renewables as a direct policy to expand access to renewables over coal fired power

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[106] "In China's Coal Country, a Ban Brings Blue Skies and Cold Homes", New York Times. Steven Lee Myers, 10 February 2018, https://www.nytimes.com/2018/02/10/world/asia/china-coal-smog-pollution.html

[107] "China move to restrict coal imports may drive price divergence", Reuters, Clyde Russell, 17 April 2018, https://www.reuters.com/article/us-column-russell/china-move-to-restrict-coal-imports-may-drive-price-divergence-russell-idUSKBN1HQ1JV

[108] "After China-induced price spike, coal set to resume long-term decline" Reuters, Nina Chestney, Henning Gloystein, 24 July 2017, https://www.reuters.com/article/us-coal-prices-analysis/after-china-induced-price-spike-coal-set-to-resume-long-term-decline-idUSKBN1A91IJ

[109] "China yet to relax restrictions on import coal at coastal ports", SX Coal, 11 June 2018, http://www.sxcoal.com/news/4573613/info/en

[110] "China's potential ban on trucking coal, ore, steel may dampen imports", S&P Global Platts, Elizabeth Low, 28 May 2018, https://www.platts.com/latest-news/metals/singapore/chinas-potential-ban-on-trucking-coal-ore-steel-26966372

111 "Resources and Energy Quarterly report" Office of the Chief Economist, Mark Cully, March 2018 Page 38 https://industry.gov.au/Office-of-the-Chief-Economist/Publications/ResourcesandEnergyQuarterlyMarch2018/index.html

[112] " Sulfur limit change could alter South Korea's demand profile for thermal coal", S&P Global Platts, Michael Cooper, 21 May 2018, https://www.platts.com/latest-news/coal/perth/sulfur-limit-change-could-alter-south-koreas-10436998

generation.[113] The NEP 2018 estimates coal's share of the Indian power sector capacity will decline from 59% in 2017 to just 39% by 2027.[114]

Supply Side Measures: Cutting Fossil Fuel Producer Subsidies

124. One supply side management strategy that could be very effective in reducing excessive supply of fossil fuels would be to curtail producer subsidies.[115] The IEA, The World Bank, the Organisation for Economic Co-operation and Development and the Group of Twenty (G20) leading developed nations have all repeatedly called for the removal of all fossil fuel subsidies.[116]

125. This has not been implemented in Australia, with the fossil fuel industry being a major beneficiary of multiple subsides, including the multi-billion dollar annual diesel fuel "rebate" for mining,[117] accelerated depreciation and 150% tax allowances for exploration and development of fossil fuel resources. For example, the entire Hunter Valley rail coal network was funded by taxpayers and remains an ongoing capital subsidy. In 2017 the Queensland Government introduced a new extended royalty "holiday" for any new coal basin opened up.[118] in recent years, the Commonwealth Government has introduced multiple new coal subsidies including low-cost multi-decade subsidised financing from the Export Finance and Insurance Credit Agency (EFIC[119]) and the North Australia Infrastructure Fund (NAIF[120]). June 2018 saw the Productivity Commission report on the need for water reform to reduce the fossil fuel industry's special access to

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[113] "Need for green energy corridors grows as over 64 GW of renewables are connected to the grid", Mercom India, Saumy Prateek, 7 March 2018, https://mercomindia.com/need-for-green-energy-corridors-rises/

[114] Government of India Central Electricity Authority, National Electricity Plan 2018 refer https://www.scribd.com/document/377133985/National-Electricity-Plan-for-India-2018-Power-Generation

[115] "Supply-side climate policy: the road less taken", DOI: 10.13140/RG.2.1.1754.4402, Report number: Working Paper 2015-13, Affiliation: Stockholm Environment Institute, Michael Lazarus, Peter Erickson, https://www.researchgate.net/publication/283056577_Supply-side_climate_policy_the_road_less_taken

[116] "The scope of fossil-fuel subsidies in 2009 and a roadmap for phasing out fossil fuel subsidies", IEA, OECD and World Bank joint report, 11-12 November 2010, https://www.iea.org/media/weowebsite/energysubsidies/second_joint_report.pdf

[117] "Pouring more fuel on the fire", The Australia Institute, Matt Grudnoff, 25 June 2013, http://www.tai.org.au/content/pouring-more-fuel-fire

[118] "Queensland Government offers Adani mining group a 'royalty holiday' that could cost the state $320 million", ABC News, Mark Willacy, 16 May 2017, http://www.abc.net.au/news/2017-05-18/queensland-government-gives-adani-royalties-holiday/8536560

[119] Export Finance and Insurance Corporation website accessed 19 June 2018, https://www.efic.gov.au/

[120] North Australia Infrastructure Facility website accessed 19 June 2018, https://industry.gov.au/industry/Northern-Australia-Infrastructure-Facility/Pages/default.aspx

Australia's water resources.[121] Removal of any or all of these subsidies consistent with the IEA policy would materially increase the cost of extraction of coal, boosting the competitiveness of alternative lower emissions alternatives.

Australian Emissions Reduction Policies

126. While climate change and emissions reductions have not been central priorities of the current Commonwealth Government, there is a range of policy measures in place that are progressively reducing energy system reliance on coal, primarily thermal coal at this stage. However, the deployment of renewable energy generated hydrogen is a step towards replacing coking coal in the manufacture of steel, as per Section 7 below.

127. At the Federal level, the Direct Action Plan[122] funds programs to reduce Australian carbon emissions. The RET works to increase investment in renewable energy infrastructure as a replacement to thermal power generation of electricity. Two government owned enterprises have been established by the Commonwealth Government to channel finance towards low emissions industries as well as research and development, namely the Clean Energy Finance Corp (CEFC[123]) and Australian Renewable Energy Agency (ARENA[124]) respectively. By increasing access to low cost finance and by boosting investment in technology development and deployment, these two entities facilitate the faster uptake of newer, lower emissions alternatives to coal.

128. The Commonwealth Government has been focussed on developing its National Energy Guarantee (NEG) energy policy framework over 2018 which, amongst other objectives, aims to lower the emissions intensity of the Australian electricity sector in line with the overall Australian emissions reduction target.[125] In the absence of a target for electricity to contribute more than its proportionate share, other sectors including steel manufacturing will have to contribute similar

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[121] "National Water Reform", The Australian Government Productivity Commission, 31 May 2018, https://www.pc.gov.au/inquiries/completed/water-reform/report

[122] "Chapter 5 Direct Action Plan" Parliament of Australia, accessed 19 June 2018 https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Direct_Action_Plan/Report/c05

[123] https://www.cefc.com.au

[124] https://arena.gov.au

[125] "A better energy future for Australia", Australian Government, Department of Environment and Energy, accessed 19 June 2018, https://www.energy.gov.au/government-priorities/better-energy-future-australia

emissions reductions targets to meet Australia's overall national Paris Agreement commitment of 26-28% relative to the 2005 base.

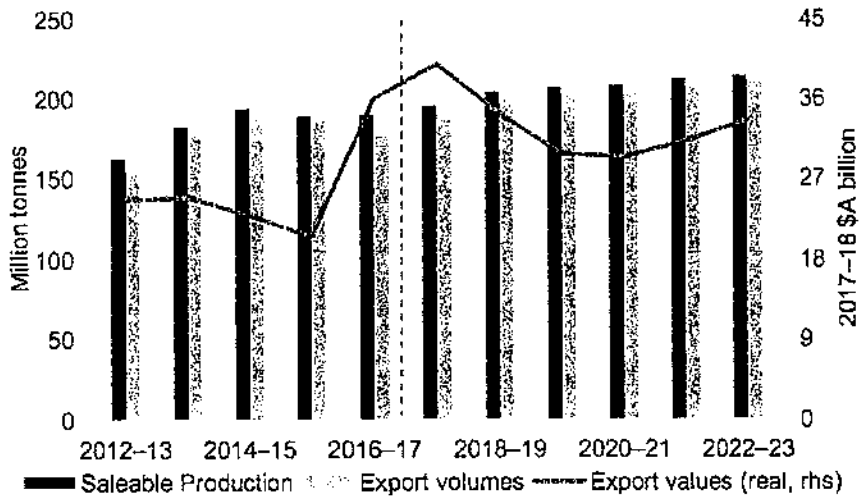
129. NSW likewise has progressed its Renewable Energy Action Plan[126], replacing its long established Greenhouse Gas Reduction Scheme with an aspirational target for net zero emissions by 2050.

[126] "The NSW Renewable Energy Action Plan", NSW Resources and Energy Department, accessed 19 June 2018 https://www.resourcesandenergy.nsw.gov.au/energy-consumers/sustainable-energy/renewable-energy-action-plan

Section 6: Market based measures are increasingly putting pressure on continued imports of coal

130. In terms of coking coal, 98% of Australian production is exported: Figure 6.1.

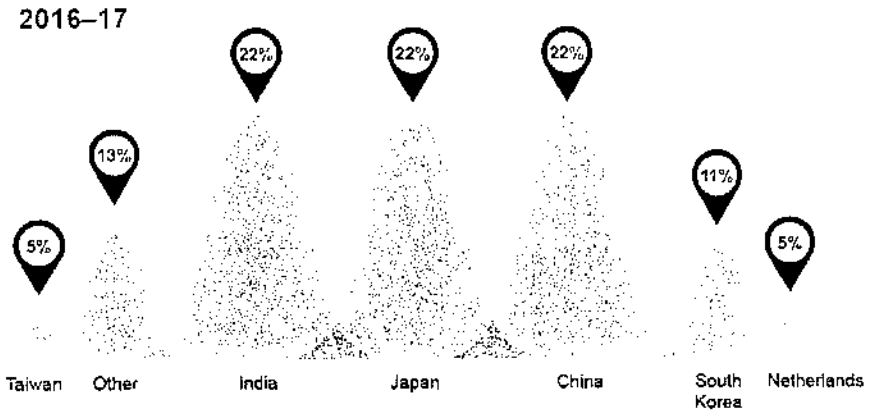
Figure 6.1: Australia's Coking Coal Production and Exports (Mtpa)



Source: Australian Government's Office of the Chief Economist, March 2018

131. Australia supplies 60% of the world's coking coal exports, with Japan, China, India and South Korea the four largest import markets – Figure 6.2.[127]

Figure 6.2: Australia's Coking Coal Export Destinations

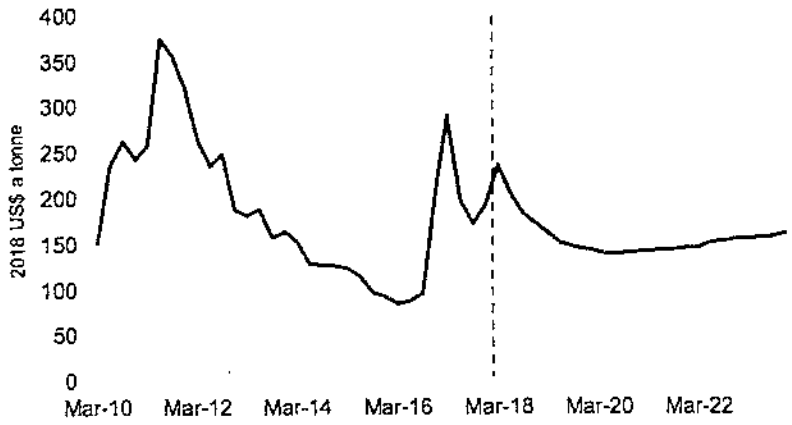


Source: Australian Government's Office of the Chief Economist, March 2018

[127] "Resources and Energy Quarterly report" Office of the Chief Economist, Mark Cully, March 2018 Page 38 https://industry.gov.au/Office-of-the-Chief-Economist/Publications/ResourcesandEnergyQuarterlyMarch2018/index.html

132. The price of coking coal has fluctuated materially this decade. After a five year decline, since the start of 2016 the coking price has doubled. However, the Office of the Chief Economist forecasts the coking coal price to decline in real terms over the coming five years – Figure 6.3.

Figure 6.3: The Australian Export Price of Coking Coal (2018 real US$/t)



Source: Australian Government's Office of the Chief Economist, March 2018[128]

133. In my opinion it is important to focus on the policies being implemented in Australia's key export markets to evaluate coal use trends. As detailed in Section 4 above, Australia's key export destinations have recently and progressively introduced:

a. national ETS (South Korea, China);
b. coal taxes (India, South Korea, Japan);
c. industry targets (China, India, South Korea and Japan);
d. pollutions controls (China, India, South Korea);
e. supply restrictions (China, South Korea); and
f. policy targets to promote lower emissions alternatives (China, India, South Korea, Japan).

134. **China**: In my opinion China is emerging as the world leader on development of low emissions industries of the future, both in terms of domestic deployment

[128] "Resources and Energy Quarterly report" Office of the Chief Economist, Mark Cully, March 2018 https://industry.gov.au/Office-of-the-Chief-Economist/Publications/ResourcesandEnergyQuarterlyMarch2018/index.html

and international expansion.[129] The WEO2017 details how, in the last five years, China deployed more than a third of all global wind, solar and hydro developments. The introduction of the national ETS in December 2017 starting with the power sector and the pledge from China's premier declaring war on pollution and to return to blue skies all highlight China's determination. A June 2018 paper released by the National Centre for Climate Change Strategy and International Cooperation highlighted the scope to lift the ambition of China's Paris Agreement NDC which requires a whole of economy emissions reduction.[130] A Chinese ETS will impact both thermal and coking coal use, given both are major sources of carbon emissions, directionally consistent with the IEA's SDS forecast for a 50% global reduction in coal by 2040.

135. **South Korea**: has introduced one of highest coal taxes globally, introduced a national ETS in 2015, followed this by setting in 2017 an ambitious RET of 58.5GW by 2030[131] and then in April 2018 imposed an immediate ban on the use of coal with a sulphur content above 0.4%.[132]

136. **India**: In 2016 India's Coal Minister Piyush Goyal pledged for India to cease all coal imports, a target he has consistently repeated.[133] This followed the introduction and subsequent doubling three times of the country's coal tax and the introduction from 2017 of new national emissions controls on all coal fired power plants. The NEP 2018 sets a course for a fivefold renewable energy expansion to 275 GW by 2027. Coal India Ltd has a target to materially expand coking coal production in order to reduce India's current reliance on imported coking supplies by half by 2031.[134] [135]

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[129] "China 2017 Review: World's second biggest economy continues to drive global trends in energy investment", IEEFA, Tim Buckley & Simon Nicholas, January 2018, http://ieefa.org/wp-content/uploads/2018/01/China-Review-2017.pdf

[130] https://mp.weixin.qq.com/s/nH1m69iaPZYmaCwPZaKrpg (Chinese) and English summary "China should consider increasing Paris climate pledge early – government thinktank", Climate Home News, Karl Mathiesen, 6 June 2018, http://www.climatechangenews.com/2018/06/06/china-consider-increasing-paris-climate-pledge-2020-government-thinktank/

[131] "South Korea targets 58.5 GW of renewables by 2030" PV Tech, Amanda Lennon, 18 December 2017, https://www.pv-tech.org/news/south-korea-announce-8th-basic-plan-for-long-term-energy-generation

[132] "Sulfur limit change could alter South Korea's demand profile for thermal coal", Platts, Mike Cooper, 21 May 2018 https://www.platts.com/latest-news/coal/perth/sulfur-limit-change-could-alter-south-koreas-10436998

[133] "Government working to eliminate coal import: Piyush Goyal" The Economic Times, PTI, 22 September 2016, https://economictimes.indiatimes.com/industry/indl-goods/svs/metals-mining/government-working-to-eliminate-coal-import-piyush-goyal/articleshow/54459898.cms

[134] "Coal India to offer coking coal to other consumers after meeting PSUs demand", The Economic Times, 5 June 2017, https://economictimes.indiatimes.com/industry/indl-goods/svs/metals-

137. **Japan**: Following the enormous electricity system disruption and policy chaos following the Fukushima nuclear disaster, Japan has recently been a laggard in action on climate change. However, this is starting to change. In January 2017 the Japanese Environment Ministry outlined its proposed "Greening of Whole Tax System and Carbon Tax in Japan" highlighting the need for significant policy tightening.[136] In January 2018 Japanese Foreign Minister Taro Kono pledged greater action on renewable energy and stated: "*For too long, Japan has turned a blind eye to global trends, such as the dramatic decrease in the price of renewables and the inevitable shift to decarbonization in the face of climate change*".[137] Japan was the second largest installer of solar globally in 2016 on the back of a feed-in-tariff policy to deliver on its RET.[138]

138. The key conclusion is that all four countries are looking to diversify their energy systems away from coal to less emissions intensive and less polluting alternatives. In my opinion this policy drive is accelerating in all four of the countries that are the largest importers of both thermal and coking coal globally.

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mining/coal-india-to-offer-coking-coal-to-other-consumers-after-meeting-psus-demand/articleshow/59001357.cms

[135] "Annual Report 2016-17", Bharat Coking Coal Limited, https://www.coalindia.in/Portals/13/PDF/BCCL_22082017.pdf

[136] "Greening of Whole Tax System and Carbon Tax in Japan", Japan Environment and Economy Division Ministry of the Environment, January 2017 https://www.env.go.jp/en/policy/tax/20170130_greening.pdf

[137] "Foreign Minister Kono decries Japan's renewable energy policy", KYODO NEWS KYODO News, 14 January 2018 https://english.kyodonews.net/news/2018/01/4f7d99f8630f-minister-raps-govt-energy-policy-vows-to-promote-renewables.html

[138] "Installed new capacity of solar energy in Japan from 2013 to 2016 (in gigawatts)", The Statistics Portal, accessed 19 June 2018 https://www.statista.com/statistics/514631/outlook-on-japans-installed-solar-capacity/

Section 7: Alternatives to use of coking coal

139. While the large scale deployments of commercially competitive technology alternatives to burning thermal coal or lignite for electricity generation are well documented, coking coal has been long viewed as having fewer alternatives. However, in my opinion, increased prices on carbon pollution and advances in recycling of scrap steel are driving technology innovation which is combining to challenge this perspective.

140. The metals industry has long researched new technologies to reduce or even eventually eliminate carbon emissions in steel manufacturing, WorldSteel reported the steel industry had reduced the average energy consumption by 50% over the 30 years to 2004.[139]

141. New technologies and processes can progressively replace the current reliance on coking coal to manufacture steel. Examples include:

a. HYBRIT is the brand for a Swedish development project to "make fossil free steel" from iron ore and hydrogen, removing entirely the need for coking coal and carbon emissions.

b. FINEX is a brand developed by South Korea's POSCO that allows for the use of lower quality thermal coal in substitution for coking coal in steel manufacturing.

c. Electric arc furnaces promote steel recycling in lieu of coking coal and iron ore.

d. Lend Lease has been trialling timber composites to replace structural steel in buildings.

HYBRIT – Towards fossil-free steel

142. In 2016, Swedish steel maker SSAB AB, Europe's largest iron ore producer LKAB and one of the largest European utilities Vattenfall - joined together in a joint venture named HYBRIT with the objective:[140]

> "*A joint venture project that endeavours to revolutionize steel-making. HYBRIT aims to replace coking coal, traditionally needed for ore-based steel*

[139] "Challenges & opportunities for the steel industry in moving towards green growth", OECD, Anthony de Carvalho Green Growth Workshop, 4 March 2010, https://www.oecd.org/sti/ind/45010081.pdf

[140] "HYBRIT – Towards fossil-free steel", SSAB, LKAB & Vattenfall corporate website accessed 19 June 2018 http://www.hybritdevelopment.com

making, with hydrogen. The result will be unique: the world's first fossil-free steel-making technology, with virtually no carbon footprint."

143. In February 2018 Steelmaker SSAB announced a venture to build a pilot plant to be operational by 2020.[141] In May 2018 HYBRIT estimated a production cost 20-30% higher than conventional steel, a premium that requires a sustained high price of carbon emissions and falling renewable energy costs, both of which are now on track in the EU.[142]

144. **Emissions free hydrogen:** A critical pre-requisite for coking coal free HYBRIT technology is the commercialisation of cost effective, low or zero-emissions hydrogen. Significant investment is underway globally in this pursuit. In 2016 four European industry majors consisting of voestalpine, Siemens, VERBUND and the Austrian Power Grid commenced construction of a 6MW pilot plant for the production of zero emissions hydrogen, with commissioning due 2019. This was reported as the largest project of its type to-date.[143]

145. Siemens AG of Germany has long studied the ability to use renewables to create and store hydrogen[144] and in February 2018 commenced construction of a 1.25MW Proton exchange membrane electrolyzer demonstration plant in Adelaide to produce hydrogen from electricity and potentially onsite from solar electricity. Siemens concluded:[145]

"This is about using inexpensive or free energy, which would otherwise be spilled to produce a clean form of stored energy that has many value streams – 100% pure hydrogen, with the only by-product being 100% pure oxygen."

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[141] "Swedish steel plant to run on hydrogen" Reuters, Lefteris Karagiannopoulos, 1 February 2018, https://af.reuters.com/article/africaTech/idAFL8N1PR4R2

[142] "Company debuts world's first fossil-free steel-making technology" Digital Journal, Karen Graham, 14 May 2018, http://www.digitaljournal.com/tech-and-science/technology/new-pilot-facility-in-sweden-to-produce-steel-without-fossil-fuel/article/522179#ixzz5FgeJthQE and "Swedish steel boss:' Our pilot plant will only emit water vapour", Euractiv, Frederic Simon, 11 May 2018, https://www.euractiv.com/section/energy/interview/hybrit-ceo-our-pilot-steel-plant-will-only-emit-water-vapour/

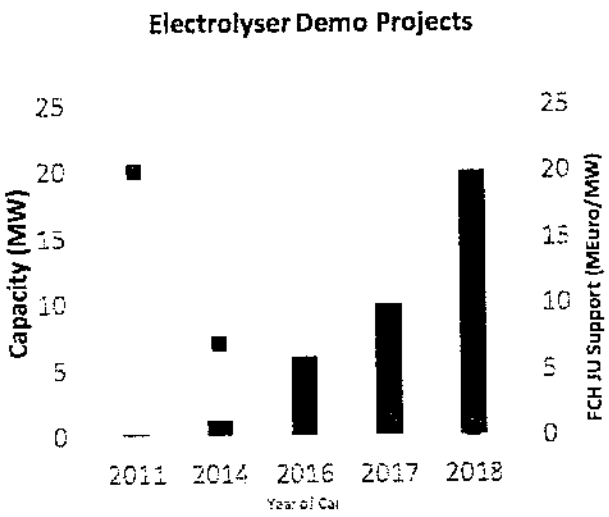
[143] "Construction starts at the world's largest hydrogen pilot plant", Joint Press Release by Siemens, voestalpine and VERBUND, 16 April 2018 https://www.siemens.com/press/en/pressrelease/?press=/en/pressrelease/2018/corporate/pr2018040253coen.htm

[144] "Siemens Supports South Australia's Hydrogen Roadmap", Press Release by Siemens, 8 September 2017, https://corporate.siemens.com.au/en/home/news-centre/press-releases/siemens-supports-south-australia-hydrogen-roadmap.html

[145] "Australia's First Hydrogen Demonstration Park with Siemens Technology to be Built in Adelaide", Press Release by Siemens, 21 February 2018, https://corporate.siemens.com.au/en/home/news-centre/press-releases/australias-first-hydrogen-demonstration-park-coming-to-adelaide.html

146. Figure 7.1 details the acceleration of hydrogen electrolyzer demonstration projects globally into 2018 and the rapidly reduced subsidy requirements (in red, right hand scale).

Figure 7.1: Hydrogen electrolyzer demonstration projects Accelerate



Source: FCH Fuel Cells and Hydrogen Joint Undertaking[146]

147. Further accelerating the development of zero emissions hydrogen, Alstom of France in 2018 launched the world's first hydrogen fuel cell powered regional train.[147] World leading firms are moving to commercialise zero emissions alternatives to fossil fuels as financial institutions increasingly restrict coal finance and increase financial supply to zero emissions alternatives.[148]

FINEX – Carbon-lean Steelmaking by POSCO of Korea

[146] "FCH JU – Key to sustainable energy and transport … making fuel cells and hydrogen an every day reality", Fuel Cells and Hydrogen Joint Undertaking, European Commission, February 2018, ISBN 978-92-9246-324-3 doi:10.2843/167095 http://www.fch.europa.eu/sites/default/files/Brochure-FCHJU-WEB-2018%20%28ID%203079916%29.pdf

[147] "Alstom's hydrogen fuel cell train wins 2018 GreenTec Mobility Award", Alstom press release, 4 May 2018, http://www.alstom.com/press-centre/2018/05/alstoms-hydrogen-fuel-cell-train-wins-2018-greentec-mobility-award/

[148] "MUFG Adopts Environmental Policy Statement, Human Rights Policy Statement, and Environmental and Social Policy Framework". Mitsubishi UFJ Financial Group, Inc. (MUFG), 15 May 2018 https://www.mufg.jp/english/vcms_lf/news/pressrelease-20180515-005-e.pdf

148. South Korea's leading steel manufacturer has long been internationally recognised for its sustainability efforts and ability to achieve:[149]

> "*carbon-lean steelmaking ... (using) iron-ore reduction of FINEX using hydrogen-enriched synagas and a hydrogen enriched blast furnace process*"

149. Further, since 2009 POSCO has reported on its carbon reduction progress and the development of a business strategy around "Green Steel" as part of its vision of "POSCO the Great" and their low carbon technology strategy.[150][151]

150. POSCO states that FINEX significantly lowers carbon emissions and eliminates the need for coking coal:

> "*This next-generation eco-friendly iron making process allow[s] the direct use of cheap iron ore fines and non-coking coal as feedstock. In addition to having significantly lower operating costs and emissions than the blast furnace process, FINEX dramatically reduces overall construction costs by eliminating the need for sinter and coke plants.*"

151. In June 2017 POSCO was involved in a successful bid to acquire Arrium out of administration, gaining control with Gupta of the Whyalla steelworks, with the group promising a A$1.4bn upgrade to implement POSCO's FINEX technology.[152]

Electric Arc Furnaces

152. In response to continued pollution pressures, China continues to introduce a suite of policy measures to remove outdated capacity across a number of industries, including steel. During its thirteenth Five Year Plan 2016-2020,[153]

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[149] "Challenges & opportunities for the steel industry in moving towards green growth", OECD, Anthony de Carvalho Green Growth Workshop, 4 March 2010 https://www.oecd.org/sti/ind/45010081.pdf

[150] 'Low-Carbon Management of POSCO in Circular Economy: Current Status and Limitations', in Anbumozhi, V. and J. Kim (eds.), Towards a Circular Economy: Corporate Management and Policy Pathways. ERIA Research Project Report 2014-44, Jakarta: ERIA, pp.185-199. Kim, J., Y. Ahn and T. Roh, September 2016, http://www.eria.org/RPR_FY2014_No.44_Chapter_11.pdf

[151] "Vision and Strategies to Mitigate Climate Change" POSCO website accessed 19 June 2018, http://www.posco.com/homepage/docs/eng5/jsp/sustain/environ/environment_03_02.jsp

[152] "Korean steel giant POSCO to invest $1.4 billion upgrading Whyalla Steelworks", Johnny Ioannou, 6 July 2017 https://www.linkedin.com/pulse/korean-steel-giant-posco-invest-14-billion-upgrading-whyalla-ioannou/

[153] "The 13th Five-Year Plan For Economic And Social Development Of The People's Republic Of China (2016–2020), NDRC accessed 18 June 2018 http://en.ndrc.gov.cn/newsrelease/201612/P020161207645765233498.pdf

China targeted the removal of 100-150Mtpa of old, highly polluting steel manufacturing capacity, equivalent to one-tenth of China's total.

153. 2017 saw 50Mtpa of new electric arc furnaces approved which will see electricity and scrap steel replace coking coal and iron ore. As this process continues, China's coking coal and iron ore demand is forecast to progressively decline over the coming two decades. [154] [155]

154. A 2017 German Power-to-Steel study[156] evaluating the combination of renewable energy produced hydrogen and electric arc furnaces concluded:

> *"it is possible to reduce CO2 emissions by up to 95% through the integration of renewable energy into the currently coal-based steel industry by using alternative technologies. Both the possibility to integrate renewable power and CO2 reduction is mainly achieved by an increase or complete discontinuation of coal."*

Timber Composites Could Replace Steel

155. Timber composites including cross-laminated timber are a renewable alternative to steel framing in housing and commercial construction. With potential with scale to be lower cost, lighter in weight, improved strength and durability specifications and with faster construction speeds (due to prefabrication) than traditional construction using steel, there are already commercial applications showing how structural timber can both act as a carbon store in replacing the high emissions generated from manufacturing steel from coking coal and iron ore.[157] The world's tallest timber building was commissioned in Vancouver in 2016.[158]

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[154] "Increased recycling may reduce metals sector energy use in China", U.S. Energy Information Administration, Paul Otis, 28 October 2015, https://www.eia.gov/todayinenergy/detail.php?id=23532

[155] "The growing importance of steel scrap in China", McKinsey &Co, Steven Vercammen, Avetik Chalabyan, Oliver Ramsbottom, Junjie Ma & Charlie Tsai, March 2017, mckinsey/industries/metals%20and%20mining/our%20insights/the%20growing%20importance%20of%20steel%20scrap%20in%20china/the-growing-importance-of-steel-scrap-in-china.ashx https://www.mckinsey.com/~/media/

[156] "Power-to-Steel: Reducing CO2 through the Integration of Renewable Energy and Hydrogen into the German Steel Industry" Alexander Otto et al Energies 2017, 10, 451; doi:10.3390/en10040451 www.mdpi.com/journal/energies

[157] "It's Cheap And Speedy To Erect - Could Timber Help Solve The Housing Crisis", Lend Lease, 8 August 2016, https://www.lendlease.com/better-places/20160803-cheap-and-speedy-timber-housing/ and "Cross Laminated Timber", Fitzpatrick + Partners, 13 May 2016, https://www.fitzpatrickpartners.com/assets/lib/2016/05/13/CLT.pdf and "Lendlease sells its tallest engineered timber office building in Australia" Media Release, Lend Lease, 9 February

Carbon Free Aluminium

156. May 2018 saw Rio Tinto and Alcoa join with the Government of Canada and Apple Inc. in a C$188m investment to develop a new carbon emissions free aluminium smelting project in Montreal, Canada. Following decades of investment in research and development, at the new venture launch, RIO Tinto chief executive Jean-Sebastien Jacques stated:[159]

> *"This is a revolutionary smelting process that can deliver a significant reduction in carbon emissions. It builds on the key role aluminium has to play in driving human progress, by making products infinitely recyclable, stronger, lighter and more fuel efficient".*

157. While not directly related to demand for coking coal for steel production, the initiative illustrates the investment that global mining leaders are now undertaking to revolutionalise and decarbonise the minerals processing sector, one of the largest electricity sector users globally. This project will bring significant cross-product learning and highlights the growing consensus on need for action. Rio Tinto's RenewAL product already has a certified emissions profile of 4 tonne CO_2 / tonne of Aluminium, one third of the global industry average.[160]

Technology Innovation is Accelerating

158. As detailed in Section 1, the world is not currently on track to deliver on the objective of the Paris Agreement, so new technologies like HYBRIT, zero emission hydrogen, FINEX, electric arc furnaces and RenewAL are critically needed and development timetables are accelerating as the world governments collectively move to ratch-up expectations and targets.

159. The IEA has consistently modelled within its scenarios over the last decade the commercialisation of Carbon Capture and Storage (CCS), but commercialisation has to-date failed, in large part due to the lack of a substantial

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2017,https://www.lendlease.com/-/media/llcom/investor-relations/media-releases/2017/20170209-lendlease-tallest-engineered-timber-office-building-australia.ashx

[158] "World's tallest wood building constructed in Vancouver", Archinect News, Nicholas Korody, 15 September 2016, https://archinect.com/news/article/149968916/world-s-tallest-wood-building-constructed-in-vancouver

[159] "Rio Tinto and Alcoa announce world's first carbon-free aluminum smelting process", Rio Tinto Media Statement, 10 May 2018, http://www.riotinto.com/media/media-releases-237_25362.aspx

[160] "RenewAl (TM) – World's first certified low CO2 aluminium", Rio Tinto Media Statement, December 2016, http://www.riotinto.com/documents/Aluminium_RenewAl_Factsheet.pdf

price on carbon emissions. The failure of CCS means other technologies like coking coal replacement zero emissions hydrogen (effectively a store of clean electricity) are increasingly important for the world to meet its Paris Agreement target.

160. The impact on carbon emissions and coking coal demand would be profound if a technology along the lines of HYBRIT were to be brought into commercial production. This is because the steel manufacturing industry accounts for one third of global industrial CO_2 emissions.[161]

161. In my opinion, technology change and market forces enhanced by energy policy changes are highly likely to combine to create demand substitution, curtailing demand and hence prices for coking coal consistent with or in-excess of the 40% global decline forecast by the IEA, with a consequent material adverse impact on the project.

[161] "Potential transitions in the iron and steel industry in Sweden: Towards a hydrogen-based future?", ScienceDirect, Emrah Karakayaa, Cali Nuur & Linda Assbring, https://doi.org/10.1016/j.jclepro.2018.05.142, Volume 195, 10 September 2018, Pages 651-663 https://www.sciencedirect.com/science/article/pii/S0959652618314823

Section 8: Existing supply of coking coal already in operation or approved

162. In the SDS modelling by the IEA in WEO2017, global coal use is required to more than halve by 2040 to 2,539Mtce[162] compared to the production in 2016 of 5,531Mtce.[163]

163. This builds on the position of the IEA that after more than a decade of strong volume growth, world coal production and consumption peaked in 2013 and subsequently declined in volume terms in the following three years. 2017 saw an uptick, but to a level still well below the 2013 peak. The IEA "Coal 2017" report Executive Summary is titled "Coal's Decade of Stagnation" and states "*global demand for coal will have been stagnant over the decade 2013-2022.*"[164]

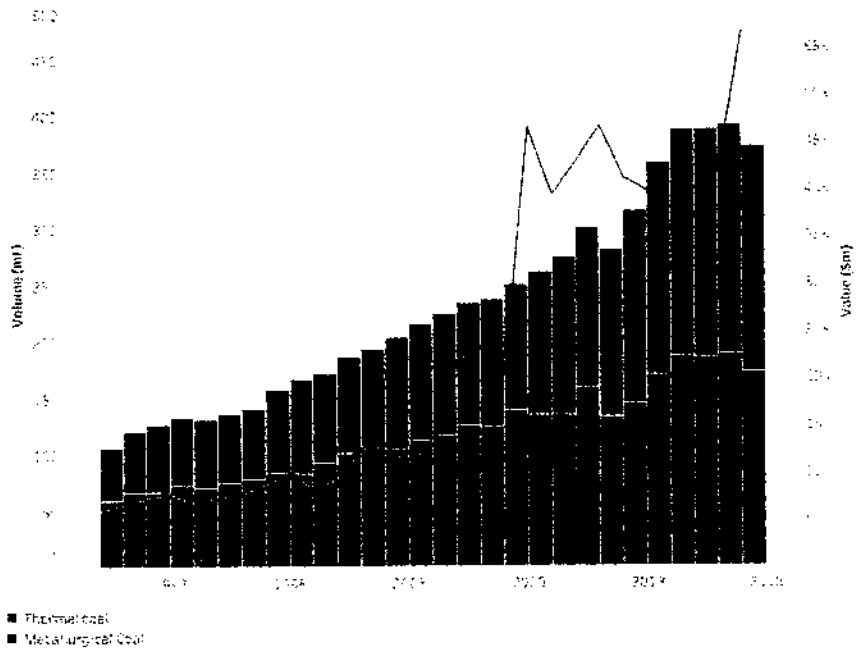
164. Global coking coal is forecast by the IEA to decline more than 40% from 2015 levels of 994Mtce to 2040 levels of 595Mtce.

Existing Coking Coal Production is Sufficient

165. In March 2018, the Commonwealth Government's Office of the Chief Economist forecast that Australian coking coal production and exports will rise more than 18% between 2017-2023, with exports forecast to rise from 172Mt in 2017 to reach 212Mtpa by 2023 (I note in this expansion the Office of the Chief Economist includes Rocky Hill's 2Mtpa).[165] This needs to be matched against the IEA SDS forecast for a declining global demand profile of a cumulative total decline of 40% in global coking coal demand by 2040 relative to 2015. The IEA SDS forecast has global coking coal demand declining 1.7% annually from 2015-2025, or a cumulative 15% decline by 2023 relative to a forecast for an 18% increase in Australian supply. This shows there is more than sufficient coking coal in production or already approved to meet existing and expected demand over the project life.

[162] Mtce = Million tonnes of coal equivalent which adjusts to normalise for the different energy content of lignite vs thermal vs coking coal.
[163] IEA WEO 2017 pages 644-645
[164] "Coal 2017: Analysis and forecasts to 2022", IEA, 18 December 2017, page 3
[165] Office of the Chief Economist, March 2018 "Resources and Energy Quarterly report page 42

Figure 8.1: Australian Coal Exports by Type in Volume and Value Terms



Source: Energy Resource Insights, Office of the Chief Economist data

166. Figure 8.1 shows Australian coal exports over the last three decades to 2018 in tonnage terms by coal type – thermal vs metallurgical (coking). Given the value per tonne of thermal coal is roughly half that of coking coal, the value split is one-third thermal and two-thirds coking coal.

167. The Commonwealth Government is mapping out continued supply growth in all of Australia's main fossil fuel exports (LNG, coking and thermal coal) inconsistent with the reductions in global emissions required under the Paris Agreement.[166]

Australian Coking Coal Expansions

168. There are a number of new coking coal mines already in operation, or approved and under development across Australia, such that the Rocky Hill Project is not required, particularly if the IEA's SDS forecast of a 40% decline in demand by 2040 proves accurate.

[166] "Resources and Energy Quarterly report" Office of the Chief Economist, Mark Cully, March 2018 https://industry.gov.au/Office-of-the-Chief-Economist/Publications/ResourcesandEnergyQuarterlyMarch2018/index.html

169. The vast majority of Australian coking coal production and reserves are located in Queensland.[167] Many new coking projects are under development, including Pembroke's 14Mtpa Olive Downs proposal, Bengal Coal's Dysart East Coal project[168] and Sojitz's recently acquired Gregory Crinum mine (currently mothballed, it retains its approvals to restart).[169]

170. The NSW Government reports the coking coal resource potential is multiples of the current commercially proven reserves being developed across Gunnedah, the Hunter, Newcastle and the Southern coal basins.[170]

171. As per Annexure 3,[171] there are a number of existing thermal, thermal/coking and coking mine operations across Queensland and NSW that could expand coal output as and if demand requires.

172. New mines can be thermal coal, coking coal or a mix of the two, depending upon the coal deposit characteristics, extent of washing and extent of selectivity involved in mine extraction. For example, China Shenhua's Watermark Liverpool Plains proposal is primarily a low ash semi-soft coking coal deposit that is being proposed for development as a thermal coal supply for use in coal fired power plants.[172]

173. I detail a few of the already approved new Queensland coking coal projects here:

174. **Red Hill**: A coking coal underground mine that is fully approved for production of up to 14Mtpa for a life of 20-25 years, having received its *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

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[167] The July 2017 publication Queensland coal – mines and advanced projects states: "Queensland has a rich endowment of high-quality coal, with an inventory estimated in 2002, at approximately 34 billion tonnes (Bt) (raw in-situ), identified by government and industry exploration. At that time, metallurgical (coking and pulverised coal injection or PCI) coals accounted for approximately 8.7Bt of the inventory, of which about 4Bt were considered potentially suitable for open-cut mining. These estimates are currently being reviewed with an expectation that the State's coal inventory will have increased significantly, resulting from the increased level of coal exploration activity by private enterprise that occurred in Queensland since 2002.

[168] Bengal Coal Pty Ltd corporate website accessed 19 June 2018 https://www.bengalcoal.com

[169] "BHP Billiton sells Gregory Crinum mine for $100m" The Australian Financial Review, Peter Ker, 30 May 2018, https://www.afr.com/business/mining/coal/bhp-billiton-sells-gregory-crinum-coal-for-100m-20180530-h10qd6

[170] "Coking Coal, Opportunities in NSW Australia", NSW Government, Department of Resources and Energy, November 2017
https://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0010/581608/coking-coal.pdf

[171] "The Coal Project Pipeline", Energy & Resource Insights, Adam Walters, 28 May 2018

[172] "Watermark Coal Project", Environmental Impact Statement, February 2013, page iii
https://majorprojects.accelo.com/public/a86af1422205f18302ef3aafb59cb191/01.%20Watermark%20Coal%20Project%20EIS%20-%20Main%20Report.pdf

approval in 2015. Red Hill Mining Lease is located adjacent to the existing Goonyella Riverside and Broadmeadow (GRB) mine complex. BHP's BMA stated that they intend for Red Hill to "*enable the continuation and potential future expansion of existing mining operations associated with the GRB mine complex*".[173] Like a number of similar projects, BMA is holding development back to ensure continuity of supply for the long term as, when and/or if needed.

175. **Byerwen**: The up to 10Mtpa open cut coking coal mine with a life of up to 50 years given a resource of up to 650Mt[174] is fully approved and under construction, with commissioning reportedly due in 2018.[175] Byerwen is owned in a joint venture between QCoal (80%) and JFE Steel (20%).

176. **Eagle Downs:** Aquila's fully approved 4.5Mtpa underground coking coal mine has been held in care-and-maintenance since 2015. May 2018 saw a press report suggesting South32 and Baowu were proposing to acquire the project.[176]

177. **Colton**: New Hope Group's 0.5Mtpa open cut coking coal mine proposal has been fully approved but is yet to commence construction. The initial mine life is proposed at 10 years, with options to extend.[177]

178. **Moranbah South**: Anglo American's 18Mtpa run-of-mine (14Mtpa product coal) underground coking coal mine received state and federal level environmental approvals in 2014, but the Mining Lease is yet to be requested. Like other projects, this proposal is held in reserve should the market need new supply. The proponent states: [178]

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[173] "Environmental Impact Statement" Section 3, Project Description, BMA, Red Hill Mining Lease, accessed 18 June 2018, https://www.bhp.com/-/media/bhp/regulatory-information-media/coal/bhp-billiton-mitsubishi-alliance/red-hill/red-hill-mining-lease-project-draft-environmental-impact-statement-eis/131213_coal_bma_redhill_section03projectdescription.pdf

[174] Chapter 2 – Project Rationale and Alternatives, Byerwen Coal Project EIS and http://eisdocs.dsdip.qld.gov.au/Byerwen%20Coal/Annual%20Reports/2017-annual-report-to-coordinator-general-byerwen-coal-project.pdf

[175] QCoal corporate website accessed 19 June 2018, http://qcoal.com.au/our-projects/byerwen-coal/

[176] "South32 close to coking coal deal at Eagle Downs". The Australian Financial Review, Peter ker, 29 May 2018, http://www.afr.com/business/mining/south32-close-to-coking-coal-deal-at-eagle-downs-20180529-h10nxg and Aquila corporate website accessed 18 June 2018 https://www.aquilaresources.com.au/projects/eagle-downs-coking-coal-project

[177] New Hope Group Colton – Corporate website accessed 19 June 2018, http://www.newhopegroup.com.au/content/projects/development/colton

[178] AngloAmerican Operations and Projects, corporate website accessed 19 June 2018 http://australia.angloamerican.com/operations-and-projects and Environmental Impact Statement (EIS) assessment report under the Environmental Protection Act 1994, Moranbah South Project proposed by Anglo American Metallurgical Coal Pty Ltd Department of Environment and Heritage Protection, Qld https://www.ehp.qld.gov.au/management/impact-assessment/eis-processes/documents/moranbah-south-project-environmental-impact-assessment-report.pdf

"The timings for project development are still to be determined and will be adjusted to suit favourable market conditions. In the meantime our focus has been on securing the environmental approvals for the project, providing us with the flexibility to progress the project when conditions improve."

Section 9: Implications for the Rocky Hill Coal Project

179. In my opinion stranded assets are created when policy, technology and/or market changes combine to prevent a facility operating for its full economic life and providing the expected rate of return on the original investment.[179]

180. For example, the May 2018 decision by the Netherlands Government to close all coal fired power plants by 2030 created stranded coal assets in Holland, given the expected useful life of a coal fired power plant is around 40 years and three power plants are only newly commissioned. This is a clear example of a specific supply side policy decision that immediately confirmed the stranded asset risk. No compensation is to be paid by the Government. The owners of these high emission coal fired power plants built these assets knowing the overall climate risks involved, even if they did not know the exact path the Netherlands Government would choose.[180]

181. The financial implications of stranded fossil fuel assets in a carbon constrained world are, in my opinion, very material and as yet under-estimated, particularly as the NPS is still viewed by the IEA as its central estimate, where the NPS assumes the world does not achieve its Paris Agreement objectives.

182. There are a number of reports that have estimated:

a. the stranded asset risks associated with the shrinking global carbon budget,[181] [182] and

b. the associated economic and multi-trillion dollar investor risks associated with any failure to meet the Paris Agreement,[183] [184] or losses in value of fossil fuel assets and associated rail and port infrastructure assets as

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[179] "What are stranded assets?", London School of Economics, 23 January 2018, http://www.lse.ac.uk/GranthamInstitute/faqs/what-are-stranded-assets/

[180] "Netherlands to ban coal-fired power plants in blow to RWE", Reuters, Bart H.Meijer, 18 May 2018, https://www.reuters.com/article/us-netherlands-energy-coal/netherlands-to-ban-coal-fired-power-plants-in-blow-to-rwe-idUSKCN1IJ1PI

[181] "Stranded Assets" Carbon Tracker Initiative, 23 August 2017, https://www.carbontracker.org/terms/stranded-assets/

[182] "Carbon Bubble About To Burst, Leaving Trillions In Stranded Assets Behind, Claims New Research", Clean Technica, Steve Hanley, 5 June 2018, https://cleantechnica.com/2018/06/05/carbon-bubble-about-to-burst-leaving-trillions-in-stranded-assets-behind-claims-new-research/

[183] "Failure To Mitigate Climate Change Could Cost Trillions, Finds Stanford Study", Clean Technica, Joshua S Hill, 30 May 2018, https://cleantechnica.com/2018/05/30/failure-to-mitigate-climate-change-could-cost-trillions-stanford/

[184] "Investing In A Time Of Climate Change", Mercer, 2015, https://www.mercer.com/content/dam/mercer/attachments/global/investments/mercer-climate-change-report-2015.pdf

cumulative policy responses are made to ensure the belated implementation is undertaken.

183. A June 2018 academic study - "Macroeconomic impact of stranded fossil fuel assets" – discusses a possible global wealth loss of US$1-4 trillion when low-cost producers' response to climate risks is also factored in to the existing technological trajectory and amplified new climate policies.[185]

184. The developments at Newcastle Coal Port provide a very current and local example of how extensively demand forecasts are being downgraded. Having worked for nearly a decade to gain approval and prepare for a new $5 billion coal terminal in Newcastle Port (the world's largest coal export port), Port Waratah Coal Services in May 2018 announced it would let this proposal lapse.[186] Despite near record high coal prices, this coal miner-owned company has dramatically revised its view of the industry's diminishing prospects and taken an estimated $30m loss.

185. In my opinion, evidence continues to mount[187] that positive action to limit climate change is likely to avoid extreme economic risks and is likely to actually enhance sustainable economic activity over the long term by avoiding economic damage, extreme weather events and stranded assets.

186. In my opinion, the IEA's SDS's modelling of a 50% decline in world coal demand by 2040 provides a clear signal as to the order of magnitude of disruption pending for the coal industry as governments around the world move to implement policies sufficient to accelerate the technology innovation and deployment needed, and as global financial markets shift capital flows sufficient to prioritise low emissions investments and limit stranded asset risks.

187. If the Paris Agreement is to be achieved, there is already more than sufficient coking coal production capacity available. As world demand for coal diminishes, there is no need for new greenfield mine developments. In my opinion, there is a

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[185] "Macroeconomic impact of stranded fossil fuel assets", Nature of Climate Change, June 2018, J.F. Mercure et al, Radboud University, Nijmegen et al https://doi.org/10.1038/s41558-018-0182-1

[186] "Port Waratah Terminal 4 Announcement: Port Waratah expect existing coal terminal capacity to be sufficient for foreseeable growth" Port Waratah Coal Services press release, 31 May 2018, https://pwcs.com.au/news/latest-news/port-waratah-terminal-4-announcement/

[187] Large potential reduction in economic damages under UN mitigation targets https://doi.org/10.1038/s41586-018-0071-9 Marshall Burke, W. Matthew Davis & Noah S. Diffenbaugh

clear risk that should it proceed, the project will become a stranded asset during its proposed mine life.

188. [redacted] NR.

Tim Buckley

20 June 2018

[188] "What should we do with Australia's 50,000 abandoned mines?" The Conversation, 23 July 2014, Corinne Unger, https://theconversation.com/what-should-we-do-with-australias-50-000-abandoned-mines-18197 and http://www.ausimm.com.au/publications/epublication.aspx?ID=15933

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DEFENDING THE ENVIRONMENT
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Annexure 1

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8 June 2018

Tim Buckley
Director of Energy Finance Studies
Institute for Energy Economics & Financial Analysis
31 Inverallan Ave
West Pymble 2073

By email: timabuckley@outlook.com

CONFIDENTIAL AND PRIVILEGED

Dear Mr Buckley

Gloucester Resources Limited v Minister for Planning; Court Proceedings No. 2017/383563
Stratford Coal Pty Limited v Minister for Planning; Court Proceedings No. 2018/23580

1. We act for Groundswell Gloucester Inc. (**GG Inc.**) in the above Land and Environment Court (**Court**) proceedings.

2. GG Inc. is a group of residents with the objectives of encouraging community participation in decisions which determine the economic, social and environmental future of the Stroud Gloucester Valley, and ensuring that the environment of the Stroud Gloucester Valley sustains a healthy, productive and vibrant community.

3. Our client is a party to the above proceedings. There are two concurrent proceedings both against the NSW Minister for Planning, namely a challenge by Gloucester Resources Limited (**GRL**) against refusal of the development application for the Rocky Hill Coal Mine (**Project**), and a challenge by Stratford Coal Pty Limited (**Stratford**) against refusal of the modification application for the Stratford Extension Project (**Modification**).

4. Our client intends to adduce expert evidence on the likely social impacts arising from the Project and the Modification and on the climate change impacts arising from the Project. Our client is seeking a decision by the Court to uphold the refusal of the Project and the Modification.

5. Our client wishes to retain your services to act as an expert witness to assist the Court impartially on matters relevant to your area of expertise.

Background

6. In 2013, a development application and Environmental Impact Statement (**EIS**) for the Rocky Hill Coal Mine (SSD 5156) was placed on public exhibition.

7. In 2015, GRL, as the proponent for the Rocky Hill Coal Mine, wrote to the Department of Planning and Environment (**Department**) requesting that the Project application be placed on hold. This request was made on the basis that GRL was considering an "advanced commercial option" that may result in an amendment of the Project application.

8. An amended development application and revised EIS for the Rocky Hill Coal Mine was placed on public exhibition from 17 August to 14 October 2016.

9. The amended Rocky Hill Coal Mine proposal involved:
   a) developing and operating an open-cut coal mine, to produce up to 2 million tonnes of run-of-mine (**ROM**) coal per year for up to 21 years;
   b) constructing and operating a private coal haul road to link the Rocky Hill Coal Mine with the Stratford Coal Complex, approximately 9 kilometres to the south;
   c) hauling sized ROM coal on the private coal haul road between 7:00 am and 6:00 pm only, Monday to Saturday;
   d) using the private coal haul road to deliver heavy equipment and construction materials to the mine area; and
   e) rehabilitating the site.

10. Concurrently, a development application and EIS for a Modification to the Stratford Extension Project (SSD 4966 MOD 1) (**Modification**) was placed on public exhibition.

11. This Modification to the approved Stratford Mine Complex sought approval to allow the incorporation of a new coal haul road, and the receipt, processing and railing of coal from the Rocky Hill Coal Mine.

12. In October 2017, the Project and the Modification were referred by the Minister for Planning to the (then) Planning Assessment Commission (**PAC**) for determination.

13. As part of the PAC assessment process, the Department recommended that the Project and the Modification be refused.

14. In relation to the Rocky Hill Coal Mine, the Department concluded that the Project was incompatibly located with respect to the southern fringes of the nearby urban area of Gloucester. The Department considered that the Project site was not a suitable site for an open cut coal mine, due to:
   a) proposed land use conflicts with existing established land uses, in particular rural-residential and tourism land uses; and
   b) its incompatibility with the underlying aims and objectives of the strategic land use zonings of the *Gloucester Local Environmental Plan* to protect the scenic

amenity of the Gloucester township and the broader Gloucester Valley by retaining scenic and rural surroundings for the town.

15. In relation to the Modification, the Department concluded that in the absence of any approval for the Rocky Hill Coal Mine, the Modification should also be refused.

16. The PAC refused the Project and the Modification on 14 December 2017.

Legal Proceedings

17. As a preliminary matter, please note that you are not permitted to express an opinion on any question of law in your report and that your report should confine itself to the relevant issues of fact within your area of expertise. However, you need to understand the legal context of this case to understand the relevant questions of fact on which the Court requires your assistance.

18. GRL filed a Class 1 Application (merits appeal) against the Minister for Planning's decision to refuse development consent to the Rocky Hill Coal Mine in December 2017. That application seeks orders from the Court to the effect that the Project application should be approved.

19. Stratford, as the proponent for the Modification, filed a Class 1 Application (merits appeal) against the Minister for Planning's decision to refuse the Modification in January 2018. That application seeks orders from the Court to the effect that the Modification application should be approved.

20. The Minister for Planning is defending the appeals, and the decisions to refuse the Project and Modification applications.

21. The Court has determined that the two appeals should be heard together.

22. On 23 April 2018, the Court ordered that GG Inc. be joined as a party to Gloucester Resources Limited v Minister for Planning, Court Proceedings No. 2017/383563, under section 8.15(2) of the *Environmental Planning and Assessment Act 1979* (**GRL proceedings**).

23. On 15 May 2018, the Court ordered that GG Inc. be joined as a party to Stratford Coal Pty Limited v Minister for Planning; Court Proceedings No. 2018/23580, under section 8.15(2) of the *Environmental Planning and Assessment Act 1979* (**Stratford proceedings**).

24. Our client has filed the following contentions in the GRL proceedings:
    a) The Project and the Modification will have a significant social impact on residents and the community of Gloucester, contrary to the public interest and the principle of intergenerational equity.
    b) The Project is not in the public interest and contrary to the principles of Ecologically Sustainable Development (**ESD**), including intergenerational equity and improved valuation, pricing and incentive mechanisms, because,

in order to limit the rise in global temperatures to below 2 degrees Celsius above pre-industrial levels, the Project should not be approved at the current time.

25. Our client has filed the following contention in the Stratford proceedings:
    The Project and the Modification will have a significant social impact on residents and the community of Gloucester, contrary to the public interest and the principle of intergenerational equity.

26. You are briefed to provide expert advice in relation to the Project's role in global markets in relation to climate change impacts.

Overview of the Work Request

Duty to the Court

27. Our client seeks to retain you to act as an expert witness. Your role as an expert witness is to assist the Court impartially on matters relevant to your area of expertise. You are not to act as an advocate for our client and any opinion expressed must be genuinely held by you based on your professional training, knowledge, or experience.

28. In this respect, we draw your attention to Division 2 of Part 31 of the *Uniform Civil Procedure Rules 2005* (**UCPR**), and the Expert Witness Code of Conduct (**Code of Conduct**) contained in Schedule 7 of the UCPR, both of which govern the use of expert evidence in the Court. We **enclose** copies of the relevant UCPR provisions.

29. In particular, we note that clause 2 of the Code of Conduct states that:

    "An expert witness is not an advocate for a party and has a paramount duty, overriding any duty to the party to the proceedings or other person retaining the expert witness, to assist the court impartially on matters relevant to the area of expertise of the witness."

30. Please read those documents carefully before you commence the work requested. **Your expert report must contain an acknowledgment that you have read the Expert Witness Code of Conduct under the UCPR and that you agree to be bound by it.** Otherwise your report will be inadmissible as evidence.

Purpose of your Expert Report

31. Your expert report will be used as evidence in chief of your professional opinion. Information which you believe the Court should be aware of must be contained in your expert report. Whilst you may be able to clarify matters contained in your report at a later date, this is unlikely to extend to the provision of new information.

32. In providing your opinion to the Court you must set out all the assumptions upon which the opinion is based. This may include, for example, facts observed as a result of field or lab work or 'assumed' facts based on a body of scientific

opinion. If the latter, you should provide references which demonstrate the existence of that body of opinion.

33. Your expert report must also set out the process of reasoning which you have undertaken in order to arrive at your conclusions. It is insufficient for an expert report to simply state your opinion or conclusion reached without an explanation as to how this was arrived at. The purpose of providing such assumptions and reasoning is to enable the Court and experts engaged by other parties to the proceedings to make an assessment as to the soundness of your opinion.

Expert Report Requirements

34. The work we require involves the following:
    a) review the relevant documentation;
    b) prepare a written expert report that conforms with the Code of Conduct and addresses the questions in paragraph 35;
    c) attend a conference with your instructing solicitors and barristers at a time to be confirmed;
    d) review the Respondent's expert report(s);
    e) confer with the Respondent's expert(s) at a joint conference(s) and prepare a joint report, which sets out the matters agreed, matters disagreed, and the reasons for agreement and disagreement as a result of the joint conference(s); and
    f) appear as an expert witness in the Court.

35. Please ensure that your expert report addresses the following:
    a) In your opinion, are there any market-based measures, including new technologies, or government policies sufficient to limit global temperature increases to less than 2 degrees Celsius above pre-industrial levels?
    b) In your opinion, are current policies (including within Australia) and market-based measures around the world consistent with limiting global temperature increases to less than 2 degrees Celsius above pre-industrial levels?
    c) In your opinion, are there alternative sources of coking coal currently available?
    d) In your opinion, will there be any changes to financial markets or carbon financing as a result of international commitments to ensure that global temperature rise will not exceed 2 degrees Celsius above pre-industrial levels?
    e) Provide any further observations or opinions which you consider to be relevant, having regard to the circumstances of this matter.

36. We request that you provide us with a draft of your report for review before finalising it. We emphasise that the purpose of this is not to influence the conclusions or recommendations you make but to ensure that the language and expression of the report is clear and complies with the formal legal requirements of an expert report.

Relevant Documents

37. All Project assessment documents relevant to the proceedings are available at:

a) Rocky Hill Coal Mine: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5156; and
b) Modification to Stratford Extension Project: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7897.

38. In particular we direct you to the following documents:
    a) The relevant UCPR provisions (**enclosed**);
    b) Modification to Stratford Extension Project:
        i) Stratford Statement of Environmental Effects – Main Report: https://majorprojects.accelo.com/public/cb7faf851047657825ca2f217f3f62d0/01.Stratford%20Main%20Text.pdf;
        ii) Instrument of Refusal: https://majorprojects.accelo.com/public/7eb257be9a68ff2e8fb0b91874aa3cd5/Stratford%20MOD%201%20Instrument%20of%20Refusal.pdf;
    c) Rocky Hill Coal Project:
        i) Rocky Hill Coal Project EIS - Executive Summary: https://majorprojects.accelo.com/public/25dac6310d36e472e1a6bb8d1c679038/11.%20Rocky%20Hill%20Coal%20Project%20EIS%20-%20Executive%20Summary.pdf;
        ii) Rocky Hill Coal Project EIS – Air Quality Appendix (including Greenhouse Gas Assessment): https://majorprojects.accelo.com/public/50c16b8a1177ee8d1c80e98b2c48ee33/34.%20Rocky%20Hill%20Coal%20Project%20EIS%20SCSC%20Vol%201_Part%202A%20Air%20Quality.pdf;
        iii) Rocky Hill Coal Project Response to Submissions (Section 2.15 Greenhouse Gases): https://majorprojects.accelo.com/public/00bad530e0d6468a1cf60a53ff75128b/Rocky%20Hill%20Coal%20Project_%20Response%20to%20Submissions.pdf;
        iv) Rocky Hill Coal Amended EIS - Executive Summary: https://majorprojects.accelo.com/public/d72cf487d31e344e694c65e17cb6020c/02.Rocky%20Hill%20Amended%20EIS%20Executive%20Summary.pdf;
        v) Rocky Hill Coal Amended EIS – Air Quality Appendix (including Greenhouse Gas Assessment): https://majorprojects.accelo.com/public/613696aa5aaa27e853710202d5181509/29.Rocky%20Hill%20Amended%20EIS%20SCSC%20Vol%201%20Part%202A%20Air%20Quality.pdf;
        vi) Rocky Hill Coal Amended EIS Response to Submissions (Executive Summary): https://majorprojects.accelo.com/public/584aab933e37564ff7a32c61acfaa3c1/RHCP_RTS%2002_%20Executive%20Summary_%20June%202017.pdf;
        vii) Rocky Hill Coal Amended EIS Response to Submissions (Sections 2.8-2.10): https://majorprojects.accelo.com/public/fb1926a382e3041c397067372cd9fe2c/RHCP_RTS%2004_%20Section%202.1%20to%202.12_%20June%202017.pdf;

viii) DPE Rocky Hill Coal Project Assessment Report: https://majorprojects.accelo.com/public/39bec827a10ce780dc804786b3315a0f/Rocky%20Hill%20Assessment%20Report%20Final.pdf; and

ix) PAC Determination Report: https://majorprojects.accelo.com/public/d7f79e4f204300ca25b7fb455aae0139/Rocky%20Hill%20Coal%20Project_%20Determination%20Report.PDF.

39. Please let us know as soon as possible if you require further information for the purpose of giving your expert opinion.

Format of Your Report

40. Division 2 of Part 31 of the UCPR Rules sets out information that your report must contain, such as:
    - your qualifications;
    - the facts, and assumptions of fact, on which the opinions in the report are based and your reasons for each opinion expressed;
    - if a particular issue falls outside your area of expertise, clear acknowledgement that it falls outside your field of expertise;
    - any literature or other materials utilised in support of the opinions;
    - details of any examinations, tests or other investigations on which you have relied, including details of the qualifications of the person who carried them out;
    - a brief summary of the report;
    - if you believe that the report may be incomplete or inaccurate without some qualification, the qualification must be stated in the report;
    - if you consider that your opinion is not a concluded opinion because of insufficient research or insufficient data or for any other reason, this must be stated when the opinion is expressed; and
    - if you change your opinion on a material matter after providing an expert's report to us, you must provide us with a supplementary report to that effect.

41. Please format your report as follows:
    - address your report to the Court;
    - sign and date your report;
    - include a summary of your qualifications and experience as an appendix to your report;
    - use 12 point type and at least 2cm page margins;
    - supply a PDF version of your report for printing and binding;
    - number each paragraph of your report;
    - number all pages, including attachments and annexes, continuously from the first page to the last page (excluding any cover page to your report); and
    - annex this letter of instruction to your report.

Timing

42. The timing in relation to this matter is as follows:

Date	Work due
9 June 2018	Draft report to EDO NSW
11 June 2018	Finalised report to EDO NSW
11 June 2018	Report to be filed with the Court
25 June 2018	GRL report to be filed with the Court
16 July 2018	Joint report to be filed with the Court
13 -31 August 2018	Land and Environment Court hearing

43. We will update you on relevant timing for you to give evidence once further information is available.

Fees and Terms

44. Thank you for agreeing to provide your advice in this matter on a pro bono (volunteer) basis. EDO NSW relies on experts such as you to assist in matters with very little financial compensation and we thank you for agreeing to provide this advice on a pro bono basis.

45. Please note the following terms:
    a) your work will only be used by EDO NSW to assist our client;
    b) EDO NSW will take all reasonable steps to prevent your work being used for purposes other than that mentioned above, but we accept no responsibility for the actions of third parties;
    c) regardless of the above points, EDO NSW may choose not to use your work; and
    d) you will not be covered by the EDO NSW's insurance while undertaking the above tasks.

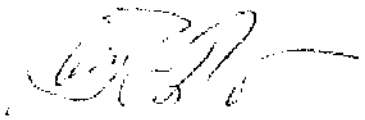
Duty of Confidentiality

46. Please treat your work as strictly confidential until your expert report is provided to other parties and the Court, unless authorised by us.

47. If you would like to discuss this brief further, please contact the author on (02) 9262 6989 or email matthew.floro@edonsw.org.au.

48. We are grateful for your assistance in this matter.

Yours sincerely
EDO NSW



Matt Floro
Solicitor

Our Ref: 1825740

Annexure 2

Resume - Tim Buckley

31 Inverallan Ave Pymble, Sydney 2073
Mobile 0408 102 127 email tbuckley@ieefa.org

Employment History

Director, Energy Finance Studies, Australasia
Institute for Energy Economics and Financial Analysis (IEEFA) (June 2013 – present)

- Publishing of financial analysis into energy projects that impact on the global transition to a low carbon economy, analysis of energy efficiency and renewables and evaluation of the associated risks to stranded assets in the fossil fuel sector. Presenting on global energy transformation at numerous energy finance conferences across China, India, Bangladesh, Singapore, Japan, U.S., Germany and Australia.

Arkx Investment Management - Managing Director (Jan 2010 – Aug 2013)

- Co-founder, Head of Equity Research and Joint Portfolio Manager for the *Arkx Global Clean Energy Fund*, Australia's first wholesale listed equities fund dedicated to low carbon. Arkx was part owned by Westpac Banking Group.
- Undertook investment research analysis into global listed company stock selection through to portfolio construction and maintenance. Maintained financial models on 100 of the world's leading firms most leveraged to the move to a low carbon future.

Shaw Stockbroking – Head of Equities (Feb 2008 –Jan 2010)

- Headhunted from Citi to take on a newly created position, Head of Equities. Responsible for oversight of Shaw's Research, Institutional Research Sales and Corporate Finance arms, leveraging an excellent retail equities advisor business.
- The role was designed to provide Shaw a leadership transition to allow the CEO to retire on a 3 year timeframe. The GFC's onset meant this transition did not eventuate.

Citigroup – Managing Director, Head of Equity Research (1998-2007)

- 2006-2007: Managing Director, Equity Research - Equity Capital Markets – Investment Banking co-ordination and transaction vetting. A member of the five person Australasian Commitments Committee (CC). Evaluation and approval of all

initial public offering and equity market issuance roles of Citigroup. A key project in this time was the $15bn bid for Alinta (jointly with Macquarie).

- 2002-2006: MD, Head of Research with a equity research staff of 100; Citigroup Australasia Executive (a management board of 8 covering Citibank, Diners Club, GCIB, Private Clients, Research & Insurance); Australasian CC; Equities Executive.
- 1998-2001: Deputy Head of Research, Appointed Managing Director in 2000.
- 1998-2003: Equity Market Research in the Diversified Industrials and Beverages sectors. Key stocks included Wesfarmers, Foster's, Pacific Dunlop, Southcorp, Lion Nathan, CC Amatil and BRL Hardie.

Deutsche Morgan Grenfell Asia – Director, Head of Equity Research (1996-98)

- Singapore based, Tim was co-head of DMG Singapore Equities, and worked closely with our retail equity partner, DMG & Partners (Singapore), a top 10 institutional and retail broker covering Singapore and Malaysia.
- Equity Market Research in the Asia Region Pulp & Paper (P&P) Sector.
- Singapore Equity Strategist / Head of Research with a team of 20.

County Natwest Securities – Director, Senior Equity Analyst (1992-1996)

- Equity Market Research in the Diversified Industrials, Beverages and P&P sectors. Key stocks under coverage included Foster's, BTR Nylex, Pacific Dunlop, Southcorp, Lion Nathan, Amcor, Fletcher Challenge, Carter Holt Harvey, Spicers Paper, Howard Smith, Wesfarmers and FIF.
- Career highlights: consistently ranked Top 3 in the Diversified Industrials, Beverages and P&P categories; and being ranked by BRW as Australia's top analyst in 1994/5.

Macquarie Equities – Senior Industrial Analyst (1988-1991)

- Equity Market Research in the Diversified Industrials sector. Key stocks covered included: Elders IXL, BTR Nylex, Pacific Dunlop, Southcorp, AFP and Wormald.
- Career highlights included being black-banned by Elders IXL's CEO John Elliott, and achieving Top 3 rankings in the Diversified Industrials category of the BRW and ABM analyst polls.

Education

HSC achieved at Barker College Hornsby (graduating in 1984, Top 1% in NSW)

Bachelor of Business, University of Technology, Sydney (1985-87)

- Graduated with Distinction
- Double Major in Accounting and Finance, Minors in Marketing and Computing

Lecturer in Finance and Accounting, University of Technology, Sydney – 1988

Post Graduate studies in Finance at Macquarie University – 1988

Lecturer in SIA – Advanced Equity Market Analysis 1990-1991

American Securities Exams Series 7 Financial Analysts – 1998
Series 24 General Securities Representative Exam- 2003

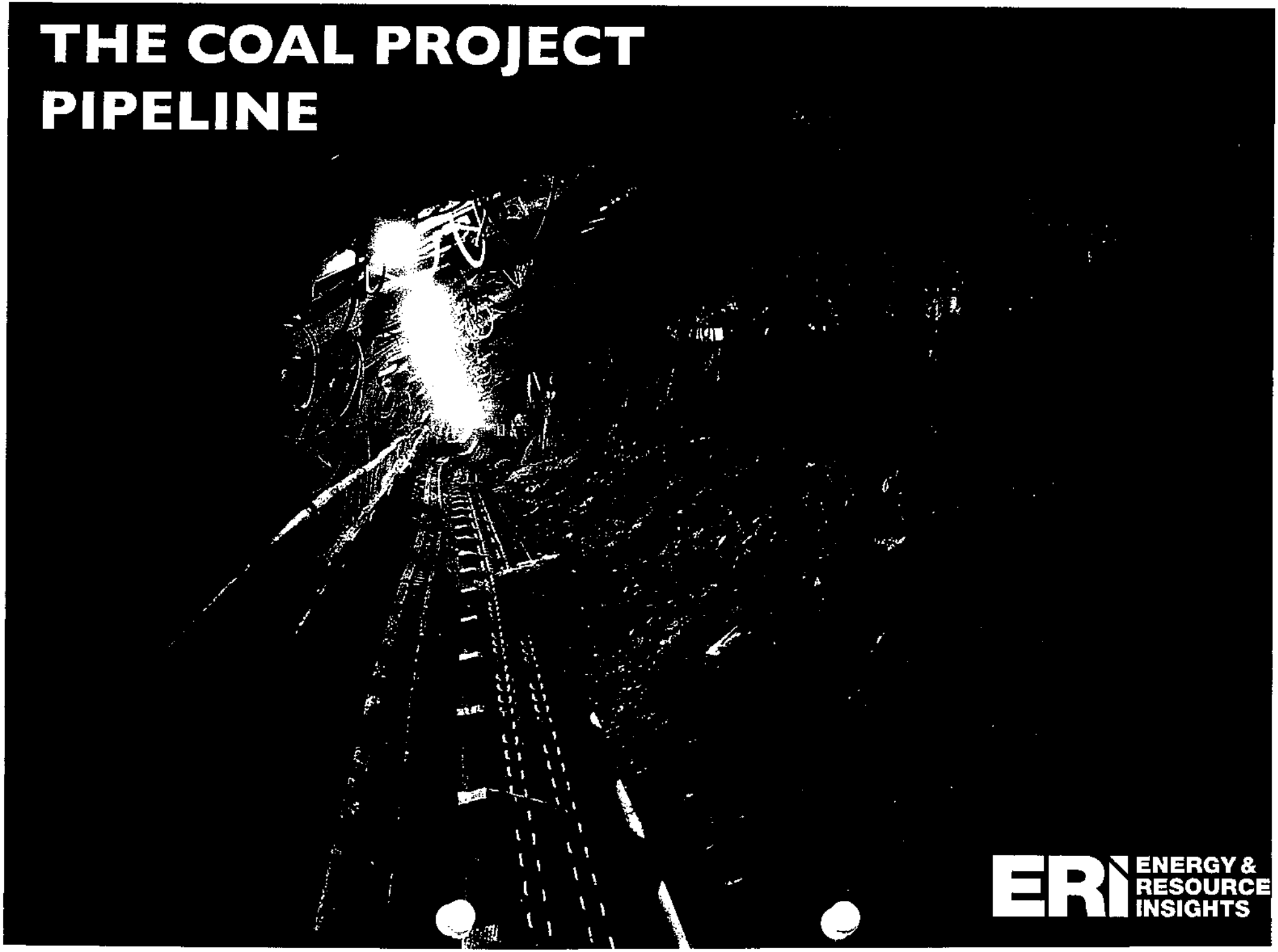
ASIC required PS146 Registered Representative – 2003-2010

ASX Responsible Executive exam – 2008

Major Reports Published

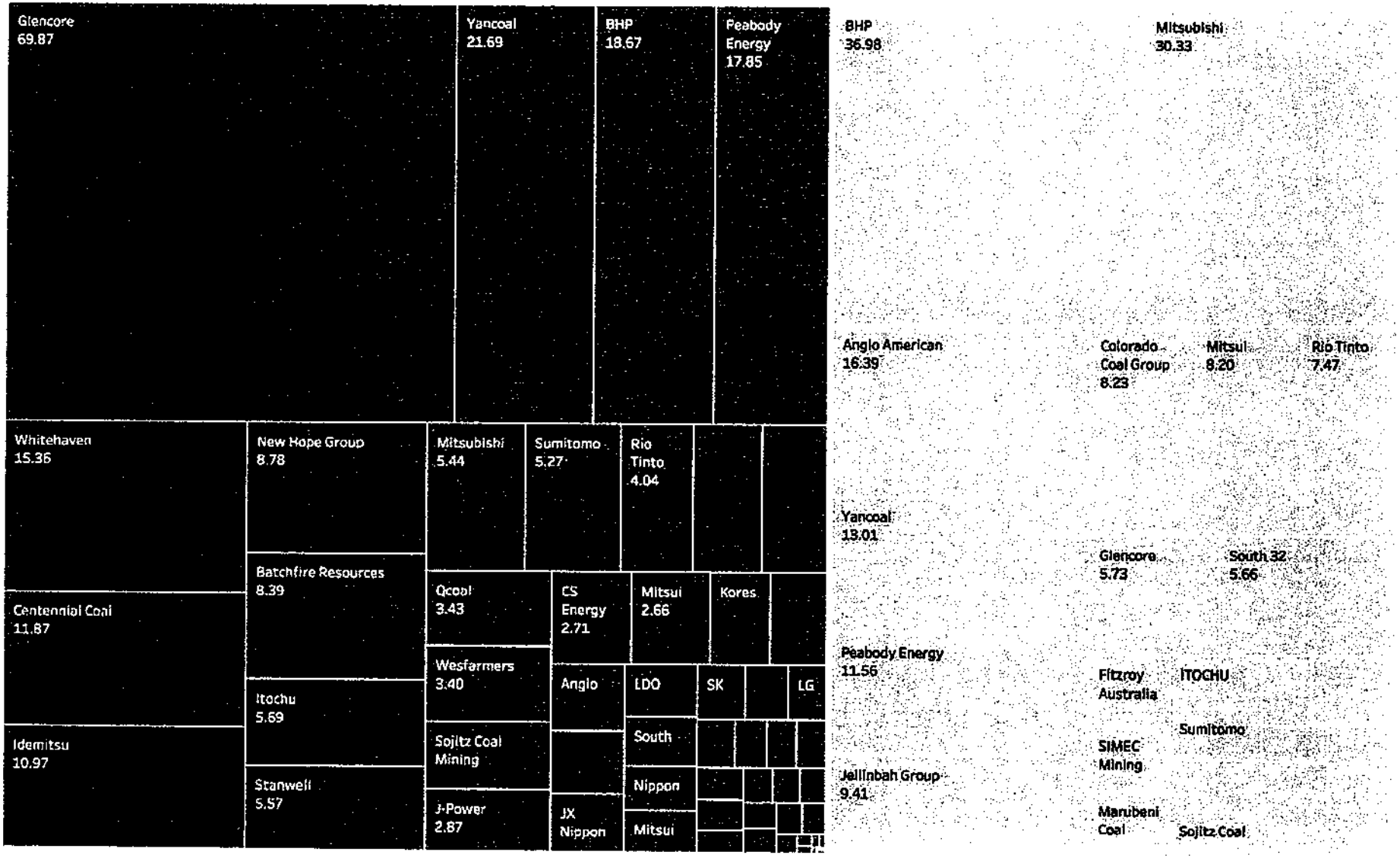
- "*Stranded: A Financial Analysis of GVK's proposed Alpha Coal project in Australia's Galilee Basin*" in June 2013.
- "*Remote Prospects: A Financial Analysis of Adani's coal gamble in Australia's Galilee Basin*" in November 2013.
- "Shenhua Watermark Coal: A Stranded Asset", November 2014.
- "*A Better Way Forward for Electrification in Bangladesh*", November 2016
- "*Japan: Greater Energy Security Through Renewables*", March 2017
- "*State-Owned Utility NTPC Takes a Lead Role in India's Electricity Transition*", May 2017
- "*Hume Coal Update 2017: Superior Alternatives Are Available*", July 2017
- "*Winners and Losers Among Big Utilities as Renewables Disrupt Markets Across Asia, Europe, the U.S., and Africa*", October 2017
- "*India's Electricity Sector Transformation*", November 2017.
- "*China in 2017 Continued to Position Itself for Global Clean Energy Dominance*", Jan 2018
- "*Tamil Nadu's Electricity Sector Transformation*", February 2018
- "*Advances in Solar Energy Accelerate Global Shift in Electricity Generation*", May 2018

THE COAL PROJECT PIPELINE



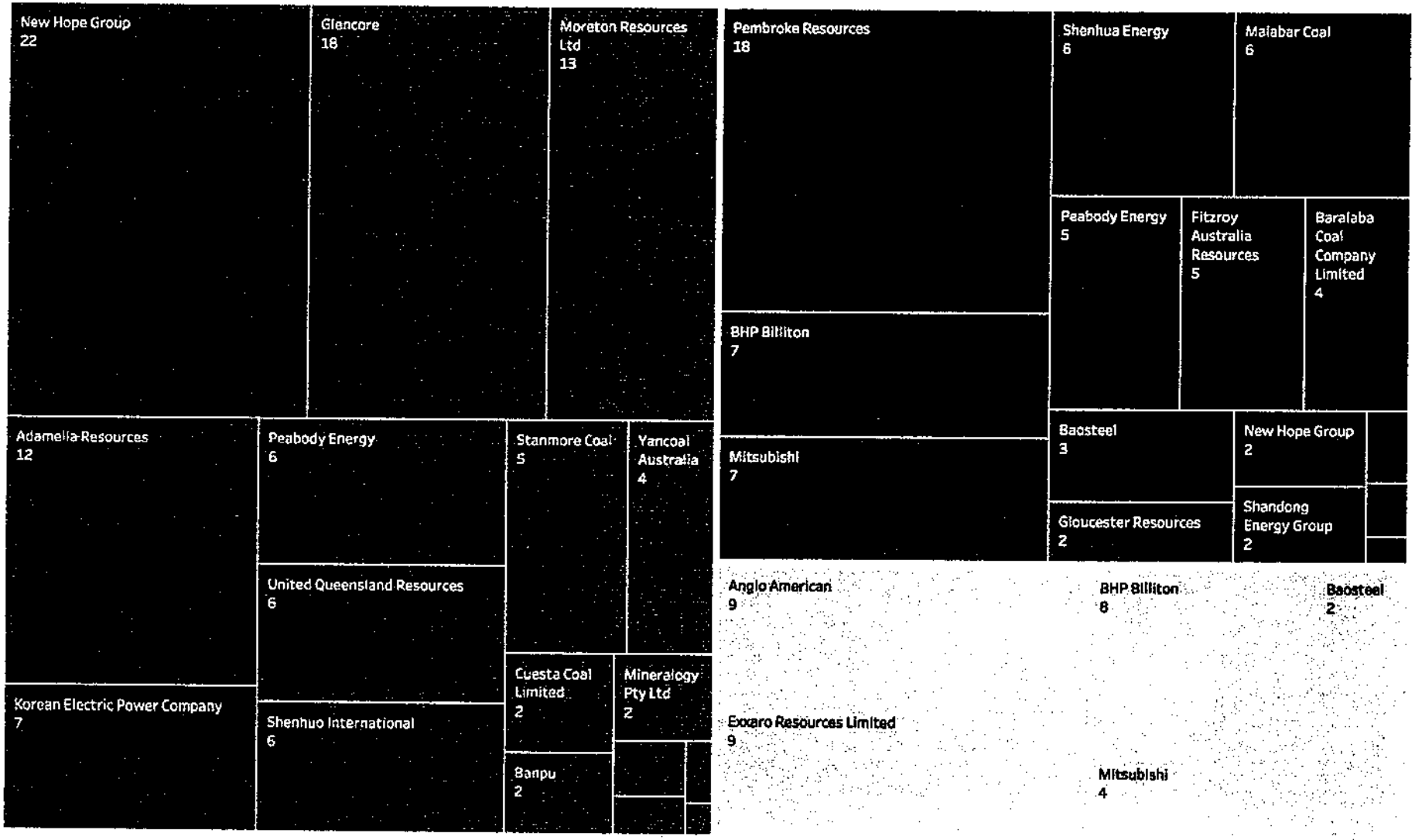
ENERGY & RESOURCE INSIGHTS

2016-17 Australian coal production by company



ERI analysis Presents 2016-17 production based on current mine ownership (rather than ownership at time of production)

Proposed new coal mining capacity by company and coal type (excluding Galilee Basin)



Department of Industry (2018) Major Projects ... ; ERI analysis