

United Wambo Mine

Submission to Independent Planning Commission

The Institute for Energy Economics and Financial Analysis (IEEFA) welcomes the opportunity to make a submission to the Independent Planning Commission (IPC) on the United Wambo Open Cut Coal Mine Project (Project) in response to the Ashurst Submission of 14 April 2019.

This submission was made at the request of the EDO NSW, acting on behalf of the Hunter Environment Lobby Inc. EDO NSW has provided me with a copy of the Uniform Civil Procedure Rules 2005 (UCPR), and the Expert Witness Code of Conduct contained in Schedule 7 of the UCPR. I have read and agree to be bound by these rules and code of conduct.

A copy of my curriculum vitae, including my relevant qualifications, is attached (Appendix A).



Tim Buckley

1 May 2019

Executive Summary

The International Energy Agency (**IEA**) estimates global seaborne thermal coal use will decline by two-thirds by 2040 if the world is to keep temperature rises to 1.5-2°C in line with the global Paris Agreement.

The IEA models other scenarios (the Current Policies Scenario (**CPS**) and New Policies Scenario (**NPS**)) that effectively start with the premise that the temperature rise limitation goal of the Paris Agreement fails. This is not acknowledged in Ashurst's submission (on behalf of United Collieries Pty Ltd and Wambo Coal Pty Ltd) dated 14 April 2019 (**Ashurst Submission**) to the Independent Planning Commission Panel on the United Wambo Coal Project (**Project**).

As the combustion of coal is the single largest source of fossil fuel carbon emissions globally, addressing the continued use of coal is central to the global success or failure of the Paris Agreement. Either global temperature rise is limited to 1.5-2°C, or it isn't.

IEEFA agrees with Ashurst that any forecast of coal demand beyond 2030 is entirely uncertain and cannot be predicted with any certainty. As stated in The Australia Institute submission to the Independent Planning Commission (**IPC**) dated February 2019, the Australian Government Department of Industry has shown this to be true, with a 2013 forecast for Australian thermal coal export volumes of 304Mtpa exports by 2017/18, 50% higher than the actual volume of 203Mtpa in 2017/18. However, the direction of coal demand is at its core dependent on several key assumptions. IEEFA would contend that leading these are the assumptions on:

1. the progressive rise in price in carbon emissions pricing and expanding global coverage (Section 1);
2. technology developments (Section 2);
3. global finance industry's lending / investing policies re climate change (Section 6); and
4. progressive decarbonisation energy policy plans by the world's largest thermal coal importers (Sections 7-10).

If it is accepted that the Paris Agreement can and will be achieved, then the central forecast of the IEA is the Sustainable Development Scenario (**SDS**), which sees global seaborne thermal coal use decline by two-thirds by 2040, with downside risk to this (Section 4).

The IEA SDS forecast assumes massive technology change. While we agree with this overall, we disagree with the IEA's controversial forecast that the coal-fired power industry will be successful in developing and achieving wide-scale deployments of high efficiency low emission (**HELE**) coal-fired power plants fitted with carbon capture and storage (**CCS**). The IEA also acknowledges this assumption is proving increasingly unrealistic as CCS deployments expected over the last decade have not materialised, and there is little new investment in CCS research (Section 2).

Absent a high global price on carbon emissions, there is no price signal to incentivise either HELE or CCS. IEEFA would contend that coal-fired power generated by a plant with HELE with CCS would see significant cost rises and as a result would not be competitive against competing zero-emissions alternatives. Notwithstanding over a decade of discussion about the merits of these technologies, the commercial reality is that industry has not supported HELE with CCS; there are no viable, operating commercial scale HELE with CCS coal-fired power plants.

But technology change in low emissions alternatives to thermal coal is phenomenal, way ahead of IEA expectations. Solar costs have been falling 10-20% annually for a decade. Every year for the last decade the IEA estimates of annual solar installations have been too conservative, requiring ongoing massive upgrades annually. Now Bloomberg New Energy Finance (**BNEF**) reports lithium-ion battery costs fell 30% in 2018 alone.

The Ashurst Submission relies on the IEA NPS as the central scenario to project that demand exists to justify proceeding with the Project. Further, the Ashurst Submission states that current nationally determined contributions (**NDC**) generally do not preclude ongoing coal use. IEEFA contends that current NDCs collectively do equate to the IEA NPS, which equates to a 2.7-3.0°C rise i.e. the failure of the Paris Agreement. But the Ashurst Submission is very selective, failing to mention that the Paris Agreement includes the requirement of the “ratchet-up” clause for all countries to progressively increase their ambition. So greater policy ambition is inherent in the Paris Agreement (Section 5).

In my opinion, even the IEA’s SDS is insufficient to give a reasonable probability of limiting global warming to between 1.5-2.0°C above pre-industrial levels (the SDS models actions required to give just a 50% probability of 2.0°C). Bearing in mind that the Paris Agreement commits signatories to pursue “efforts to limit the temperature increase to 1.5°C above pre-industrial levels”, I am of the opinion that even more drastic global policy action than is set out in the IEA SDS scenario is required and likely. Combined with the failure of the coal industry to commercialise CCS, this means a total thermal coal phase out even faster than modelled under the SDS.

IEEFA also contends this greater policy ambition is starting to be realised. Japan and South Korea are in the middle of setting new roadmaps of greater climate ambition. So is India, with the new ambition to go to 500GW of renewable energy by 2030 as a massive step above their previous 275GW by 2027 target. China’s solar installs are already 230GW at the end of 2018, more than double their 2020 target of 100GW. As the four biggest thermal coal import nations globally, their collective energy policy ambition to decarbonisation is rising rapidly.

The Ashurst Submission provides an exceptionally detailed review of why the United Wambo Coal is slightly better quality than its global seaborne thermal coal competitors, making it slightly less emissions intensive. We agree with this assessment. But it also sets up a straw man argument. This selective analysis fails to mention that United Wambo Coal also directly competes with zero emissions alternatives that are seeing rapid deployment uptake in all of its key target export markets. United Wambo Coal is 100% more emissions intensive than these zero emissions alternatives.

Using the current European Union Allowances (**EUA**) pricing of carbon emissions, IEEFA’s analysis shows that the Scope 1-3 carbon emissions of United Wambo Coal of 266Mt have a market value estimated at A\$11 billion. This is many multiples of the proponent’s estimated net cost benefit to NSW of A\$414m. The presumption that this carbon emissions cost will remain externalised to the global power generation sector for the life of the Project is key. If the carbon emissions are priced in, then coal-fired power generation becomes increasingly uncompetitive, and hence the United Wambo Coal expansion is not needed.

IEEFA notes that collectively, global investors managing US\$32 trillion have called for the urgent implementation of a global price on carbon emissions, and also for the rapid phase out of unabated coal use in the OECD by 2030 and globally by 2050.

IEEFA notes that over 100 globally significant financial institutions have now implemented policies precluding the provision of insurance, investment in and/or lending to thermal coal mines and coal-fired power plants. In 2019, new thermal coal exclusion policies announcements by global finance majors are running at one per week (with Hannover Re, Mitsubishi UFJ Financial Group, OCBC and the Development Bank of Singapore (DBS) all announcing just in April 2019 alone – refer Section 6).

The ratchet up clause of the Paris Agreement is seeing progressive new policy initiatives in all key coal importing nations. Technology change in zero emissions alternatives to thermal coal are accelerating rapidly, and the Project is 100% more emissions intensive than these increasingly low cost zero-emissions competitors. And global finance is increasingly moving to direct global capital flows consistent with the Paris Agreement. To conclude, if the Paris Agreement is achieved due to the combined impact of new policy, technology and finance developments globally, then the central forecast is that global seaborne thermal coal use will decline by two-thirds by 2040.

The United Wambo Coal expansion is not needed. With a forecast decline in seaborne thermal coal demand of 2-3% annually to reach zero use by 2050, there is more than enough existing production to supply the declining residual demand, leaving clear stranded asset risk. Additionally, the Project's cost-benefit is overwhelmingly determined by the \$11bn of carbon emissions released by its coal use, a figure the proponent excludes as an uncoded externality worn by the single global atmosphere. The Ashurst Submission provides significant detail on the merits of a narrow market substitution argument that this coal is slightly better than other coals, failing to acknowledge the Project's output is 100% more emissions intensive than the zero emissions alternatives that coal import nations are now actively pivoting to in order to collectively deliver on their Paris Agreement commitments.

Section 1. The Value of Carbon Emissions

United Wambo Coal, a Glencore and Peabody joint venture, is seeking approval to expand open cut mining operations at the existing mine, to allow for the extraction of an additional 150 million tonnes (Mt) of run-of-mine (ROM) coal over a period of 23 years.

The Environmental Impact Statement (EIS) submitted by United Wambo Coal references the Umwelt “Greenhouse Gas and Energy Assessment” of May 2016, which identified scope 1-3 carbon emissions equivalent of 265.9Mt, 97.5% of which relate to scope 3 i.e. the combustion of the thermal coal by coal fired power plants sourcing their fuel from United Wambo Coal.

The Ashurst Submission quotes external modelling by CRU that asserts the scope 1-3 emissions of the United Wambo Coal at 164Mt and then uses this benchmark to conclude the Project has a marginally lower scope 1-3 emissions profile than international thermal coal alternatives. Given the details of this modelling are excluded from public exhibition as they are deemed “commercially sensitive”, we are unable to reconcile why the Ashurst Submission uses an emissions profile one-third lower than the Project’s own assessment.

The Project’s Scope 1-3 Emissions are Costed at A\$11bn

The European Union Allowance (EUA) pricing provides a guide to the cost of carbon and methane emissions. EUA’s are currently trading at a record €27/t (Figure 1.1).

Figure 1.1: European Union Allowance Pricing (€/t)



Source: <https://markets.businessinsider.com/commodities/co2-emissionsrechte>, 16 April 2019

In the absence of a direct Australian government policy to calculate the global cost of greenhouse gas emissions, IEEFA has utilised a standard cost-benefit analysis referencing the EUA pricing. We also note that one of the world’s largest coal import nations, South Korea, now has one of the world’s highest coal and carbon tax combinations (Section 9).

Using EUA pricing, the cost of scope 1-3 emissions of the United Wambo Coal extension amount to over A\$11bn, a cost 20-30 times the net project benefit argued by the proponent.

Figure 1.2: United Wambo Mine – Value of Scope 1-3 Emissions

Run of Mine Coal (Mt)	150.0
Scope 1-3 CO2 emissions per tonne	1.8
Scope 1-3 CO2 emissions (Mt)	265.9
Carbon price (EU EUA (€/t)) *	27
Euro to AUD *	1.59
Carbon price (A/t)	\$42.93
Value of emissions (A\$m)	\$11,415
Scope 3 as a share of total emissions	97.5%
* As of 26 April 2019	

Source: Umwelt United Wambo Coal EIS May 2016, IEEFA calculations

Note: The Ashurst Submission relies on a CRU expert report summary that references Scope 1-3 emissions at 164Mt for the Project, but there is no reconciliation of why this contradicts the Project EIS's estimate of 265.9Mt. Given the 265.9Mt is more consistent with IEEFA's understanding, we have relied on this estimate.

Contrary to the argument proposed in the Ashurst Submission in paragraph xii, the A\$11bn cost of the scope 3 emissions alone swamp the estimated private benefits to the proponent.

Australia is a signatory to the Paris Agreement. Like all countries party to this treaty, Australia is obliged to work towards fulfilling this global agreement in clear acknowledgement there is only one atmosphere, and regardless of where the emissions from this project's coal are released, the impact is universal. Scope 3 emissions are directly the result of the use of this project's output; there is no atmospheric difference where the coal is burned. There is no requirement nor even suggestion this thermal coal will be sold for use in coal-fired power plants with CCS technologies (in practice, none of United Wambo's customers use coal CCS). Absent this, the mining of this coal directly contributes 265.9Mt of additional carbon emissions to the global atmosphere.

High Quality Coal Use is Theoretically Preferable

The Ashurst Submission claims it is logical and preferable for the global coal demand to be met by the supply of higher quality coal resources such as the Project's coal.¹

IEEFA would note that coal is the largest fossil fuel contributor to global carbon emissions, overtaking oil in 2005.² This fact is not acknowledged in the Ashurst Submission. By comparison, electricity generation from renewable energy is near zero emissions, so it is far more logical and preferable from a global climate perspective that new investment be undertaken in zero emissions renewable energy projects than new coal projects. This is central to energy policy developments in Australia's key export markets: Japan, South Korea, China and India.

¹ (para d (ii) (D), page 13)

² The Global Carbon Project, "Global Carbon Budget 2018", 5 December 2018
<http://www.futureearth.org/news/Budget2018>

Additionally, it might be theoretically preferable to Glencore and Peabody for China or India to use less emissions intensive Australian export thermal coal over their own domestic coal (allowing for the additional emissions in transportation), but practically both China and India have pursued policies that put a priority on energy security, leveraging domestic supply, with imported coal left to supply residual demand. A minemouth coal-fired power plant in Western China or central India cannot use imported coal, regardless of its lower total emission profile; the required rail and port infrastructure is not established. Energy security and domestic investment / employment needs are key determinants of energy sourcing, particularly in emerging nations.

The Coal Minister of India, Piyush Goyal, has repeatedly said he will prioritise domestic Indian renewables and domestic coal as ways to reduce reliance on expensive imported thermal coal.³ China has similarly put an import embargo on Australian coal imports at the start of 2019 in order to prioritise domestic coal sourcing. Meanwhile, both China and India are now deploying 60-70GW and 10-15GW annually respectively of new renewable energy capacity as the dominant new source of electricity capacity. This renewable energy alternative has been the low cost source of supply in India since 2017, and 2019 saw the first zero-subsidy tender completed for renewables in China.⁴

The Ashurst Submission provides an exceptionally detailed review of why the United Wambo Coal is better quality than its global seaborne thermal coal competitors. This selective analysis fails to mention that United Wambo Coal also directly competes with zero emissions alternatives. United Wambo Coal is 100% more emissions intensive than these zero emissions alternatives.

³ Financial Express, "Piyush Goyal: No need to import coal, we have sufficient in India", 12 June 2017
<https://www.financialexpress.com/industry/piyush-goyal-no-need-to-import-coal-we-have-sufficient-in-india/713803/>

⁴ In April 2019 China's SPIC awarded 6GW of wind tenders at grid parity with coal-fired power generation as part of China's wider policy move to achieve zero subsidies for renewables by 2021, refer WindPower, "Domestic firms win all 6GW of China's first subsidy-free site", 3 April 2019.

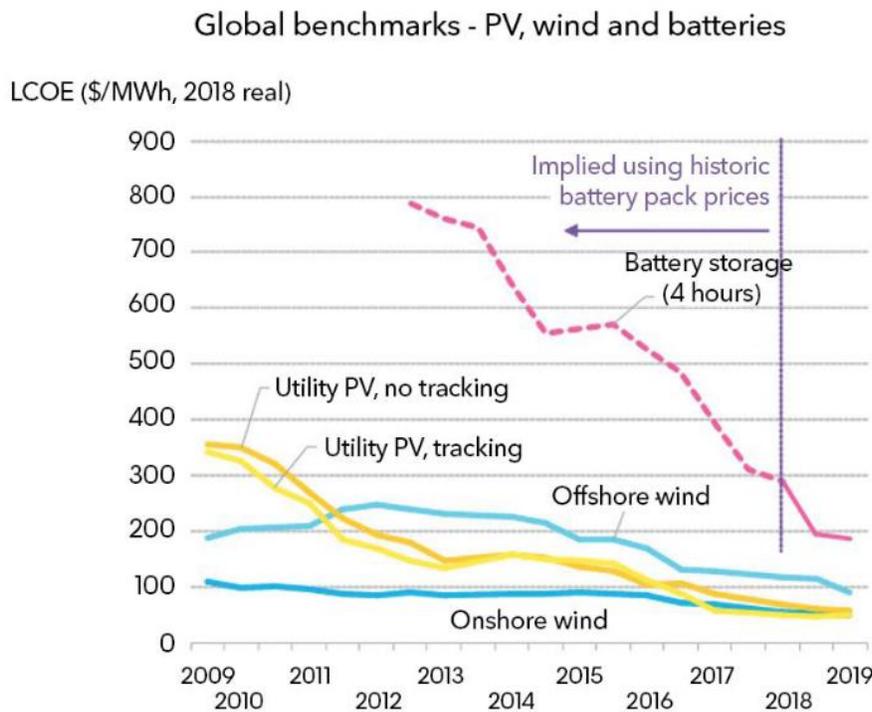
Section 2. Technology is Disrupting Electricity Markets

While Australia’s current political landscape currently creates a policy disconnect between its international treaty obligations and its domestic climate policy, the financial, legal, and fiscal risks and costs of this have been well articulated by the Reserve Bank of Australia (RBA),⁵ Australian Prudential Regulatory Authority (APRA)⁶ and in our legal system.⁷

Zero emission technologies are witnessing massive deflation

BNEF regularly publishes on the rate of technology improvement and resulting deflation across most zero emissions, renewable energy technologies. Onshore and offshore wind as well as solar have seen massive cost reductions over the last decade. The development of the lithium-ion battery technologies has seen a more recent but similar learning curve experience, with a record 30% deflation in lithium battery costs evidenced in 2018 - Figure 2.1. The development of increasingly price-competitive lithium ion batteries is driving the commercialisation of electric vehicles and the associated rapid convergence of the stationary power and the transportation sectors, accelerating technology innovations as global firms position to disrupt incumbent industries.

Figure 2.1: Ongoing Price Deflation in Zero Emissions Technologies



Source: BloombergNEF. Note: The global benchmark is a country weighed-average using the latest annual capacity additions. The storage LCOE is reflective of a utility-scale Li-ion battery storage system running at a daily cycle and includes charging costs assumed to be 60% of whole sale base power price in each country.

⁵ RBA Guy Debelle, Deputy Governor, “Speech: Climate Change and the Economy”, 12 March 2019

⁶ APRA Geoff Summerhayes, Executive Member, “Australia’s new horizon: Climate change challenges and prudential risk”, 17 February 2017

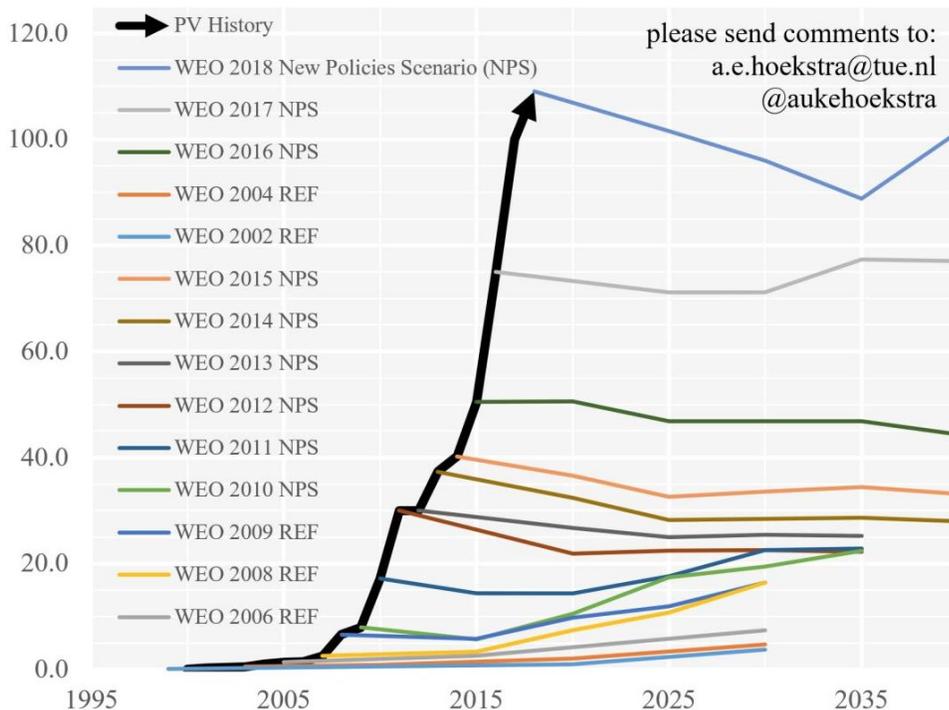
⁷ Centre for Policy Development, “Updated Hutley opinion on directors’ duties and climate risk”, 29 March 2019

The IEA has dramatically underestimated this renewable energy deflation, and as a result consistently underestimated the deployment of renewables capacity, particularly solar – Figure 2.2. After a decade of wrongly forecasting the peak of solar installations in the then current year, the IEA World Energy Outlook published in November 2018 (WEO 2018) forecast a decline of 10% in global solar installs in 2018, only to see global installs rise 10% to 101GW instead. Analysts are forecasting another rise of up to 20% in 2019.⁸

Figure 2.2: IEA Underestimation of Global Solar Installations

Annual PV additions: historic data vs IEA WEO predictions

In GW of added capacity per year - source International Energy Agency - World Energy Outlook



Source: PV Magazine, "IEA versus the reality of solar PV", 20 November 2018

April 2019 saw an open letter published in the Financial Times calling out the IEA for this consistent, ongoing bias in overestimating fossil fuel demand (particularly thermal coal) and underestimating renewables.⁹

Sections 8-11 review the progress in renewable energy policy and installations in China, Japan, South Korea and India, the four largest thermal coal import nations globally, accounting for a collective 67% of total global coal demand¹⁰ and 56% of global seaborne thermal coal demand.¹¹

⁸ Gerard Reid, "The outlook for global solar is very bright!", 14 March 2019

⁹ Financial Times, "IEA's climate models criticised as too fossil-fuel friendly", 3 April 2019

¹⁰ BP "BP Statistical Review of World Energy", June 2018

¹¹ Office of the Chief Economist, "Resources and Energy Quarterly", March 2019

Little Progress in Carbon Capture and Storage in a Decade

The IEA SDS forecasts a massive, technology driven disruption of global energy markets. While we agree with this overall, we disagree with the IEA's controversial forecast that the coal-fired power industry will be successful in developing and achieving wide-scale deployments of HELE coal-fired power plants fitted with CCS. Indeed, the IEA acknowledges this assumption is proving increasingly unrealistic as coal CCS deployments expected over the last decade have not materialised, and there is little new investment in CCS research and development. In the WEO 2018 the IEA states:¹²

“Carbon Capture, utilisation and storage (CCUS) needs to play an important role in meeting climate goals, but there are very few projects operating or planned. ... In the SDS, coal is almost squeezed out of the power mix. Renewables account for two-thirds of power generation by 2040 in this scenario and the share of coal falls to around 5%.”

Absent a high global price on carbon emissions, there is no price signal to incentivise either HELE nor CCS. IEEFA would contend that coal-fired power generated by a plant with HELE with CCS would see a doubling of capital and operating cost rises and as a result would not be competitive against competing zero-emissions alternatives. The Ashurst Submission references the emission reduction benefits of HELE with CCS, but curiously fails to mention the cost implications that make thermal coal use entirely uncompetitive. At a time when zero emissions renewable energy is increasingly the low cost source of new electricity, the ability of coal-fired power plants to be cost competitive at all is conjecture. Notwithstanding over a decade of discussion about the merits of these technologies, the commercial reality is that industry has not supported HELE with CCS; there are no viable, operating commercial scale HELE with CCS coal-fired power plants.

The Ashurst Submission references that Japan is a global leader in HELE and CCS coal-fired power plants, citing without reference that 95% of the country's coal plants are HELE. IEEFA has published many electricity sector studies on Japan and notes that of the 45,568 MW of coal-fired power plants currently operating in Japan, just 39.3% or 17,900 MW use ultra-supercritical or HELE technology. Far from all being modern, Japan actually still relies on 11,549 MW of subcritical coal-fired power plants using technology dating back to 1962 for 25.3% of their installed coal capacity.¹³ Not a single coal-fired power plant in Japan operates CCS, a point the Ashurst Submission omits.

The Ashurst Submission references two HELE coal-fired power plant proposals (Huaibei Shenergy Power Generation in China, Nabha Power in India, neither of which involve CCS) and some research proposals into CCS, but the Ashurst Submission fails to cite a single successful HELE with CCS project operational, anywhere in the world.¹⁴ The Ashurst Submission omits any reference to the now-failed US\$7.5bn Kemper coal-fired power plant (a HELE with CCS development in Mississippi, America). Nor does it reference SaskPower's Boundary Dam HELE with CCS project in Saskatchewan in Canada. While still operational at a small scale, the massive underperformance versus expectations means early in 2018 SaskPower management ruled out any further CCS development and the potential closure of this failed project.¹⁵

¹² International Energy Agency, “World Energy Outlook 2018”, page 216.

¹³ [Global Coal Plant Tracker database](#), January 2019

¹⁴ The Ashurst Submission, page 88.

¹⁵ Renew Economy, “[New renewables cost data shuts door on coal power's CCS escape route](#)”, 19 November 2018

Section 3. Export Growth has Not Materialised

In the context of rapidly changing global energy markets, the IEA’s history of coal demand forecasts have proven widely optimistic.

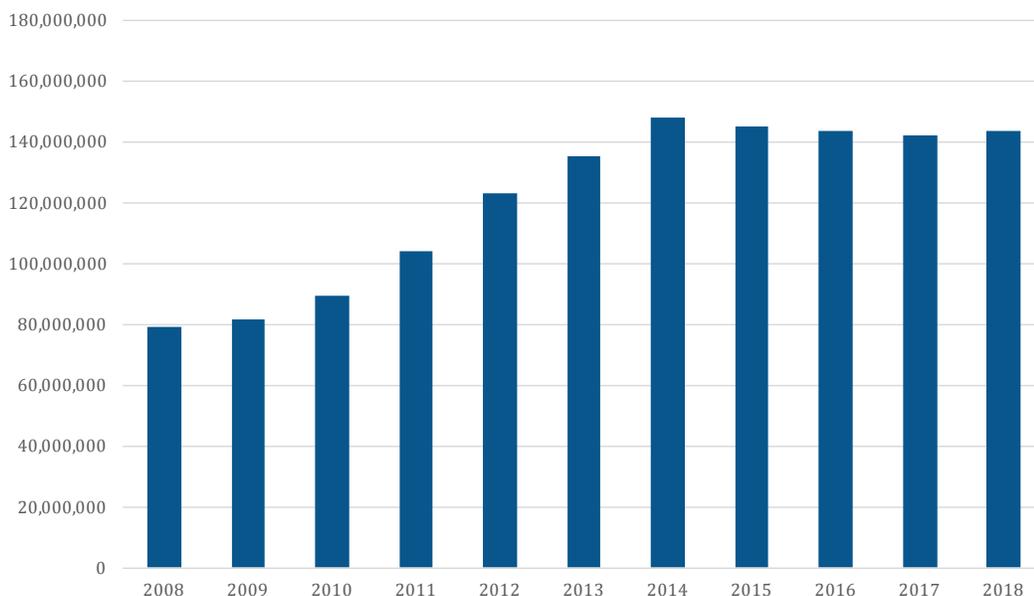
Overly optimistic coal export forecasts are nothing new in NSW. The planned T4 terminal at the Port of Newcastle was intended to ship increasing volumes of coal, but after it turned out it would never be needed, it was cancelled last year. Even after the cancellation, the port still has 24% unused capacity.

The NSW coal industry was quick to trumpet record high value of coal exports in 2018 but this was driven by temporarily high prices, not high volumes.

Thermal coal export volumes from NSW peaked in 2014 (Figure 3.1) and there is no guarantee that volumes will rise above the 2014 figure in the short or medium term. In the long term exports will, in IEEFA’s view, certainly fall as any rise in thermal coal imports by smaller Asian electricity markets will be more than offset with declining imports by current major destinations, as set out in a recent IEEFA report on the NSW coal industry’s long-term outlook.¹⁶

It is no surprise then that the Port of Newcastle’s chair has recognised an “urgent need” for the port to diversify away from an excessive reliance on thermal coal.

Figure 3.1: NSW Thermal Coal Exports by Calendar Year (Mt)



Source: DFAT STARS Database, based on ABS Cat No 5368.0, December 2018 data.

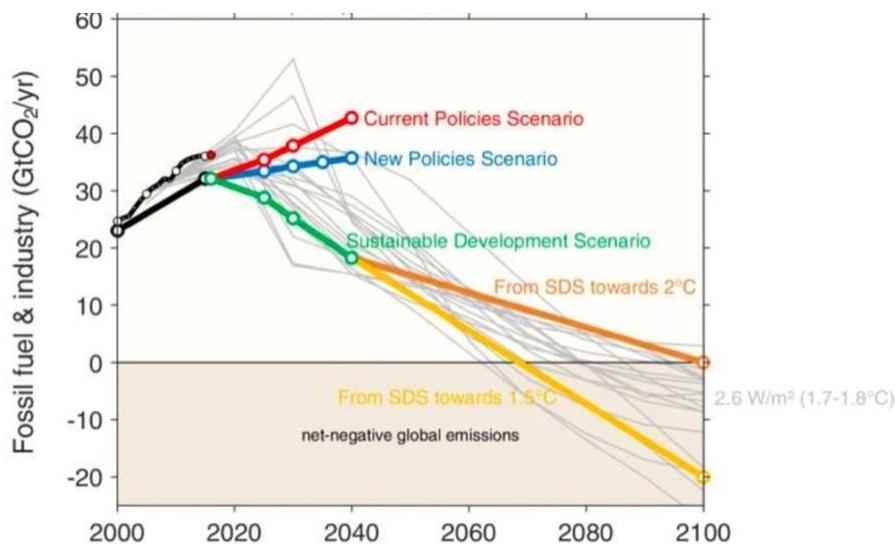
¹⁶ IEEFA, “Past their peak, New South Wales coal export volumes head toward terminal decline as markets transition”, 31 October 2018

Section 4. Scenarios on Coal's Structural Decline

Each year, the IEA releases the [World Energy Outlook \(WEO\)](#) which, among other things, [models](#) global energy demand using various [scenarios](#). The scenarios are not predictions, rather tools to assess risks. The scenarios respond to global [Paris Agreement](#) targets aimed at keeping temperature rises to 1.5- 2°C.

If the world is to successfully limit climate change to well below 2°C of warming, fossil fuel extraction must rapidly decrease towards zero net emissions, starting immediately. Thermal coal is the most negatively exposed commodity in this scenario. All countries must instead accelerate reliance on sustainable, affordable and renewable non-fossil sources of energy to avoid catastrophic climate change. IEEFA sees that even more drastic global policy and investment action than that set out in the IEA's SDS is required and likely. Global financial institutions exiting coal are generally committing¹⁷ to the IEA's SDS or an even more ambitious transformation as outlined in the Beyond 2°C Scenario when they set Paris Agreement compliant targets.

Figure 4.1: Possible Carbon Emissions Pathways Reflecting IEA Scenarios



Source: Glen Peters, IEA WEO 2017, SS database (IIASA)P.¹⁸

The [Sustainable Development Scenario \(SDS\)](#) presents a realistic scenario whereby nations work together to successfully limit climate change by transforming the energy market, albeit working to a lower ambition than collectively presented in the Paris Agreement commitments. Under the SDS, the planet's 'carbon budget' will be exhausted as early as 2023 under a 1.5°C target and by 2040 under a 2°C objective. The SDS projects a significant decline in thermal coal demand, with global trade plummeting 65% by 2040. The SDS falls short of meeting the Paris Agreement's target with any certainty, given the presumption that coal CCS is commercialised at scale by 2030 (refer Section 2).

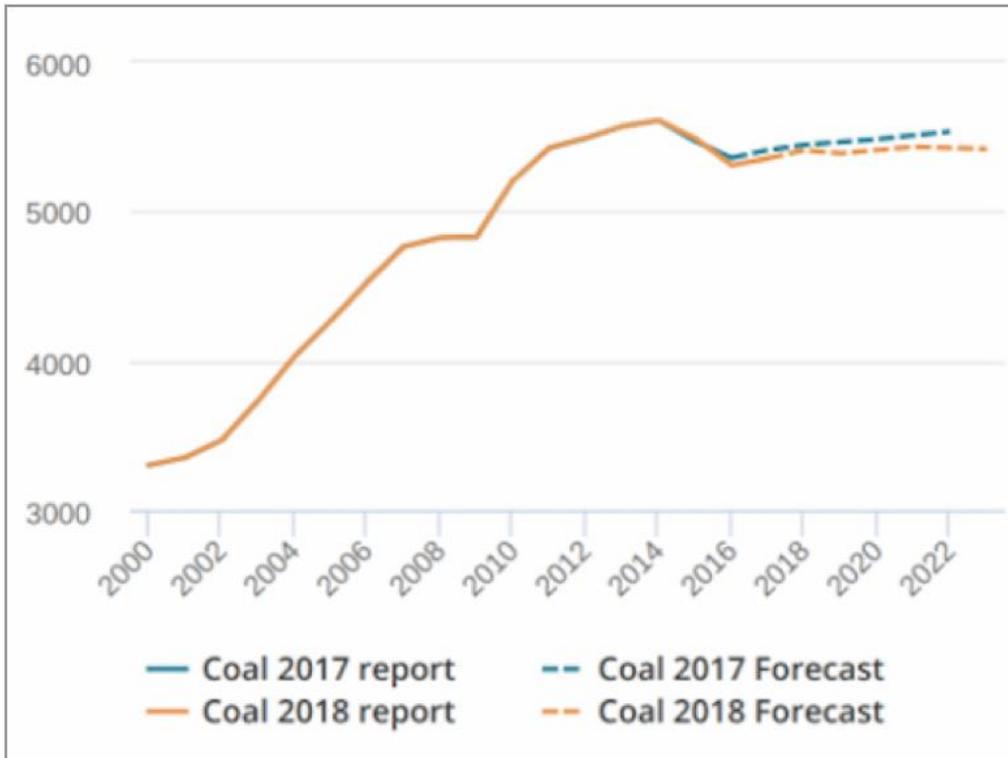
¹⁷ See IEEFA, [Over 100 Global Financial Institutions Are Exiting Coal, With More to Come Every Two Weeks a Bank, Insurer or Lender Announces New Restrictions on Coal](#), 27 February 2019

¹⁸ Centre for International Climate Research (CICERO), [Beyond Carbon Budgets and Back to Emissions Scenarios](#), Glen Peters, September 2018

Reviewing IEA's thermal coal forecasts to 2040

The IEA acknowledges that global coal use likely peaked in 2014 while modelling a stagnant near-term outlook to 2022 (See Figure 4.2). The global seaborne thermal coal market is a sub-section of the global coal market. The IEA also estimates seaborne thermal coal exports to have likely peaked in 2015.

Figure 4.2: IEA Global Coal Demand Actual and Estimates 2018 vs 2017 (Mtce)



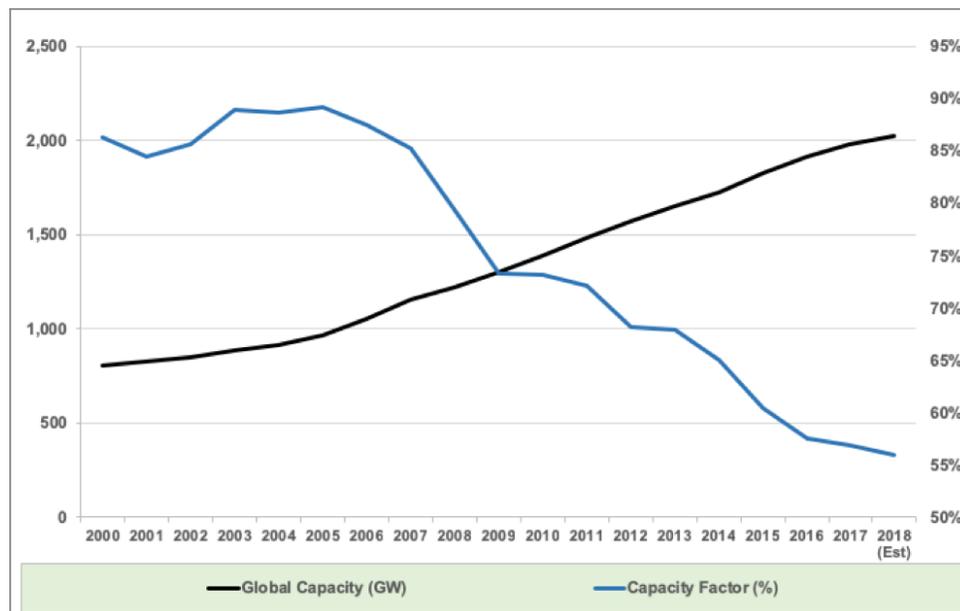
Source: OECD / IEA

IEEFA notes the global seaborne thermal coal market is not likely to reverse the inevitable technology, cost and policy driven direction of a slow, steady and ultimately terminal decline in volumes by 2050. The world collectively is making enhanced efforts to implement the Paris Agreement, and absent a significant and sustained lift in investment, the long touted development of expensive CCS and HELE coal-fired power plants looks increasingly unlikely.

A decade-long global over-investment in new coal

The Ashurst Submission justifies a positive outlook for thermal coal by referencing the continued commissioning of new coal-fired power plants globally over the last decade – a trend confirmed in Figure 4.3.

Figure 4.3: Global Coal-fired Power Plant Capacity and Utilisation Rate



Source: *Global Coal Plant Tracker, BP Statistics, IEEFA estimates & calculations*

This outlook however only tells the optimistic half of the story, with the narrative missing several key globally entrenched developments:

As coal plant capacity has risen, coal plant utilisation has declined.

Coal consumption is not linked to increased coal-fired power plant capacity but to the use of a coal plant. An idle new coal plant does not use any coal; it simply represents a stranded asset. The capacity utilisation rate of the global coal-fired power plant fleet hit a new record low in 2018, exceeding the record low set in 2017, and that set previously in 2016, and in fact every year this past decade (See Figure 4.3 (RHS in blue)).

Bullish demand forecasts cite new coal plant development pipelines while failing to mention the rate of coal plant retirements.

Global coal power retirements are accelerating and by 2022 are forecast to exceed new plant completions (Figure 4.5).¹⁹ For example, in January 2019 Germany announced it would close 12 GW of coal plants by 2022 with an accelerated 100% coal phaseout of its remaining 42 GW by 2038.²⁰ Global coal closures over 2015-2018 were 32 GW pa, a 50% increase vs the previous four years.

The global coal plant pipeline has shrunk by two-thirds.

The pipeline has shrunk by a cumulative US\$1 trillion or 744 GW in a small timeframe (the 30 months to July 2018). Stranded asset losses are rapidly rising as renewable energy competition gets increasingly competitive.

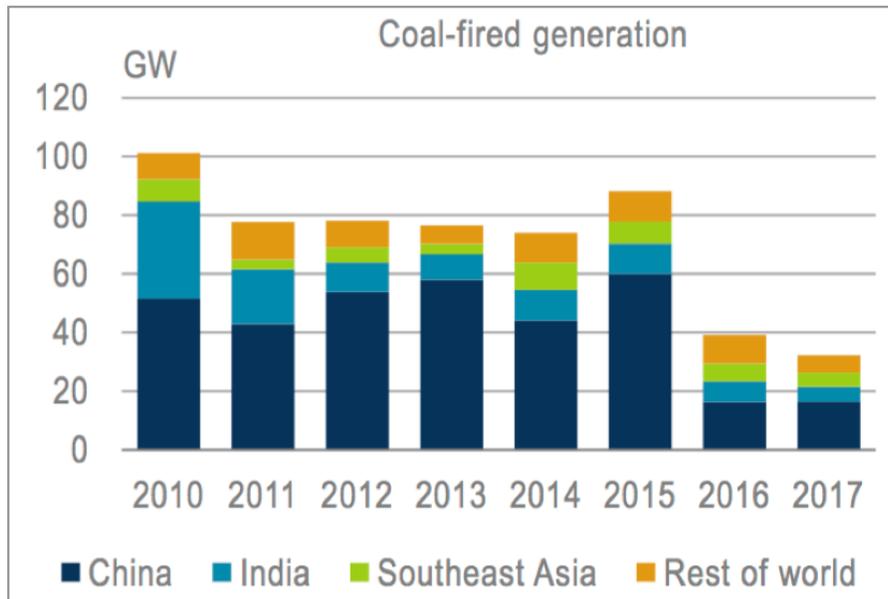
New coal plant proposals moving to final investment decisions are slowing.

¹⁹ Carbon Brief, *Global Coal Plant Tracker*, “Guest post: ‘Peak coal’ is getting closer, latest figures show”, July 2018

²⁰ Financial Times, “Germany plans to phase out coal-fired power stations by 2038”, 28 Jan 2019

The IEA identifies 2017 as having a record low level of new coal-fired power plant proposals moving to final investment decision (FID), due to investors reassessing coal’s future (Refer Figure 4.4).

Figure 4.4: IEA Global Coal Power Plants Reaching FID Sign-off



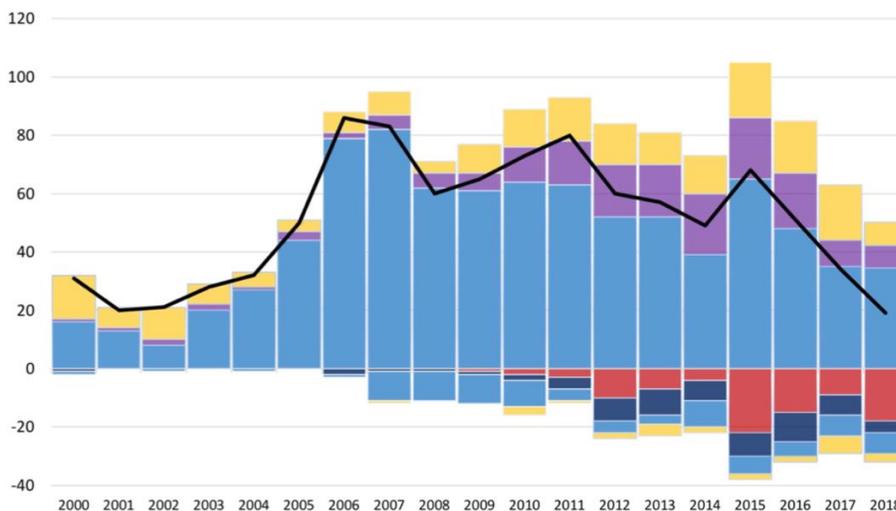
Source: IEA, 2018

IEEFA notes there has been a decade-long over-investment in new coal-fired power generation capacity, in excess of demand. By 2020, IEEFA expects global coal plant capacity to reach a peak, and steadily decline thereafter, with thermal coal having already peaked back in 2014.

Figure 4.5: Net Global Coal-fired Power Plant Capacity Expansion

Figure 3: Coal power capacity additions (above 0 GW) and retirements (below 0 GW) between 2000 and 2018 (colored columns) and the global net change (black line) (gigawatts).

China = blue, India = purple, Other = yellow, USA = red, EU = dark blue, Net change = black line



Source: *Global Coal Plant Tracker, March 2019*

The commercial viability of the global coal power fleet on aggregate is technically challenged by collapsing utilisation rates which are sitting near 55%, suggesting plants sit idle every second day on average. This is a long way below the optimal 75-85% assumption erroneously factored into optimistic and incorrect past projections.

As per the IEA, if the world takes an SDS path consistent with limiting average warming to 2°C, global coal demand will more than halve by 2040 (-57%). The consequences for thermal coal would be even more dire, dropping in the realms of 61% (Figure 4.6).²¹

Figure 4.6: IEA Global Coal Use 2014-16 vs Forecast 2040: NPS vs SDS (Mtce)

	2014	2015	2016	2017	NPS 2040	NPS Chg vs 2017	SDS 2040	SDS Chg vs 2017
Total Coal (Mtce)	5,680	5,531	5,225	5,360	5,441	1.5%	2,282	-57.4%
Coking Coal (Mtce)	1,016	994	956	960	806	-16.0%	579	-39.7%
Thermal Coal (Mtce)	4,374	4,254	3,979	4,134	4,412	6.7%	1,609	-61.1%
Coking Coal % of total Vol.	17.9%	18.0%	18.3%					

Source: *IEA WEO 2017 page 644-645, WEO 2018 pages 520-521, IEEFA calculations*

Note: Mtce = Million tonnes coal equivalent (normalising grades for differing energy content)

Under the SDS, which is a possible 2°C outcome, traded seaborne demand declines 65.1% against 2017 levels (Figure 4.7).

Figure 4.7: IEA Global Seaborne Coal 2014-17 vs 2040: NPS vs SDS (Mtce)

Mtce	2014	2015	2016	2017	NPS 2025	NPS 2040	NPS Chg vs 2017	SDS 2040	SDS Chg vs 2017
Thermal	801	761	756	805	736	760	-5.6%	281	-65.1%
Coking	284	293	292	302	320	346	14.6%	250	-17.2%

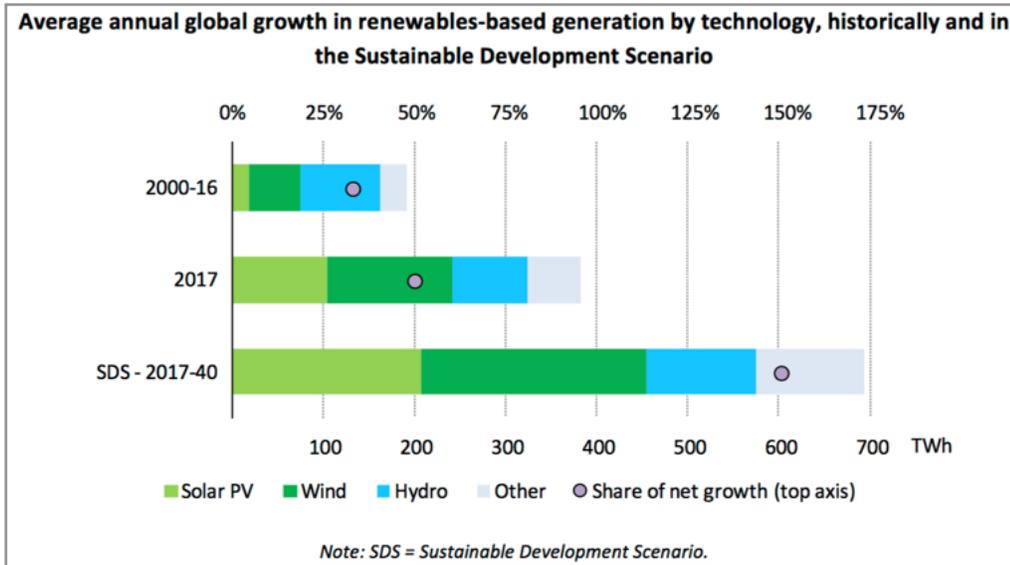
Source: *IEA WEO 2016 page 206, WEO 2017 page 207, COAL 2017, NPS page 134, WEO 2018 p.218*

Note: Mtce = Million tonnes coal equivalent (normalising grades for differing energy content)

The SDS models electricity generation from zero emissions technologies more than doubling through to 2040 relative to the record high set in 2017 (Figure 4.8).

²¹ As measured in millions of tonnes of coal equivalent (Mtce), an adjustment to standardise coal use by energy content.

Figure 4.8: The IEA SDS Forecasts Renewable Energy will supply 150% of net growth in electricity demand globally over 2017-2040



Source: IEA WEO2018

India is already talking about a trebling of renewable energy installations annually in the next two years relative to the record high installs recorded in 2017/18. Similar to the IEA, IEEFA sees India’s shift to the lowest cost sources of electricity generation, wind and solar, as indicative of the likely shift across the greater Asian market over the coming decade. Whether motivated by any or all of the reasons for this including energy security, economics, financial flows and/or policies to deal with rising fossil fuel pollution and other pressures, this trend is accelerating.

The implications are clear – the demand for seaborne thermal coal is past its peak and potentially entering terminal decline if current energy policy, technology and financial market trends continue to develop on the current trajectories.

Section 5. Commitment to Paris Agreement

Australia is a signatory to the Paris Agreement and is committed as part of a global effort to limit temperature rise to 1.5-2°C above pre-industrial era levels.

Approving the Project is clearly moving in diametrically the opposite direction to Australia's Paris Agreement commitments to make best endeavours to progressively curtail fossil fuels production and use.

Australia is likely to come under increasing international pressure to do more to reduce carbon emissions going forward. This will include calls for action to reduce Australia's major global role in the export of fossil fuels to other countries.

Back in 2017, the US\$6.3 trillion asset manager BlackRock's global head of infrastructure, Jim Barry, made it very clear:²²

"It's been amusing sitting back and watching Australia from afar because in effect it's been denying gravity... Coal is dead. That's not to say all the coal plants are going to shut tomorrow. But anyone who's looking to take beyond a 10-year view on coal is gambling very significantly."

The ratchet up clause

The Paris Agreement includes a requirement for all parties to submit new or updated NDCs by 2020, depending on their current mitigation target timeframe. Parties will then be required to update their NDCs every five years under the 'ratchet mechanism' and a 'global stocktake' in 2023 will be done to assess collective progress towards the goal of keeping the increase in global average temperature to within 2°C (Article 14). This global stocktake will then reoccur every five years. These stocktakes are intended to inform parties in updating and enhancing their NDCs.²³

The IEA concludes current collective NDCs set the world on a path to 2.7°C temperature rises relative to pre-industrial era levels,²⁴ i.e. the failure to deliver on the Paris goal of 1.5-2°C. When the IEA says the NPS is its central scenario, it concludes by saying that this clearly shows global efforts to reduce carbon emissions need to be accelerated, entirely consistent with the ratchet-up clause. So forecasting that does not have thermal coal demand in terminal decline by 2050 is predicated on the failure of the Paris Agreement, even with the commercial development and widespread, rapid deployment of HELE coal-fired power plants also fitted with CCS. While possible, investment trends over the last decade do not support this, and beyond vague proposals from coal lobbyist associations, IEEFA can see no evidence this trend is changing.

As discussed in Sections 7-11 below, the world's largest thermal coal import nations (China, Japan, South Korea and India) are lifting their ambitions to deliver on the Paris Agreement consistent with the ratchet up clause. Other nations are following suit. May 2019 saw Thailand's cabinet approve the national Power Development Plan 2018-2037 that halve the country's targeted reliance on imported coal from 25% by 2036 to just 12% by 2037.²⁵

²² The Australian Financial Review, "BlackRock says coal is dead as it eyes renewable power splurge", 26 May 2017

²³ The Parliament of Australia, "Paris climate agreement: a quick guide", 10 November 2017

²⁴ The IEA, [Energy Technology Perspectives](#)

²⁵ Reuters, "Thailand approves power plan, expects capacity to reach 77 GW by 2037", 1 May 2019

Section 6. Global Divestment from Coal-fired Power

Financial Institutions Pivot Away from Thermal Coal

There is an ongoing and accelerating global shift away from financing thermal coal and coal-fired power plants, matched with the rapid declines in the cost of renewables technology and the very clear message of the United Nation's Intergovernmental Panel on Climate Change (**UN IPCC**) highlighting the need to virtually cease global coal use by 2050.

Global investors managing US\$32 trillion released a policy statement in December 2018 calling for a global price on carbon and an accelerated coal phase-out:²⁶

“Expert analysis shows that to meet the Paris Agreement goals of limiting the increase in global temperatures by 2°C, while striving to limit the increase to 1.5°C, a coal phase-out is needed by 2030, in the OECD countries and in the European Union; by 2040, in China; and by 2050, in the rest of the world.”

The **Bank of England**²⁷ has repeatedly highlighted the magnitude of climate change risks, in April 2019 quantifying stranded asset losses at an estimated US\$20 trillion.

Australian banks have all moved to recognise the global financial risks of climate change, making strong commitments to reduce funding for thermal coal mining and coal-fired power plants.

Westpac ruled out financing new thermal coal basins in April 2017.

Commonwealth Bank (**CBA**) reported in August 2018, as part of its 2017/18 financial results, substantial progress in measuring, reporting and acting on their Climate Policy commitments, with a substantial decarbonisation shift well underway. This includes “carbon foot-printing” its equity portfolio of Colonial First State, one of Australia's largest fund managers. CBA has also shifted its lending programs towards funding low emissions technologies. Direct exposure to coal mining was down 7% year on year (yoy) to \$270m and coal infrastructure was down 30% yoy to \$1,000m, while lending to renewable energy was +32% year-on-year to \$3,700m.

In contrast, **Macquarie Group**²⁸ has to-date made no public commitment to exit thermal coal. However, we note Macquarie has made renewable infrastructure investing one of its four global pillars of growth. Landmark **renewable energy**²⁹ and **storage**³⁰ deals across Europe and Asia show the momentum of global infrastructure investing towards decarbonisation.

Global coal divestment has also been progressing, with financial institutions pivoting to boost lending to renewable energy infrastructure and other low emissions alternatives.

Today, over 100 globally significant financial institutions have divested from thermal coal, including 40% of the top 40 global banks and 23 globally significant insurers.

²⁶ IGCC, “[Briefing Paper on the 2018 Global Investor Statement to Governments on Climate Change](#)”, December 2018

²⁷ <https://www.bankofengland.co.uk/-/media/boe/files/speech/2019/avoiding-the-storm-climate-change-and-the-financial-system-speech-by-sarah-breedon.pdf?la=en&hash=AC28DFEFED7B14A197E6B0CB48044D06F4E38E84>

²⁸ <https://www.afr.com/brand/chanticleer/macquarie-group-sees-big-dollars-in-renewables-20171103-gzef1a>

²⁹ <https://cleantechnica.com/2018/10/12/macquarie-group-investments-in-11-gigawatt-asian-renewable-energy-hub/>

³⁰ <https://reneweconomy.com.au/macquarie-capital-to-finance-korea-solar-plus-storage-project-73746/>

Since the beginning of 2018, 44 coal restriction policies have been announced, with 28 being new and 16 involving a further tightening of earlier coal-related policy commitments, including:

- February 2018 - [Generali of Italy](#) announced it would cease coal investments.
- March 2018 - [BBVA of Spain](#) committed to US\$100bn of renewables lending by 2025 as well as ceasing financing any new coal mines and coal-fired power stations or extensions to existing ones.
- April 2018 - [HSBC](#) committed to stop financing new coal-fired power stations in all countries except for Indonesia, Bangladesh and Vietnam.
- June 2018 - the world's third largest reinsurer [Hannover Re \(US\\$64bn AUM\)](#) introduced a 25% coal revenue maximum for its investment universe.
- July 2018 - [Swiss Re](#) announced it would no longer provide insurance or reinsurance to businesses with more than 30% exposure to thermal coal.
- August 2018 - [Munich Re](#), the world's second largest reinsurer, committed to cease offering insurance for new coal-fired power plants and mines in industrialised countries. In addition, Munich Re will no longer invest in shares and bonds of firms that generate more than 30% of their sales in the coal sector.
- September 2018 - the Chairman of [Standard Chartered](#) José Viñals announced the bank's coal exit strategy entitled "*Here for good means saying no to coal: Why we're stopping our financing of new coal-fired power plants*".
- September 2018 - the Netherlands' [ING Bank](#) announced it would assess its US\$600bn lending book against alignment with a less than 2.0°C global temperature change, consistent with the Paris Agreement. The bank had previously announced a phase-out of lending to coal and expects to have zero coal lending exposure by 2025.³¹
- September 2018 - [Standard Bank of South Africa](#) announced a withdrawal from new coal power plant financing.
- October 2018 - the [World Bank](#) exited underwriting of the Kosovo coal power plant, its last coal finance proposal. The [International Finance Corporation \(IFC\)](#) then announced it would shift its indirect partner financing away from coal. And at the same time, the [Asia Development Bank \(ADB\)](#) acknowledged coal plants were becoming unviable investments. The ADB incorporates a US\$36/t price on carbon on all lending decisions, has a strong bias to renewable energy.
- November 2018 - the biggest public life insurer in Norway, the US\$85bn [Storebrand ASA](#) announced a progressive coal exit I to be completed by 2026.³²
- November 2018 – Spain's [Banco Santander](#) announced its coal exclusion policy.
- November 2018 - [Generali of Italy](#) (US\$581bn AUM) limited its coal insurance, having divested from coal in February 2018.

³¹ Financial Times, "[ING will steer portfolio towards 2°C goal to help combat climate change](#)", 16 September 2018

³² Bloomberg, "[An \\$85Bn Asset Manager Is Planning a Total Exit From Coal](#)", 30 November 2018

- December 2018 - The [European Bank for Reconstruction and Development \(EBRD\)](#) announced its even tighter policies under its Energy Strategy away from coal in “[The Switch from Coal](#)”.
- December 2018 - [Citi](#), the #1 U.S. banker of coal power in 2017, updated its coal policy excluding project financing of new coal-fired power plants.
- January 2019 - [Export Development Canada](#) revealed its new Climate Change Policy: “No new financing for coal power plants, thermal coal mines or dedicated thermal coal-related infrastructure – regardless of geographic location.”
- January 2019 - [Barclays Bank UK](#) expanded on its April 2018 exclusion of project finance for coal mining to also exclude coal plants.
- January 2019 – [Varma of Finland](#) announced a cessation from investing in coal.
- January 2019 - [Nedbank of South Africa](#) withdrew financing for two major coal-fired power plant projects in South Africa. February 2019 saw [FirstRand Bank](#) withdrew from funding commitments for two coal-fired power plant projects in South Africa.
- February 2019 - [VIG of Austria](#) ceased coal insurance.
- March 2019 – [MAPFRE](#) of Spain and [UNIQA](#) of Austria excluded coal insurance.
- March 2019 – [State Development & Investment Corporation](#) is the first leading Chinese financial institution to completely exit the coal industry.
- March 2019 - [BNP Paribas Asset Management](#) (€537bn AuM) announced a new coal exclusion policy.
- March 2019 – [UBS](#) of Switzerland expands its progressive exit from thermal coal.
- March 2019 – [QBE Insurance](#) announces its progressive exit from coal.
- April 2019 – [DBS](#) and [OCBC of Singapore](#) both announce they will cease coal-fired power plant financing.
- April 2019 - [Mitsubishi UFJ Financial Group \(MUFG\)](#) is planning to establish quantitative targets for restricting both domestic and overseas coal project financing.
- April 2019 – [Hannover Re](#) tightened its existing coal fired power plant insurance criteria citing increased coal based risks.

While initial measures vary in effectiveness, IEEFA has found the trend is for financial institutions to ratchet up the strength of policies once they are in place. With environmental and reputational concerns certainly driving factors for capital fleeing coal, investors are also increasingly aware that coal forecasts are increasingly dour.

Section 7. China, The Top Importer of Coal, is Pivoting Away

In the World Energy Outlook 2012, the IEA correctly stated: “China is coal, coal is China”.

China is the world’s largest producer, consumer and importer of thermal coal, accounting for over 50% of the world’s coal production and use in 2016-2018.

However, for most of this decade, China has been pursuing a strategy to reduce its overreliance on thermal coal for electricity generation, pursuing all alternatives, be that nuclear, gas, hydro-electricity or renewables. All are materially lower emissions intensive electricity sources than thermal coal, and all have lower pollution impacts.

Over the last decade, China has installed more hydro-electricity capacity than the rest of the world combined, reaching over 350 GW of total capacity³³ (over three times that installed in America, the world’s second largest hydro-electricity market). Likewise at the start of this decade China set a target to be one of the largest nuclear power plant operators globally by 2020, albeit this plan has fallen short on delivery.³⁴

But it is China’s consistent record as the world’s largest installer of renewable energy that has surprised energy forecasts, particularly the IEA. In 2017 and again in 2018 China was the world’s largest installer of solar capacity, building 45-50% of the global total in both years. China was also the world’s largest installer of onshore wind every year this decade. In 2018 China set another record, installing a record 40% of global offshore wind farms.³⁵

China has been progressively driving double digit annual deflation in the cost of renewables. China has long targeted subsidy-free grid parity for wind with coal-fired power generation by 2020, and has recently shown this target is well on track. China’s State Power Investment Corporation (SPIC) completed a US\$6bn, 6GW wind tender in April 2019 at grid parity with coal-fired power at what will also be the world’s largest wind investment ever.³⁶

In September 2018 a plan from the National Development & Reform Commission saw China increase its target for renewable energy to account for at least 35% of total electricity consumption by 2030, a significant step up from its previous target of 20% of energy use by 2030.³⁷

Over 2019 it has been widely reported that China had implemented an informal ban to the importation of Australian coal, using the pretext of stricter implementation of quality controls. Platts Coal concludes “the policies were a way to protect the domestic coal market.”³⁸ The Office of the Chief Economist for Australia forecasts a 5.2% annual decline in total thermal coal imports by China though to 2024.³⁹ IEEFA is of the view that energy security is a key factor driving all countries energy plans, and that China will continue to prioritise domestic energy sources, be that hydro-electricity, wind and solar as well as domestic thermal coal mining over imports.

³³ Renewable Energy World, “China’s renewable energy installed capacity grew 12% across all sources in 2018”, 6 March, 2019

³⁴ Reuters, “China to fall short of 2020 nuclear capacity target”, 2 April 2019

³⁵ Global Wind Energy Council, “CWEC: Global Wind Report 2018”, April 2019

³⁶ WindPower, “Domestic firms win all 6GW of China’s first subsidy-free site”, 3 April 2019

³⁷ Bloomberg News, “Climate Changed: China Steps Up Its Push Into Clean Energy”, 26 September 2018

³⁸ Platts, “More Chinese ports delaying Australian thermal coal imports: sources”, 20 March 2019

³⁹ Office of the Chief Economist, “Resources and Energy Quarterly”, March 2019

Section 8. Japan, Australia's biggest export customer, is pivoting

In April 2019 the Japanese government proposed⁴⁰ adopting a long-term strategy on climate change to commit Japan to achieving net zero emissions “as early as possible in the second half of this century.” This has emerged after a series of major coal-fired power plant cancellations and thermal coal mine divestments from Japan (Australia's largest thermal coal export destination) since mid-2018.

New thermal coal exits were announced by major insurance firms [Dai-ichi Life](#) in [May 2018](#) and [Nippon Life](#) in [July 2018](#). Japanese banks are changing lending standards to exclude all lending to out-dated coal-fired power plant technologies, as reported in October 2018 for [Sumitomo Mitsui Banking Corporation](#). IEEFA has [written](#) extensively about this emerging trend, particularly with respect to Marubeni Corp, one of the most significant builders of coal-fired power outside China.⁴¹

In September 2018 [Marubeni Corp](#) announced a significant pivot away from coal, one reinforced by the opinion piece by [Prime Minister of Japan Shinzo Abe](#) acknowledging the rise of extreme weather events and the need to act decisively to deal with global warming, noting “climate change can be life-threatening to all generations”. More recently, several of Marubeni's fellow sōgō shōsha ([Mitsubishi Corp](#)⁴², [Mitsui & Co.](#)⁴³, [Itochu](#) and [Sojitz](#)) also divested their last thermal coal mine holdings.

December 2018 saw another domestic coal-fired power proposal had been cancelled – [JFE Steel and Chugoku Electric Power's](#) 1GW project near Tokyo.⁴⁴

In January 2019 [Tokyo Gas](#) decided not to push ahead with the proposed but long delayed 2GW Chiba imported coal-fired power plant.⁴⁵ In a separate development, a proposed 112MW Able Company plant in Iwaki which was to be fuelled by coal with up to 30% biomass has been revised to operate as a biomass-only plant, Japan's ninth proposed coal unit cancellation or modification since 2012. Also in January 2019, [Tokyo Electric Power Company](#) (TEPCO) announced construction of its first commercial offshore wind plant in Japan.⁴⁶ TEPCO's aim is to achieve 2-3GW of offshore wind, key to its strategic move away from thermal and nuclear power, [announcing](#) a US\$9bn offshore project.

In March 2019 Japan's [Environment Minister Yoshiaki Harada](#) said that in principle it will not sanction construction of new large coal-fired power plants nor boilers to existing facilities in line with Japan's international pledges to tackle global warming. March 2019 also saw Kansai Electric announce a 6GW renewables target for 2030.

April 2019 saw reports that Japan's largest bank, [Mitsubishi UFJ Financial Group](#) (MUFG), plans to establish quantitative targets for restricting both domestic and overseas coal project financing. Additionally, [Osaka Gas](#) withdrew from the proposed 1.2GW Ube coal-fired plant joint venture.⁴⁷

For more details on Japan, please refer to IEEFA's recent [briefing note](#).⁴⁸

⁴⁰ The Diplomat, “Does Japan's New Climate Change Strategy Go Far Enough?”, 16 April 2019, <https://thediplomat.com/2019/04/does-japans-new-climate-change-strategy-go-far-enough/>

⁴¹ IEEFA, “Marubeni's Coal Problem: A Japanese Multinational's Power Business at Risk”, Jul 2018

⁴² Reuters, “Mitsubishi exits thermal coal sector, sells stakes in Australia mines”, 18 Dec 2018

⁴³ Reuters, “Japan's Mitsui may sell stake in Australia thermal coal mine”, 31 October 2018.

⁴⁴ Bloomberg, “JFE Steel, Chugoku Electric Scrap Coal-Fired Power Plant Plans”, 27 Dec 2018

⁴⁵ Reuters, “Japan's Idemitsu, Kyushu Elec, Tokyo Gas scrap coal-fired power plant plan”, 31 January 2019

⁴⁶ TEPCO, “TEPCO's First Commercial Offshore Wind Facility to Launch Jan 2019”, 27 Nov 2018

⁴⁷ Reuters, “Osaka Gas to withdraw from coal-fired power station project”, 24 April 2019

Section 9. Korea: A New Energy Master Plan

During a public hearing for South Korea's new energy master plan on 19th April 2019, the Ministry of Trade, Industry and Energy announced that it would seek to significantly cut reliance on coal-fired power generation whilst shifting even more towards renewable energy. South Korea's energy master plan sets long-term energy policy and is renewed every five years.

Under the new draft plan, the government intends to increase the share of power output from renewable energy sources by up to 35% by 2040, up from around 8% currently.⁴⁹ The previous renewable energy target, set in 2017, was to reach 20% by 2030.

Park Jae-young, Director of the Ministry of Trade, Industry and Energy, states that the role of coal-fired power is to be cut further.⁵⁰ Driven by concerns over air pollution and carbon emissions, Korea will "drastically" cut coal power generation by banning new coal plants and closing old ones.

In addition, the government will favour the use of Liquefied Natural Gas (LNG) and stop the construction of nuclear power reactors. In 2018, coal accounted for 41.9% of South Korea's power generation, followed by LNG with 26.8% and nuclear energy with 23.4%.

April 2019 has seen South Korea's coal tax increased by another 28% to KRW46/kg (US\$40/t). At the same time the tax on LNG imports has been cut by 75%.⁵¹ This follows a 20% increase in the coal tax in April 2018. The South Korean government is clearly continuing a well-established program to progressively shift away from coal use in power generation.

BNEF sees the South Korean electricity generation mix moving from 72% coal and nuclear in 2017 to 71% gas and renewables by 2050.⁵² As the nation's coal and nuclear plants retire, BNEF foresees the electricity system becoming increasingly based on renewables, supported by South Korea's battery storage manufacturing capacity as well as gas peaking plants.

South Korea is one of Australia's four major thermal coal export destinations.⁵³

Global Carbon Pricing Raised US\$33bn in Revenues in 2017, up 50% on 2016

The US\$40/t coal tax is in addition to South Korea's carbon price, which was introduced in 2015 via a cap-and-trade system that currently prices carbon at around US\$20/t. Combined, the coal tax and carbon tax are possibly the highest tax on coal-fired power generation in the world.

Beyond the EU, major economies globally are increasingly using carbon emissions and / or coal taxes to drive energy policies ambitions towards accelerated decarbonisation, consistent with the ratchet-up clause of the Paris Agreement. According to the World Bank,⁵⁴ governments generated US\$33bn in revenues from carbon pricing in 2017, an \$11bn rise from the \$22bn raised in 2016. The World Bank finds that carbon prices are rising, with about half of emissions now covered by carbon pricing initiatives priced at over US\$10/tCO_{2e}, compared to one-quarter of emissions covered in 2017.

⁴⁸ IEEFA, "Japan's Pivot from Thermal Coal to Renewables is Building", 29 March 2019

⁴⁹ Reuters, "South Korea steps up shift to cleaner energy, sets long-term renewable power targets", 19 April 2019

⁵⁰ The Korea Bizwire, "S. Korea to Cut Dependency on Fossil Fuel, Shift to Renewable Energy", 19 April 2019

⁵¹ S&P Platts, "South Korea to cut LNG taxes by 74% in April, raise thermal coal tax by 27%", 1 February 2019

⁵² BNEF, "New Energy Outlook 2018"

⁵³ IEEFA, "Briefing Note: South Korea Shifting Further Away from Coal", April 2019

⁵⁴ World Bank, "State and Trends of Carbon Pricing 2018"

Section 10. India's Sustained Pivot to Renewables

Under Prime Minister Narendra Modi, India has accelerated its national pivot to lower cost, zero emissions renewable energy. October 2018 saw Modi reconfirm India's 2030 target to generate 40% of its total electricity from non-fossil fuels.

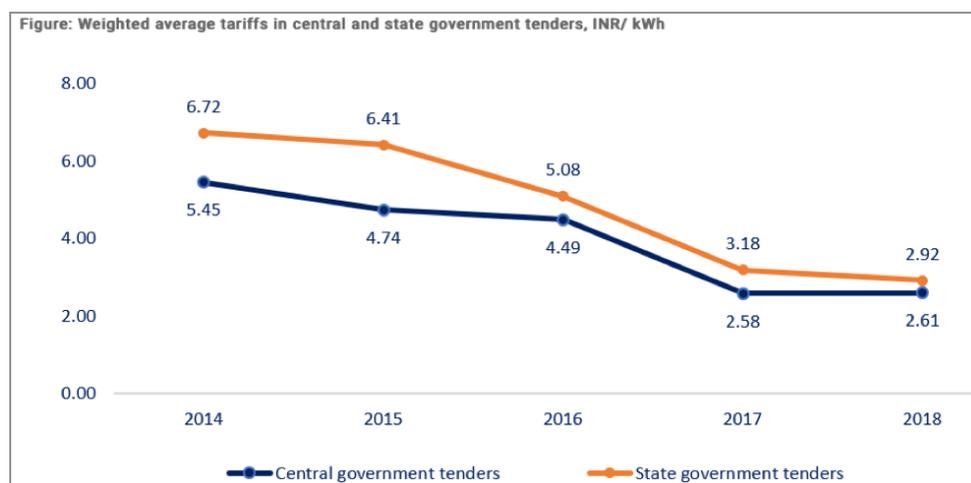
India's Power Minister R. K. Singh has repeatedly talked up opportunities for India to lift the development of renewables to a massive 40GW annually, triple the current run-rate. In January 2019 R. K. Singh yet again lifted the level of renewables ambition, sounding out a call for India to target the installation of 500GW of renewables by 2028.⁵⁵

The Indian Coal and Railways Minister Piyush Goyal has repeatedly stated his target for India to cease thermal coal imports,⁵⁶ recognising the threat to India's energy security of India's excessive and unsustainable reliance on fossil fuel imports.

India's progress has been astonishing. With wind and solar tariffs regularly being tendered for Rs2.40-3.00/kilowatt hour (kWh) and averaging Rs2.61-2.92/kWh in 2018 (Figure 10.1), existing domestic thermal power is struggling to compete.

NTPC, India's largest power generator, had an average 2018/19 (year-to-date to December 2018) tariff of Rs3.47/kWh for existing domestic coal-fired power, up 6% year-on-year. Non-minemouth coal requires tariffs of Rs4.00-5.00/kWh and new imported coal-fired power generation requires a tariff of Rs5.00-6.00/kWh.

Figure 10.1: Solar Tariff Declines Continue to Drive Indian Deflation



Source: Bridge to India, January 2019

In September 2018 Gujarat completed a 500MW solar tender at a record low of Rs2.44/kWh with zero indexation for 25 years. As import duties roll off in 2020, this trend is set to accelerate, given global

⁵⁵ ETEnergyWorld, "India to bid out 500 GW renewable energy capacity by 2028", 7 January 2019

⁵⁶ Financial Express, "Piyush Goyal: No need to import coal, we have sufficient in India", 12 June 2017

solar module prices fell by over 30% over 2018. New thermal coal cannot compete with the current deflationary tariffs that are contractually set to decline in real terms every year for the next 25 years.

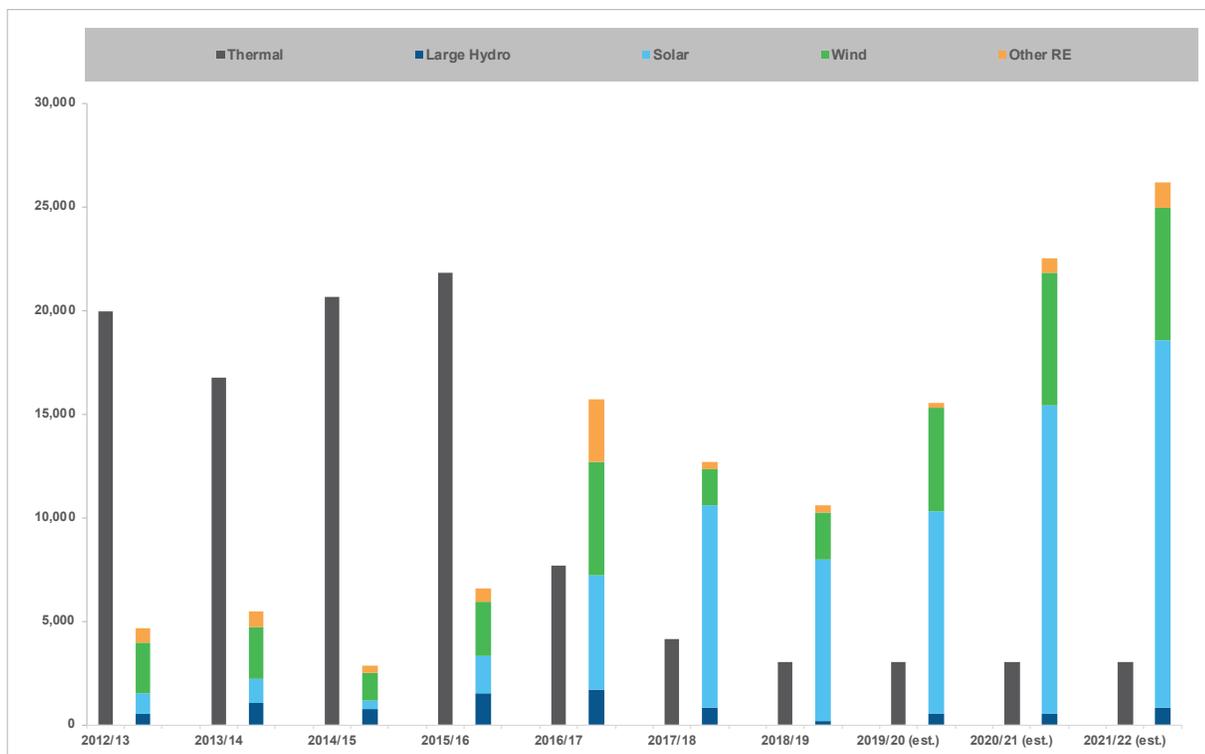
Major private integrated power firm **Tata Power** has suspended all new coal-fired power plant developments. Tata instead is preferring to acquire **financially distressed existing power plants** which are selling at 40% of the face-value of debt, valuing completed projects at 30% of total investment value. CEO Praveer Sinha announced a **US\$5bn renewable energy investment plan** in May 2018.

NPTC Ltd has likewise commenced a pivot into renewables with a plan to facilitate or build upwards of 10-20GW over the coming decade. NTPC has also announced it has **cancelled 10GW of proposed new coal power plants to-date in 2018**.

The Adani Group has expanded into renewable energy, floating its renewables business (Adani Green) on the Bombay Stock Exchange in June 2018. With 3GW of renewables in operation and another 3GW in planning, it is a top corporate investor in Indian renewables. In Australia, Adani announced a 1,500MW solar investment program.

As a result, India’s renewable energy installs have doubled to 12GW in 2018/19, while thermal power installs (net of closures) have **dropped 80% to just 3GW annually** vs the 20GW annual installs evidenced up to 2015/16 (Figure 10.2). IEEFA forecasts a more than doubling of renewable energy installs by 2021/22, on the back of open tenders of 35GW plus finalised auctions of 25GW as of April 2019, with a two-year build timeframe.

Figure 10.2: Indian Thermal and Renewable Power Capacity Adds (MW)



Source: Central Electricity Authority, MNRE, IEEFA Estimates

IEEFA references this to highlight the severity of stranded asset risk for fossil fuel projects in India. India is grappling with upwards of US\$100bn of non-performing loans to the thermal power sector alone as a result of underestimating the rate of technology change and renewable energy deflation.

Section 11. The Project is Unlikely to Pay Corporate Tax

The Ashurst Submission cites an estimate that the Project will contribute to Australian corporate tax, and that NSW's share is estimated at \$66.6m.⁵⁷

IEEFA notes that historic precedent is that both of the Project's ultimate owners, Glencore and Peabody, have a history of paying no material Australian corporate tax in the last four years, despite near record high coal prices.^{58 59}

The erroneous presumption that this Project will have zero financial leverage sits entirely at odds with standard corporate behaviour, particularly for tax haven based multinationals operating in Australia. As such, the presumption that this Project offers a net benefit is entirely flawed to the extent it relies on this entirely illusionary corporate tax benefit.

⁵⁷ The Ashurst Submission para 5.46 (b), page 38.

⁵⁸ Michaelwest.com.au, "Sneaky coal giant Glencore drops off the Top40 Tax Dodgers", 28 December, 2018

⁵⁹ Michaelwest.com.au, "Top40 Tax Dodgers: Peabody Energy", 6 March, 2019

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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Tim Buckley, IEEFA's director of energy finance research, Australasia, has over 30 years of financial market experience covering the Australian, Asian and global equity markets from both a buy and sell side perspective. Tim was a top-rated Equity Research Analyst and has covered most sectors of the Australian economy. Tim was a Managing Director, Head of Equity Research at Citigroup for many years, as well as co-Managing Director of Arkx Investment Management P/L, a global listed clean energy investment company that was jointly owned by management and Westpac Banking Group.

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Appendix A

Curriculum Vitae – Timothy Alister Buckley

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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, particularly the seaborne coal market for Australia.
- 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

A Selection of Recent 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
- [*“Adani Godda Power Project: Too Expensive, Too Late, and Too Risky for Bangladesh”*](#), April 2018
- [*“Advances in Solar Energy Accelerate Global Shift in Electricity Generation”*](#), May 2018
- [*“Marubeni’s Coal Problem: A Japanese Power Business Is at Risk”*](#), July 2018
- [*“Karnataka’s Electricity Sector Transformation”*](#), July 2018