

Stranded assets in Australia – with reference to the coal industry

Key points

- Coal-fired power stations require a significant initial capital investment. In order for the project to be viable, the initial capital cost is amortised across a long life (i.e. 50 years);
- Increased competition from renewable energy, and climate change action is reducing profitability of coal and causing early write-offs or early plant closures (already some examples);
- New renewable electricity power projects are cheaper than new coal or gas;
- Business has already factored in key climate and cost risks to new coal projects and is cautious about financing;
- Existing coal power plants at greater risk of early closure (becoming stranded);
- Premature closure in the coal industry disproportionately impacts regional communities that rely on coal for income and employment (e.g. Queensland, Latrobe Valley Vic);
- Significant risk to long-term viability of Australian coal exports;

1.1 Context

Stranded assets are those that must be unexpectedly or prematurely written down because the economic returns on the asset are no longer present. An asset may also be classified as stranded if the technology becomes unviable, obsolete or superseded by better technology. Obsolescence will also cause the asset owners to write-down the value of the asset.

In context of the coal industry a coal fired power station, or mine risks becoming “stranded”:

- Lack of realised economic return (supply of renewables crowding out coal);
- Future government intervention - imposition of carbon pricing, or other rules/regulations on high emitting industries; or
- Legal risk and community lobbying.

Traditional sources of electricity generation such as coal fired power stations have very high capital costs and relatively low operating costs. Coal fired power stations are often built with an assumed long asset life (e.g. 50 years) where an investor would expect to recoup the initial capital costs of the plant over the 50 years.

As a great proportion of expenditure for large coal fired power stations is required up front as capital costs, project owners risk not being able to recoup their investment if the underlying market transitions away from coal.

Coal-related assets at risk from becoming a “stranded asset” within the energy sector in Australia include:

- Any new coal-fired power station built;
- Expansions or reinvestment in older coal-fired power stations;
- New thermal coal mining operations (exposed to international market);

1.2 Lack of economic returns

Increases in renewable energy generation will potentially offset generation from non-renewable sources of energy. Over the coming years it is expected that lower cost renewable energy will crowd out old and **any new coal power supply**.

The path to becoming a “stranded asset” for a coal fired power station:

- Increased renewable energy generation will reduce supply from non-renewable sources. This will reduce the amount of electricity demanded/supplied from coal and gas base load plants. As renewable electricity is more intermittent (peakier), it causes trouble for coal plants which are difficult to ramp up or down quickly;
- This will therefore decrease power station revenue, and will lessen their ability to cover fixed costs (capital costs). This will effectively increase the cost of each unit of electricity supplied from the power station;
- As the coal-fired power station is forced to operate at a lower production level, this implicitly increases the long-term costs of the plant (higher capital costs amortised per unit of output). Coal power ability to compete with cheaper renewables in the National Electricity Market will be further reduced;
- The only way for the coal-fired power station to compete is to write-off value from the plant (stranded asset). Recognise lesser value of investment. Further erosion of profitability can lead to the early closure of the plant.

Example Northern Power Station (South Australia):

The Northern Power Station was a brown coal power station located in South Australia that was commissioned in 1985 and closed in 2016 (31 years). It was only 31 years old when it was closed, which is relatively young for a brown coal power plant. The closure was the result of high penetrations of large scale wind and rooftop solar in South Australia that eroded the economic viability of the plant.

1.3 Australian Electricity Supply Market

Australia’s main electricity market is the National Electricity Market (NEM) which operates across all of the Eastern States (Queensland, NSW, Victoria, Tasmania, and South Australia). Australian generators register with the Australian Energy Market Operator (AEMO) to participate in the wholesale electricity market. Generators bid into the wholesale market to provide electricity supply. The market dynamics give rise to a wholesale electricity price. Recently the wholesale price has been increasing because of:

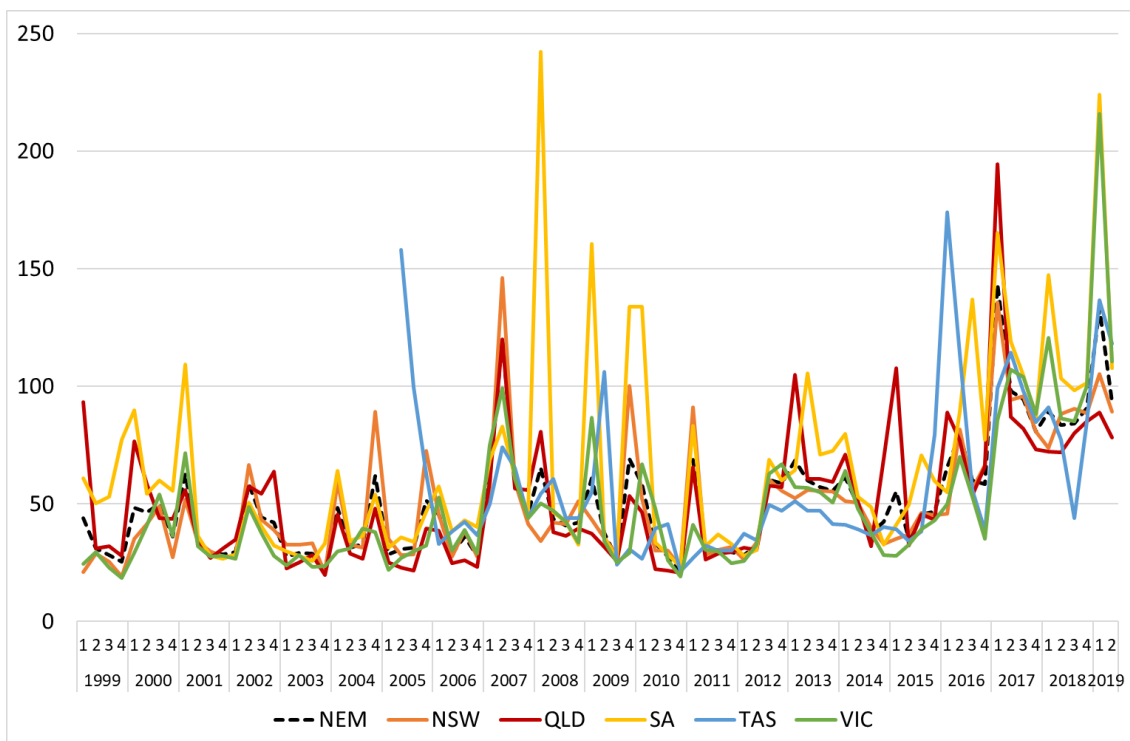
- Closure of old, cheap coal-fired power plants as they reach the end of their asset life (e.g. Hazelwood in the Latrobe Valley in Victoria);
- Subsidised construction of renewable energy projects (large scale wind and solar, and rooftop PV);
- Opening up of the Australian eastern gas market to the international market, which increased local gas prices and therefore increased the price of gas generation. (Also increases gas prices for domestic consumption, which via substitution place pressure on electricity prices).

Australia's supply of electricity is transitioning away from a predominantly coal-based supply to a larger mix of renewable electricity. This transition is ongoing and will continue well into the future.

Recent developments affecting market dynamics:

- Older coal fired power plants that were built 30 to 60 years ago have recently retired (e.g. Hazelwood, Northern Power Station)
- New renewable energy capacity is getting constructed at a fast pace (in particular wind and solar). The Clean Energy Council lists 14,611 MW of renewable projects across Australia under construction or about to start production.
- Aging coal plants are becoming unreliable in peak demand (extreme heat) conditions. (e.g. Unscheduled outages at Yallourn and Loy Yang in summer peak demand 2019 in Victoria);
- Renewable energy without back up storage is not dispatchable and only available on an intermittent basis. Increasing need for back up supply, or supply that can smooth the peaks and troughs in renewable supply.

Figure 1.1: Wholesale electricity prices – NEM states (\$ per MWh)



Source: AEMO/NIEIR

Table 1.1 Australia's Electricity Supply – all sources grid/off grid (per cent)			
Fuel/technology	2016-17	2017-18	2018-19
Small-scale PV	3.3	3.9	4.9
Large-scale PV	0.4	0.5	0.6
Wind	4.3	4.7	5.4
Hydro	8.9	7.7	7.8
Biogas	0.8	0.8	0.7
Biomass	1.1	1.1	0.9
Total Renewable	18.9	18.7	20.4
Coal - Black Coal	45.9	48.4	48.0
Coal - Brown Coal	17.5	14.5	14.5
Coal Seam Methane	0.2	0.2	0.2
Natural Gas	17.0	17.6	16.3
Distillate and other	0.5	0.6	0.6
Total Non-renewable	81.1	81.3	79.6

1.4 Market and government intervention

The current market dynamics have led to a focus on increasing reliability to balance renewables and increasing supply to offset falls in generation from expected coal retirements. Emergent out of the current market are higher wholesale prices. The government has stated lower electricity prices as another key goal.

Lower emissions had been a previously stated government goal. Each of these criteria was addressed in the previous National Energy Guarantee (NEG) that was later abandoned and helped to topple the previous Prime Minister. In order to appease to pro-coal Right factions of the Liberal Party of Australia/National Party of Australia Coalition and regional constituents that rely on the coal industry or wider mining industry for employment, the Federal government has started using terms such as technological “agnostic” or “neutral” when it is forming policy. This is largely seen as a veiled attempt at building a government subsidised coal-fired power station.

The Federal government is running a program to subsidise new generation (Underwriting New Generation Investments Program) with the stated goals to increase supply, increase reliability and decrease prices. The government has shortlisted 12 projects:

- 6 renewable pumped hydro projects;
- 5 gas projects; and
- 1 coal upgrade project.

In addition, they are proposing to build Snowy 2.0, an expansion of the Snowy Hydro scheme in NSW that will be able to store renewable electricity from solar and wind. While the only coal project shortlisted is an upgrade to an existing plant, the Federal government has promised to conduct a study on building a new coal power plant in Queensland (largely to appease the Queensland LNP or National Party).

Previous Federal government intervention has focused on increasing renewable energy supply. Programs have included:

- Federal Renewable Energy Target of 20 per cent facilitated through the Large-Scale Renewable Energy Scheme;
- Small scale Renewable Energy Scheme to increase rooftop solar;
- Australian Renewable Energy Agency (government subsidies for renewable projects);
- Clean Energy Finance Corporation (a government run lender of finance to clean energy projects);

The current government is focusing more on reliability and less on emissions reduction. They have no set target for post-2020. Even if the Federal government does not pursue a renewable energy target, or related climate change action, states are pursuing their own energy policy agenda including state-based renewable energy targets (typically 50 per cent by 2030) which will increase renewable electricity generation. Jurisdictions with targets include Queensland, Victoria and the ACT.

Even if no formal target is set by the Federal government Australia may reach 50 per cent renewables by 2030 by market driven forces alone anyway.

This is a key risk to new coal-fired power stations. And it is an ongoing risk to existing coal-fired power stations and the mines that feed to local industry. Higher penetrations of renewables could force early retirement of existing coal-fired power stations.

Also consider that governments have short, fixed terms. They have a much smaller planning period than the life of a power station or coal mine. There is every risk that a carbon price or another carbon reduction mechanism will be introduced by a future government, or that a future government will take a more proactive approach to renewable energy.

Business supports a carbon price, and generally views it as inevitable. The view from most of the private sector is that it is too risky to finance a new large coal project in Australia without guarantees about exemptions on emissions restrictions.

*"This will require a technological response, utilising market mechanisms to achieve abatement at least-cost. **The simplest, most efficient method of achieving this transition is a price signal that places a value on lower-emissions**, more efficient technology and encourages innovation to drive this technological shift."*

– Business Council President Grant King

For these reasons it is unlikely that coal-related projects will be able to easily obtain financing or private backing. For example, the initial ambitious scope of the Adani Carmichael coal mine was reduced when they were unable to obtain external finance, and had to instead internally finance the proposed mine. While there are some calls from the Federal Government to build a new coal-fired power station, the private sector is generally unwilling to fund any such project.

Therefore, most of the risk of write-downs and early retirements is to existing plant that is scheduled to close over the next 30 years.

1.5 Cost of new generation

The following two charts show the cost to build new power stations within Australia (Figure 1.2) and the Levelised Cost of Energy (LCOE) for the 2020 year as forecast by CSIRO in their annual GenCost report.

To build:

- Black and brown coal are expensive, and prohibitively expensive when attempting to add carbon capture and storage (CSS)
- Natural gas is one of the cheapest to build
- Rooftop PV, Large scale PV and Wind are all relatively cheap to build

To operate:

- Coal is relatively cheap to operate subject to world prices for coal (black coal);
- Natural gas is expensive to operate (high gas prices);
- Renewables are very cheap to run (zero marginal cost of fuel);

The LCOE is a measure of the lifetime costs of the project divided by its energy production. The LCOE takes into account initial capital expenditure, fuel costs, financing costs, operations costs and maintenance costs. It is the industry standard method of comparing the cost of new generation.

Given the wholesale price of electricity is hovering around the low \$100 per MWh mark, the type of new generation built will influence which direction the wholesale prices move.

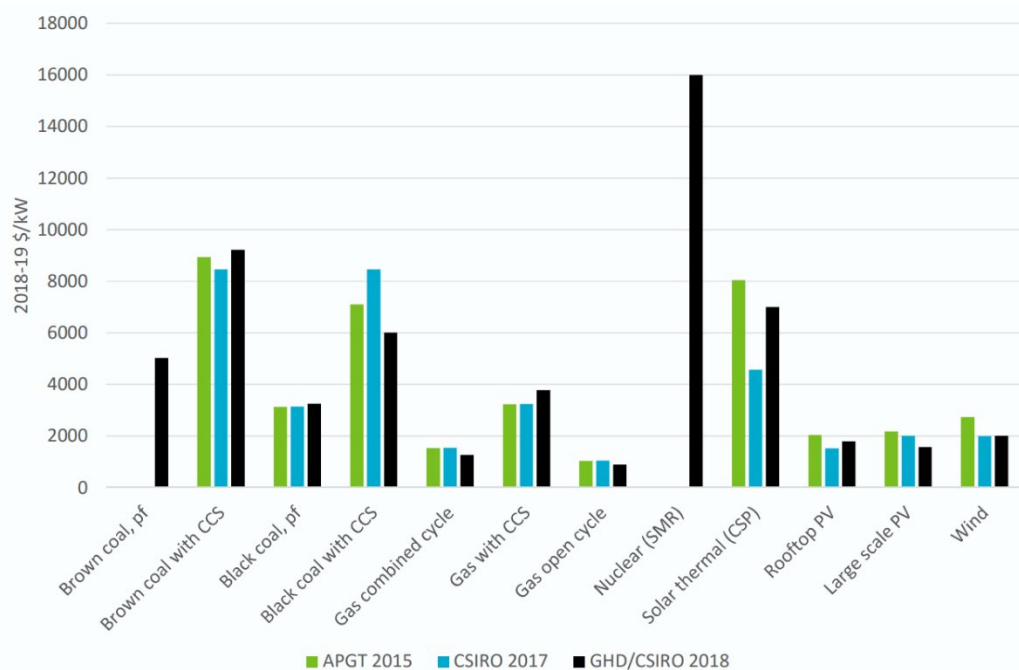
Main points of Figure 1.3:

- New coal power without carbon pricing or risk premium is around the current wholesale price;
- New coal power including a risk premium, or a carbon price is more expensive than current wholesale prices;
- New coal power with CCS is very expensive and currently cannot be taken seriously as a viable “clean” energy as proposed by some politicians;
- Solar and wind without storage is only around \$50 per MWh, much less than wholesale;
- Solar and wind with battery storage is comparable to new coal (without carbon pricing or risk premium);
- Solar and wind backed up by pumped hydro is also comparable, but slightly cheaper than battery storage;

In summary renewable electricity supply **will be able to meet** the goals of reliability, emissions reduction and price reductions. Coal-fired power stations will be able to meet reliability standards, but will lead to **increased emissions and will increase prices**. Renewable energy will out-compete any new coal fired power station by cost alone. If the government introduces carbon pricing or otherwise intervenes in the market to reduce emissions, any new coal-fired power station will be much more costly and risks being stranded. Renewable energy technologies (including battery storage) also continue to fall in price which will make them even more competitive in comparison to coal.

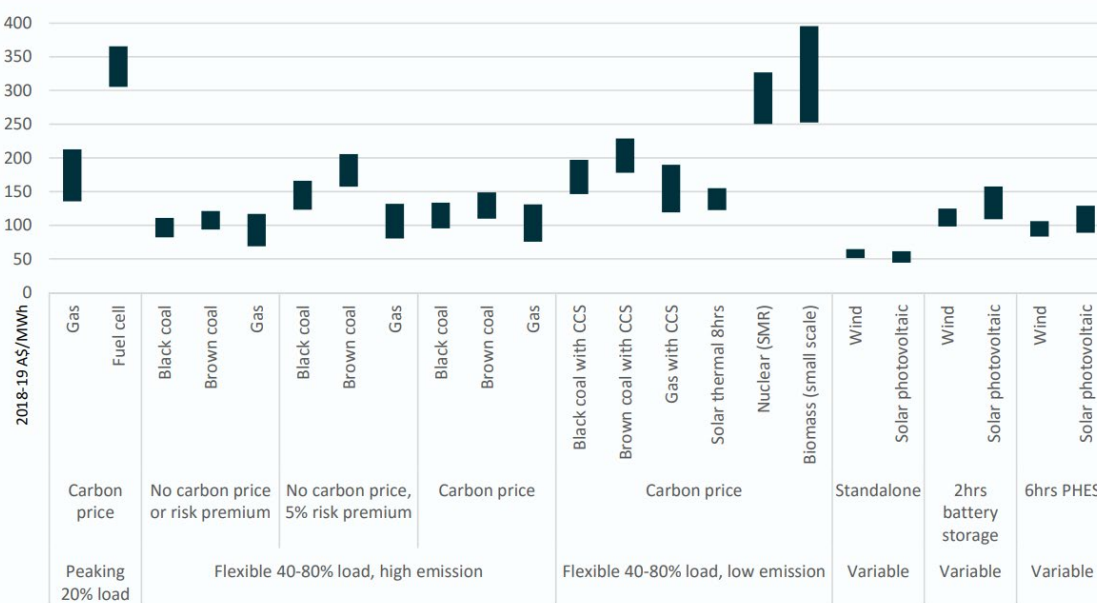
Therefore, calls to build a new coal-fired power station risk the asset being stranded on the day it is built, unless there is substantial subsidies or financial backing from the government.

Figure 1.2: CSIRO Estimates of capital costs of generation



Source: GenCost 2018: Updated projections of electricity generation technology costs, CSIRO

Figure 1.3: CSIRO Estimates of Levelised Cost of Energy (LCOE) - 2020



Source: GenCost 2018: Updated projections of electricity generation technology costs, CSIRO

1.6 Other issues

World

- The rate at which new coal-fired power stations has been built over the past 20 years is staggering, which has underpinned demand for Australian coal (China, India);
- Increases in global coal capacity are plateauing, and it is likely that capacity will start decreasing to meet air pollution, carbon emissions goals;
- International action on climate change (in particular in China) places risk on the viability of Australian thermal coal mines;
- A report by Carbon Tracker in London suggests that 40 per cent of coal power stations globally are already lossmaking, and that will grow to 70 per cent by 2040. Within Australia, 37 per cent of coal power stations have higher long run operating costs than renewables, rising to 72 per cent by 2030¹.
- Overall significant risk to Australian exports of coal, and will have flow on effects to economy;

Regional Australia

- Some regional communities rely on the coal industry for employment and income;
- Early closure risks unemployment and declining regional income in these places;

¹ <https://www.afr.com/business/mining/coal/coal-stranded-asset-warning-takes-on-fresh-edge-with-adani-goahead-20181129-h18ifd>