

Colossal fossil failures

100 breakdowns at gas and coal plants so far in 2018

Bill Browne — researcher

Mark Ogge — project lead, Gas & Coal Watch

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Summary

So far in 2018 there have been 100 major breakdowns at gas and coal plants in the National Energy Market – including every coal-fired power station bar one (Mt Piper). While old subcritical coal plants performed poorly, the newer supercritical plants (so-called “HELE” plants) were even more unreliable. There were also breakdowns at some of the newest gas plants (Tallawarra, Swanbank and Braemar). Victoria’s brown coal plants were the least reliable overall.

Introduction

By the 2nd of September, The Australia Institute’s Gas & Coal Watch had identified 100 major breakdowns at gas and coal power stations in the National Electricity Market (NEM), each one removing hundreds of megawatts of capacity from the system. The vast majority (95) were unit trips, where a generating unit is taken suddenly and wholly offline. A minority (5) were decreases, where the unit unexpectedly and dramatically reduced its electricity generation, but continued with some level of generation.

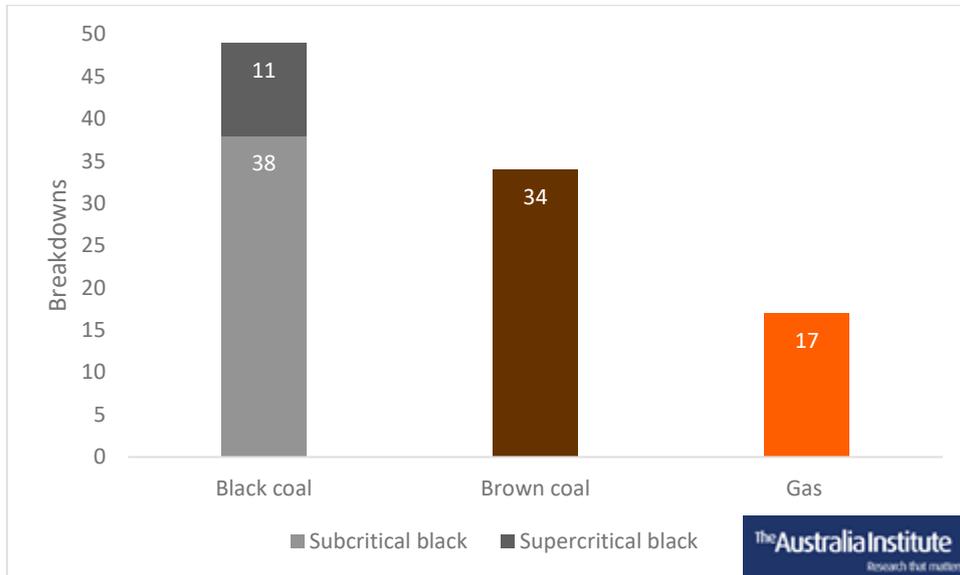
On average, this represents one breakdown at a gas or coal plant every 2.4 days.

Breakdowns by fossil fuel category

As of the day of the 100th fossil fuel breakdown (2 September), just under half (49) of breakdowns had been at black coal plants. 34 were at brown coal plants, meaning that together coal plants have been responsible for 83 of the 100 breakdowns. Gas plants were responsible for the remaining 17 breakdowns.

Some newer black coal plants use supercritical technology, while other black and all brown coal plants in the NEM use subcritical technology. In Figure 1, the black coal category is further divided into subcritical plants and supercritical plants.

Figure 1: Total breakdowns in 2018 so far by category



While black coal is responsible for more breakdowns than brown coal or gas in absolute terms, there are more black coal plants than brown coal plants. Black coal is the single largest contributor to electricity in the NEM, responsible for 37% of capacity.

When capacity is taken into account, brown coal is the worst performer with 7.3 breakdowns per gigawatt (GW) capacity (Figure 2).

Figure 2: Breakdowns per GW of capacity in 2018 so far by category

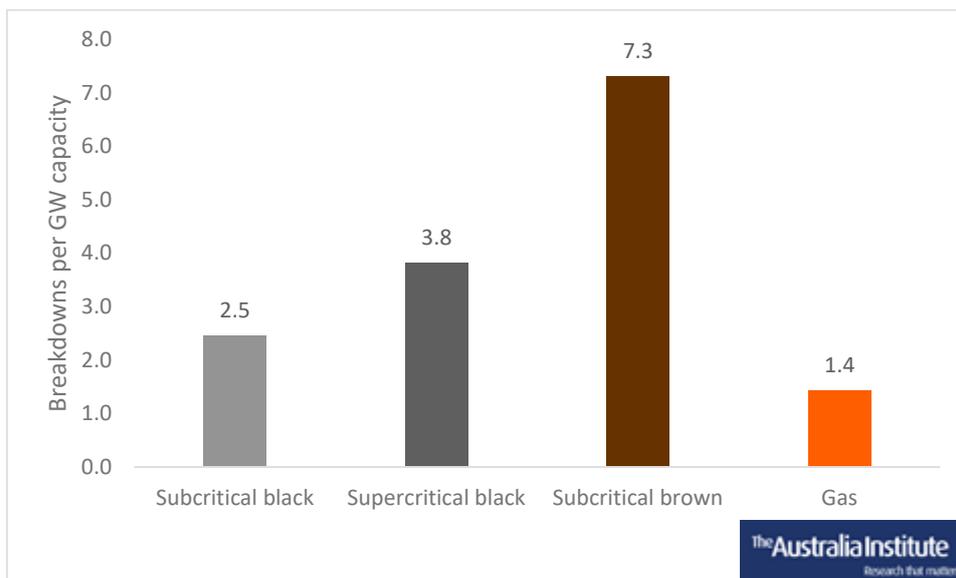


Figure 3: Breakdowns by category and share of capacity in 2018 so far

Group	Capacity (GW)	Share of NEM	Breakdowns	Share of breakdowns	Breakdowns/GW of capacity
Subcritical black	15.5	31%	38	38%	2.5
Supercritical black	2.9	6%	11	11%	3.8
Subcritical brown	4.7	9%	34	34%	7.3
Gas	12.0	24%	17	17%	1.4
Total	35.0	70%	100		2.9



Note: The remaining capacity in the NEM is mostly from renewables.

Coal

15 of the NEM’s 16 coal plants broke down at least once since the start of 2018. There have been 5.2 breakdowns per plant on average in the year to date.

The NSW subcritical black coal plant of Mt Piper is the only coal plant to have not broken down so far in 2018.

The two worst coal plants are Loy Yang A, with 16 breakdowns, and Yallourn W, with 15. Both are brown coal plants. The next worst performing plants are Gladstone, with 11 breakdowns, and Liddell, with 9. Both are black coal plants.

Figure 4: Coal plants in the NEM, breakdowns in 2018 so far

Name	State	Group	Breakdowns
Liddell	NSW	Subcritical black	9
Vales Point	NSW	Subcritical black	3
Bayswater	NSW	Subcritical black	2
Eraring	NSW	Subcritical black	2
Mt Piper	NSW	Subcritical black	0
Gladstone	Queensland	Subcritical black	11
Kogan Creek	Queensland	Supercritical black	5
Stanwell	Queensland	Subcritical black	4
Tarong	Queensland	Subcritical black	4
Callide A and B	Queensland	Subcritical black	3
Callide Power Plant	Queensland	Supercritical black	3
Millmerran	Queensland	Supercritical black	2
Tarong North	Queensland	Supercritical black	1
Loy Yang A	Victoria	Subcritical brown	16
Yallourn W	Victoria	Subcritical brown	15
Loy Yang B	Victoria	Subcritical brown	3

Supercritical black coal

Australia has four supercritical coal plants, all in Queensland:

- Kogan Creek
- Callide C (“Callide Power Plant”)
- Tarong North
- Millmerran

Despite being described as HELE (“High Efficiency, Low Emissions”) plants, supercritical plants are less efficient and have worse emissions than competing power generation like gas and renewables.

Significantly, supercritical black plants break down more often (3.8 times per GW of capacity) than subcritical black plants (2.5 times per GW of capacity) despite being some of the newer coal plants in Australia.

A supercritical plant, Kogan Creek, is responsible for the largest losses of capacity in the NEM when it breaks down, as its single unit can generate up to 750 megawatts.

Gas

While gas performs better than coal, its performance has worsened. Over the summer December 2017 through February 2018, gas represented 24% of NEM capacity but 15% of fossil fuel breakdowns. So far in 2018, gas still represents 24% of NEM capacity but is now responsible for 17% of breakdowns.

Gas breakdowns do not discriminate by technology type or age, with breakdowns at both the newest CCGT power plants (Tallawarra, Swanbank and Braemar in NSW and Queensland) and at one of the oldest steam cycle plants (Newport in Victoria).

Figure 5: Gas plants in the NEM, breakdowns in 2018 so far

Name	State	Breakdowns
Tallawarra	NSW	3
Braemar	Queensland	3
Swanbank	Queensland	2
Oakey	Queensland	1
Newport Power Station	Victoria	4
Pelican Point	SA	4

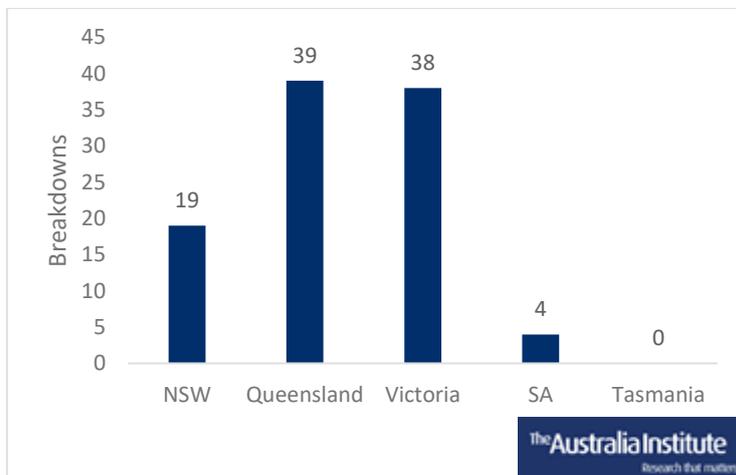
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Note: This table only shows gas stations that had breakdowns. There are about 40 gas stations in the NEM, depending on classification.

States

Queensland has just pipped Victoria as the state with the most fossil fuel breakdowns this year (39 vs 38). The two smaller states, South Australia and Tasmania, are the best in absolute terms with four and no breakdowns respectively.

Figure 6: Total breakdowns in 2018 so far by state

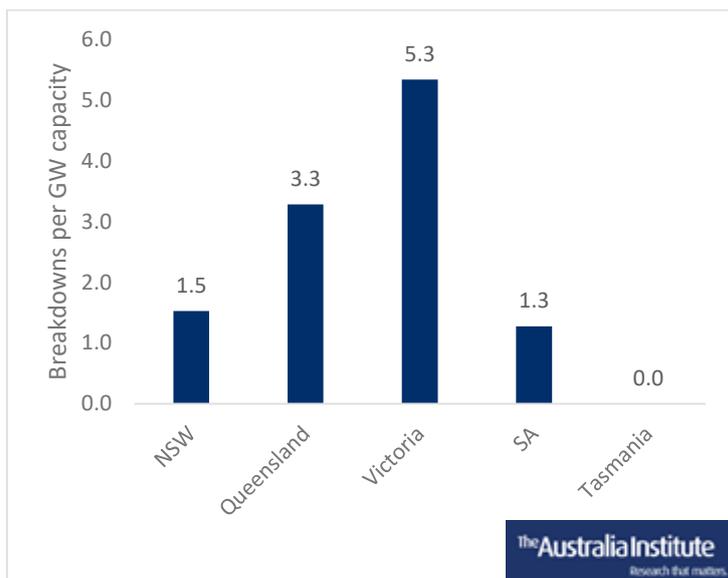


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However, these absolute comparisons do not reflect the different generation capacities of the states. For example, NSW has the highest fossil fuel capacity despite coming third in number of breakdowns.

When breakdowns are compared to GW of capacity, Victoria emerges as the worst performer with 5.3 breakdowns per GW of capacity. This is mostly due to the fallibility of its brown coal generators.

Figure 7: Breakdowns per GW of capacity in 2018 so far by state



Worst weeks

Although the average is one fossil fuel breakdown per 2.4 days (about three per week), there have been periods with many more breakdowns. The seven days between the 10th and 16th of January were the worst, with 11 breakdowns. Other extreme weeks for fossil fuel breakdowns occurred in February, March, May and June.

Figure 8: Seven-day periods with an average of one or more breakdowns per day

Period	Breakdowns
10–16 January	11
9–15 February	8
3–8 March	7
1–7 May	7
1–7 June	8

Conclusion

There is a misconception that coal and gas are necessary to provide the NEM with reliability. Although we are only two-thirds of the way through 2018, gas and coal power plants in the NEM have already broken down 100 times – one breakdown every two and a half days. Some periods have been much worse, with five weeks with seven or more breakdowns – including one with 11 fossil fuel breakdowns.

15 of the 16 coal plants in the NEM have broken down at least once in 2018 so far. Despite proposals from some politicians to build new supercritical black coal plants, supercritical black coal plants have broken down more often – per GW of capacity – than the older subcritical black coal plants.

Brown coal is the outright worst performer, with 7.3 breakdowns per GW of capacity.

The Australian Energy Market Operator's recent Electricity Statement of Opportunities reflects this new norm, forecasting increased risk to the market based on the reduction in coal and gas generation reliability in recent years.

Gone are the days where we rely on gas and coal for reliability.