Institute for Energy Economics and Financial Analysis

Gas' Role in the Transition

A Fuel Transitioning Out of the Energy System

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May 2023

Key Findings

Gas usage for gas-powered electricity generation in Australia has collapsed.

Gas usage for electricity generation has almost halved in recent years dropping 47% from 2012 – 2022 and is expected to drop a further 34% to 2030.

The amount of gas we will need for electricity generation by 2030 is very small, at just 4% of forecast production on the east coast of Australia.

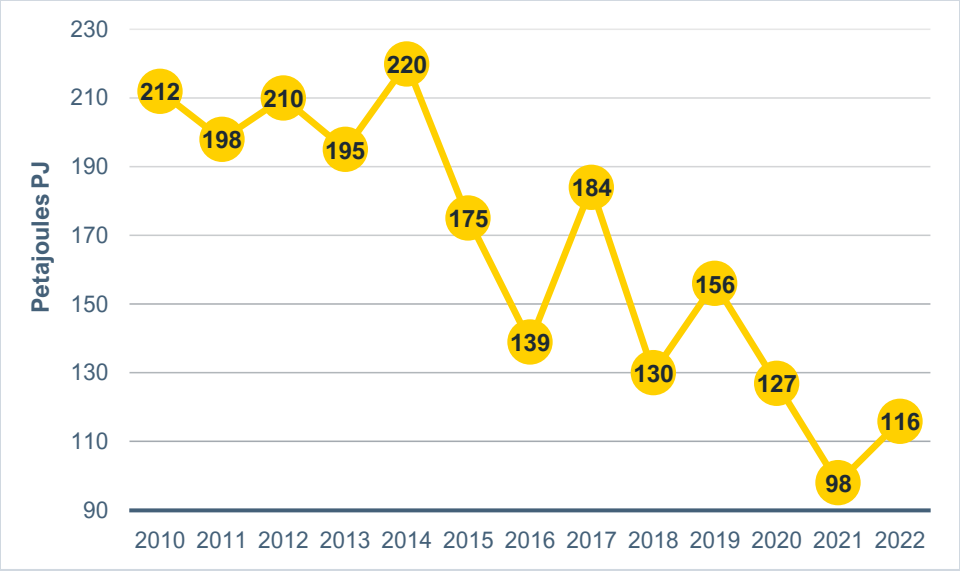
Gas is a fuel transitioning out of the energy system.

Executive Summary

Gas usage for gas-powered electricity generation in Australia has collapsed.

Between 2014 and 2022, gas usage for gas powered generation fell by 47%. A market that virtually halves in just eight years is usually termed a collapse.

Figure 1: Gas-Powered Generation – Annual Gas Usage



Source: Australian Energy Market Operator (AEMO).

By 2030, the Australian Energy Market Operator (AEMO)forecasts gas usage for electricity generation will fall a further 34% to just 76 petajoules from 116PJ in 2022. AEMO forecasts demand will suffer a further collapse in that period.

This paper will seek to explain how gas usage for gas-powered generation is suffering a collapse on top of a collapse.

Gas Is a Transition Fuel?

The peak gas lobby group, the Australian Petroleum Production & Exploration Association (APPEA), has consistently stated for many years that gas is
a transition fuel:

"Our transition to cleaner energy is at risk because of a shortage of a fossil fuel: natural gas.

"Or, to put it another way, we need more gas because we need more renewables.

"People willing to think about the nuts and bolts of decarbonising Australia's generation sector know that a cleaner sector means, for many years, more gas-fired generation."[1]

This refrain of, "We need more gas to fire gas power stations in a renewables-rich grid" has been faithfully repeated by the Prime Minister[2] [3] and the Energy Minister.[4]

We do not need more gas for the transition; we need much less gas in a renewables-rich grid.

This paper will demonstrate that the amount of gas needed in the energy transition is very small and shrinking.

Gas Usage for Power Generation and Renewables

The Current Situation

From 2014-2022, renewables increased their share of electricity generation strongly while gas usage in gas-powered generation nearly halved.

In 2014, renewables comprised less than 14% of the electricity generated in the National Electricity Market (NEM), which covers the eastern states of Australia. Last year, renewables accounted for nearly 35% of electricity generated.[5] While renewables' share of generation has gone up 2½ times, gas usage for gas-fired generation in the NEM has nearly halved.

The AEMO Forecasts

The government has clear ambitions to transform Australia's grid into a renewables-rich grid, taking the share of generation from 35% renewables in 2022 to 82% renewables by 2030.[6]

With renewable generation expanding rapidly, AEMO forecasts large falls in gas usage from 116PJ in 2022 to just 76PJ in 2030.[7]

[1] APPEA. Road to renewable energy goes via the nation's gas fields. 27 December 2016.
[2] Australian Financial Review. Gas has a key role in energy transition. 6 March 2023.
[3] Australian Financial Review. Greens' gas objections impede clean energy transition: PM. 7 March 2023.
[4] Australian Financial Review. Bowen defends need for future gas supply as Labor pushes Greens. 13 March 2023.
[5] National Energy Market. OpenNEM energy consumption statistics 1998-2023.
[6] The Conversation. To hit 82% renewables in 8 years, we need skilled workers – and labour markets are already overstretched. 18 August 2022.
[7] AEMO. Forecasting Data Portal

The Answer to Gas and the Transition Is 4%

While demand for gas for gas-powered generation will collapse by 2030, overall gas production on the east coast of Australia is expected to decline only marginally.

The net result is that a very small amount of overall production is needed for the transition to a renewables rich grid.

Only 4% of total east coast gas production will be used for gas-powered generation in 2030, AEMO forecasts.[8]

The Need for Gas-generation Capacity

If we are to get to 82% renewable generation by 2030, as the government aims to do, many believe there is a need for more gas-peaking capacity. AEMO calls for an increase in gas-fired peaking plants from 7GW capacity now to 10GW capacity in 2050 in its Integrated System Plan (ISP).[9]

So how can gas demand for gas-powered generation be collapsing when gas-peaking plant capacity is rising with the need to back up renewables?

The answer is quite simple: APPEA is intentionally conflating an increase in gas-peaking capacity with an increase in gas demand from electricity generation. It is doing this to deceive the public into believing we need more gas in a renewables-rich grid. Quite simply we don't. We need less gas to run a renewables-rich grid.

Gas demand for electricity generation has fallen, and will continue to fall, for two basic reasons:

- Gas baseload plants are closing. Gas is too expensive in Australia to use for baseload generation. Gas baseload plants use a lot of gas as they operate for most of the time;
- Gas-peaking plants simply don't operate very often. Typically, gas-peaking plants will operate for 4-14% of the year.[10]

High gas-consuming gas baseload plants are shutting, and some heavily government subsidised gas-peaking plants are opening that will not consume much gas.

While we will need some gas-peaking capacity, it will not operate very often, leading to low gas consumption.

[8] AEMO. Forecasting Data Portal. 21 April 2023.
[9] AEMO. Integrated System Plan 2022. Page 11
[10] National Energy Market. OpenNEM. 2023

Batteries – Direct Competition to Gas

Increasingly, it is being recognised that grid-scale batteries pose a major threat to gas-peaking plants.

Batteries have totally different economics to gas plants. Those that operate in the merchant market will use their capacity every day. Batteries have high up-front capital costs but very low operating costs. They will therefore operate every day, filling at the cheap prices of the day and typically selling into the evening peak periods. Their economics rely on the difference between the price they buy electricity and the price they sell electricity. This is in contrast to gas-peaking plants, which can only operate at very high electricity prices as they struggle to compete with very high domestic gas prices in Australia.

Batteries have rapidly grown in scale. Grid-scale batteries arrived in Australia in November 2017, with the construction of the Hornsdale power reserve in South Australia.[11] The battery was a 100MW/129MWh. It was upgraded in September 2020 to 150MW/193.5MWh.

It has since been dwarfed by other projects, such as AGL's big battery project at Torrens Island in SA. The 250MW big battery, sized initially at one-hour storage (250MWh), is likely to expand to up to four hours storage (1,000MWh).[12]

In December 2021, the Victorian Big Battery opened in Geelong. The 300MW/450MWh facility is the biggest completed battery storage installation
in Australia.

Even bigger batteries are planned by AGL, with a 500MW battery for the Liddell site following the closure of its 52-year 1,500MW Liddell coal-fired power station in April, and Origin Energy plans a 700MW battery for its Eraring site,[13] where it intends to close its 2,992MW coal-fired power plant in 2025.[14]

The increasing scale and number of grid-scale batteries will crimp demand for gas.

Grid-scale battery technology is attracting large investment.[15] Technological advances in batteries could spell the demise of gas much faster than any current forecasts for the industry.

[11] Hornsdale Power Reserve.
[12] Reneweconomy. AGL begins process of powering up Torrens Island battery, biggest in South Australia. 17 November 2022.
[13] Australian Financial Review. AGL Energy given green light for 500MW Liddell battery.
20 March 2022.
[14] Origin Energy. Eraring Power Station.
[15] Bloomberg. Lithium-ion Battery Pack Prices Rise for the First Time to an Average of $151/kWh. 6 December 2022.

Conclusion

Gas consumption for gas-powered generation has collapsed and will continue to collapse as the electricity system changes to a renewables-rich grid.

The amount of gas we will need for electricity generation by 2030 is very small, at just 4% of forecast production on the east coast of Australia.

We are being misled by our government and the oil and gas industry, telling us we need more gas and more gas fields for the transition. We don't.

The gas industry does not have a supply problem, it has a demand problem. Gas is a fuel transitioning out of the energy system.

Appendix 1 - Gas-powered Generation Gas Consumption by State (TJ/day)

	NSW/ACT	QLD	VIC	SA	TAS	Total
2014-15	76.3	334.3	43.0	120.0	0.5	574.0
2015-16	81.0	220.8	33.5	129.5	18.3	483.0
2016-17	56.8	170.3	53.5	155.0	16.3	451.8
2017-18	46.8	141.0	88.5	186.8	18.0	481.0
2018-19	29.8	113.0	76.3	175.3	11.5	405.8
2019-20	43.5	133.8	69.8	157.3	3.3	407.5
2020-21	20.8	126.0	37.0	129.5	2.8	316.0
2021-22	51.3	122.0	44.3	98.5	1.5	317.5
2022-23 (YTD)	31.3	107.0	38.0	83.7	2.7	262.7

Source: Australian Energy Regulator.

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