Gas as a transition fuel is a bit-player

Andrew Blakers

E2 Professor of Engineering, Australian National University

E-mail: Andrew.blakers@anu.edu.au

Web: http://re100.eng.anu.edu.au/

In Australia, natural gas has small importance as a transition fuel to a low emissions economy. Domestic gas consumption will fall substantially during the 2020s.

The global electricity system is rapidly transitioning towards low-cost renewable energy (Blakers et al. 2019) (Fig. 1). About two-thirds of net global annual generation capacity additions are solar photovoltaics (PV) and wind energy systems (Fig. 1).

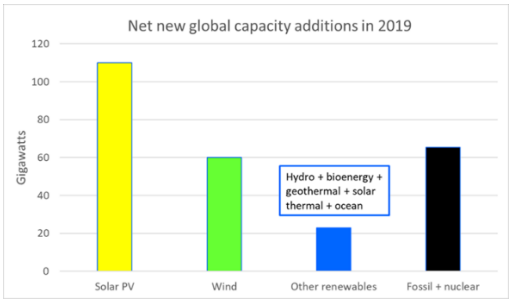

Figure 1: Net new global generation capacity additions showing the dominance of solar and wind.

Australia is a global renewable energy pathfinder. In Australia, solar PV and wind comprise virtually all new generation capacity. The deployment rate of new renewables is 10 times faster per capita than the global average and 4 times faster per capita than in Europe, China, Japan or the USA (Fig. 2).

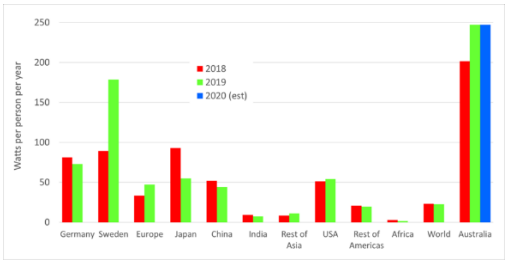

Figure 2: Deployment rate of renewables (principally solar PV and wind) in various regions in terms of Watts per person per year. (IRENA 2020)

The Australian National Electricity Market (NEM) has passed 25% renewable electricity and is tracking to 50% in 2025 (Blakers, Baldwin and Stocks 2020). South Australia will pass 60% solar and wind in 2020. Rapid falls in emissions from the electricity sector are causing economy-wide emissions reductions.

Both South Australia and the NEM as a whole have highly reliable electricity supply. The wholesale market price in South Australia so far this year is around $50 per MWh, which is similar to Queensland but below NSW and Victoria, which have about 15% wind and solar and a price of $60–70/MWh. High levels of wind and solar are correlated with stable electricity supply and lower electricity prices.

Balancing energy demand with 50–100% variable wind and solar during every second of every year is straightforward at low cost, using off-the-shelf methods:

- energy storage

- legacy coal and gas plant
- demand management, and
- strong interconnection over large areas using high-voltage transmission lines (Blakers et al. 2017).

Energy storage is mainly hydro (water held in dams in the Snowy Mountains and Tasmania), pumped hydro (like Snowy 2.0) and batteries (home, utility and electric vehicles).

Demand management can include switching off aluminium smelters for a few hours, paying people to reduce air conditioning loads during a stress period, avoiding charging electric vehicles during evening peak periods, moving water heating to daytime, or even paying some factories to have a holiday if an occasional wet windless week in winter is forecast.

Strong transmission helps because sunny or windy weather in one place can offset lack of generation in another place. This hugely reduces the cost of balancing.

Storage and demand management react far faster (sub-seconds to minutes) than legacy coal or gas plant and will garner most of the associated ancillary market payments. New Gigawatt-scale pumped hydro, batteries, transmission and demand management are being developed right now.

The Federal Government has proposed an intervention in the market to build a Gigawatt-scale gas generator in NSW to help cover stress periods in the grid.[1] Such a generator will have to compete with the other methods mentioned above as well as existing coal and gas generators. Its duty cycle, emissions and revenue will probably all be small.

Gas for energy has a limited future. Gas only produces 8% of NEM electricity (OpenNEM 2020). Electric heat pumps are starting to push gas out of air and water heating in buildings. Solar and wind will squeeze most gas out of the Perth, Pilbara, Darwin and mining electricity grids in the 2020s. The latest A.C.T. reverse auction produced a wind price around $40/MWh (Mazengarb 2020). Both PV and wind will reach $30/MWh by 2030, at which price it undercuts gas at $5-6/GJ for industrial heating (given the losses in the latter) (Blakers and Stocks 2020).

However, gas for chemical production (fertilisers, plastics etc) will continue into the 2030s, until sustainable and low-cost alternatives are fully commercialised.

Methane is a far more potent Greenhouse gas than CO_2. Leakage of 4% of the natural gas equalises coal and gas in Greenhouse terms when viewed over a 20-year time frame (Swann 2020). No one knows what the real leakage rates of methane are in Australia, and detailed research is urgently needed to find out.

To achieve zero oil, gas and coal in the economy (= 85% reduction in total emissions) we need to triple electricity production to meet the needs of transport, heating and industry (Lu et al. 2020). Wind and solar are being deployed at a rate of 6–7 GW per year in Australia, and this only needs to double to 13 GW per year to reach zero fossil fuels in 2050 (Blakers, Baldwin and Stocks 2020). For context, in 2017, the deployment rate was only 2 GW per year. The net cost will be about low or negative because wind and solar are cheap and getting cheaper.

The most important help the renewable energy industry needs from Government right now is far faster deployment of new and upgraded transmission lines to get the new wind and solar power to the cities.

[1] https://www.pm.gov.au/media/gas-fired-recovery

In summary, electricity production will rapidly increase to replace fossil fuels used for heating, transport and industry, and this new electricity will come overwhelmingly from solar and wind. Natural gas will have a steadily diminishing role in Australian domestic energy.

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