

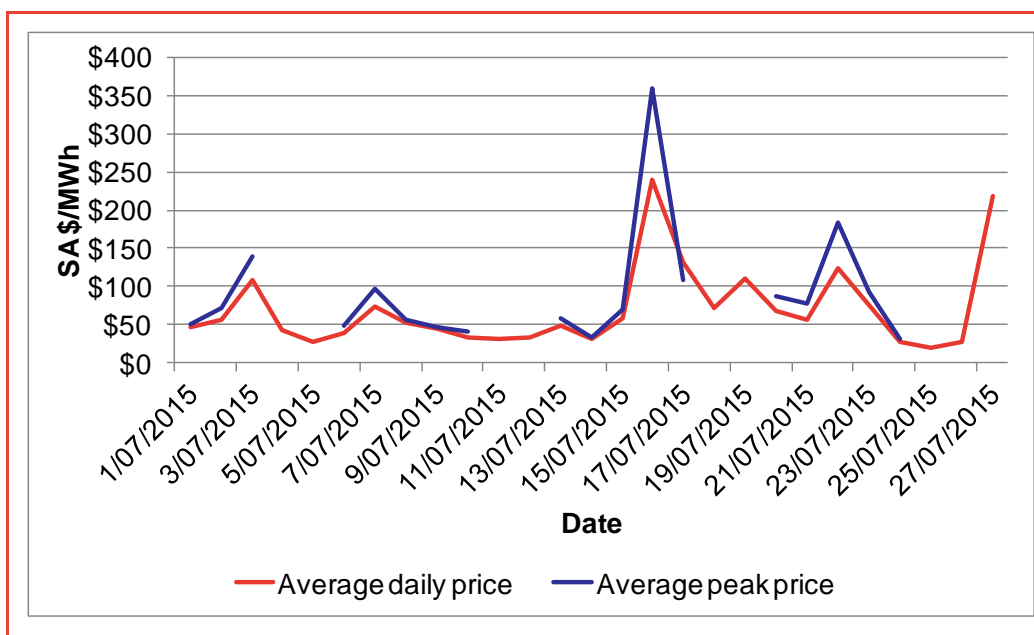
Out of puff

WHOLESALE PRICE IMPACT OF WIND IN SOUTH AUSTRALIA

South Australia has experienced a spate of high wholesale electricity price events in July 2015. As has been long predicted, increasing penetration of wind, and its inherent intermittency, appears to be primarily responsible for the events. This briefing from Frontier Economics examines the causes of these incidents and discusses how a change in policy might be required to ensure the South Australian market operates efficiently in the future.

South Australia has experienced a spate of high wholesale electricity price events in July 2015 as shown in Figure 1, which shows the daily average and peak prices in South Australia this month.

Figure 1: South Australian average daily and peak wholesale electricity prices



Source: Frontier Economics analysis of AEMO data

These high daily and peak prices have been driven by a small number of 5 minute dispatch intervals where prices have spiked greater than \$1,000/MWh.

These events trigger a requirement for the market operator AEMO to produce a pricing event report¹ analysing the cause of the price event.

¹ Found at <http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/Pricing-Event-Reports/>.

According to AEMO, these price events have all had a common factor – low levels of wind production in South Australia.

Box 1: AEMO pricing event reports – South Australia July 2015

Electricity Pricing Event Report – Wednesday 22 July 2015

Market Outcomes: South Australian spot price reached \$2,296.07/MWh for trading interval (TI) ending 1830 hrs...During the high priced TI, **wind generation in South Australia was low at 39 MW.**

Electricity Pricing Event Report – Sunday 19 July 2015

Market Outcomes: South Australian spot price reached \$2,372.11/MWh for trading interval (TI) ending 1830 hrs...During the high priced TI, **wind generation in South Australia was low at 3 MW** for TI ending 1830 hrs.

Electricity Pricing Event Report – Friday 17 July 2015 (TI ending 0000 hrs on 18 July 2015): South Australia

Market Outcomes: South Australian spot price reached \$2,256.25/MWh for trading interval (TI) ending 0000 hrs (on Saturday, 18 July 2015)...**Wind generation in South Australia was approximately 120 MW** for TI ending 0000 hrs on 18 July 2015.

Electricity Pricing Event Summary – Tuesday 7 July 2015

Market Outcomes: South Australia spot price reached \$1,221.54/MWh for trading interval (TI) ending 1900 hrs...**Low levels of wind generation in South Australia at approximately 60 MW** at TI ending 1900 hrs

Electricity Pricing Event Report – Friday 03 July 2015

Market Outcomes: South Australian spot price reached \$2,296.32/MWh for trading interval (TI) ending 0830 hrs...During the high priced TI, **wind generation in South Australia was low at 45 MW** for TI ending 0830 hrs.

Source: AEMO, <http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/Pricing-Event-Reports/July-2015>

Whilst the events have coincided with relatively high demand conditions in South Australia and some minor restrictions on imports of electricity from Victoria, low wind production levels are the key common feature of every event. The market response at such times has been to offer higher priced capacity to the market leading to high prices, just as the NEM was designed to do under conditions of scarcity.

A GATHERING FRONT

Numerous commentators have predicted for years that increasing penetration of intermittent renewable generation would lead to more volatile wholesale market

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prices. In December 2008, as part of advice Frontier Economics provided on the potential expansion of the Renewable Energy Target we stated that:

The increase in intermittent generation (by itself) is likely to increase the volatility of the pool price compared to an equivalent increase in thermal capacity, since wind cannot guarantee supply of energy at times of high demand.²

South Australia, with its high levels of both utility scale wind and residential solar generation, was always going to be the first region of the NEM to see significant wholesale price volatility arising from this effect. Whilst we can expect to see related issues arising in other regions, the biggest question is what happens in South Australia in the future?

In June 2015, Alinta Energy announced³ the permanent closure of the Flinders Power Stations – Northern and Playford – from as early as 2016. This represents the exit of the only major baseload power station in South Australia. Intermittent wind has led to volatile prices in July that have occurred at times when South Australian demand is around 2,000 MW. What will happen when Northern's 576 MW is absent from the market? Northern's exit introduces additional issues around maintaining inertia and frequency stability in South Australia. This could be further exacerbated by additional wind investment in South Australia in the future.

In the extreme case, with higher and more volatile wind output, less inertia and increasing dependence on the Heywood interconnector, South Australia may face load shedding events and potentially even a state-wide black out.

WHAT TO DO?

Potential policy responses fall into three broad categories:

- **Do nothing** – Over time, higher levels of price volatility and, potentially, the level of prices, would provide incentives to existing peaking and mid-merit power stations to run more often and potentially lead to new investment in peaking capacity
- If left alone, the market will eventually respond to limit wholesale prices. However, continued policy uncertainty, for example vaguely defined proposals to significantly increase the RET, may frustrate generators' desire to operate and/or invest to capture higher prices in South Australia. In the interim, customers are likely to bear the cost of higher wholesale energy prices and increased risk in supplying a retail load.

² Frontier Economics, *Impacts of climate change policies on generation investment and operation*, December 2008, p vii.

³ See <https://alintaenergy.com.au/about-us/news/flinders-operations-announcement>.

- **Force thermal generators to run** – If higher cost capacity were in operation *before* wind output dropped, then there would be less opportunity for sudden price rises as there would be no supply delay arising from generators having to switch on peaking power stations. In industry terms, this would equate to operating additional 'spinning reserve' to manage the fluctuations in wind and solar output, which could also be sourced from other states via imported electricity. Of course, this means high cost generators would need to be running *all the time* even when the wind was blowing. Whilst higher levels of spinning reserve would be likely mitigate very short term wholesale price rises in South Australia, they would impose additional costs at all other times. Again, consumers are likely to bear these costs, which could be higher than the volatile wholesale prices they replace.
- **Force wind generators to not run** – Aggregate South Australian wind generation could be limited to ensure the remaining generators are capable of meeting demand. Putting aside the issue of the financial impact this would have on existing wind generators who invested in good faith, this may not even be operationally possible in South Australia after Northern exits the market as there is simply not enough thermal generation in South Australia to meet demand when the wind is not blowing. Consumers would be likely to see higher wholesale prices and potentially higher RET costs under this option.

CONCLUSION

The level of wind and solar penetration in South Australia presents a fascinating natural experiment in the impact of intermittent generation on wholesale prices. Unfortunately, this test is anything but academic and the people of South Australia are increasingly likely to bear increased electricity costs as wind makes up a greater proportion of South Australian generation. Whilst policy makers may be tempted to act to force thermal and/or wind to behave uneconomically, the likely outcome means South Australian consumers will bear more costs.

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