

Market power in Australia's National Electricity Market following the closure of the Hazelwood Power Station

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Outline

- ▶ **Background** (Steven) – 2 minutes
- ▶ **Theory** (Bruce) – 8 minutes
- ▶ **Generator prices and volumes** (Steven) – 30 minutes
- ▶ **Contrived or genuine scarcity?** (Bruce) – 5 minutes
- ▶ **What does this mean for prices and profits?** (Bruce) - 5 minutes
- ▶ **Conclusions and policy implications** (Bruce) - 3 minutes

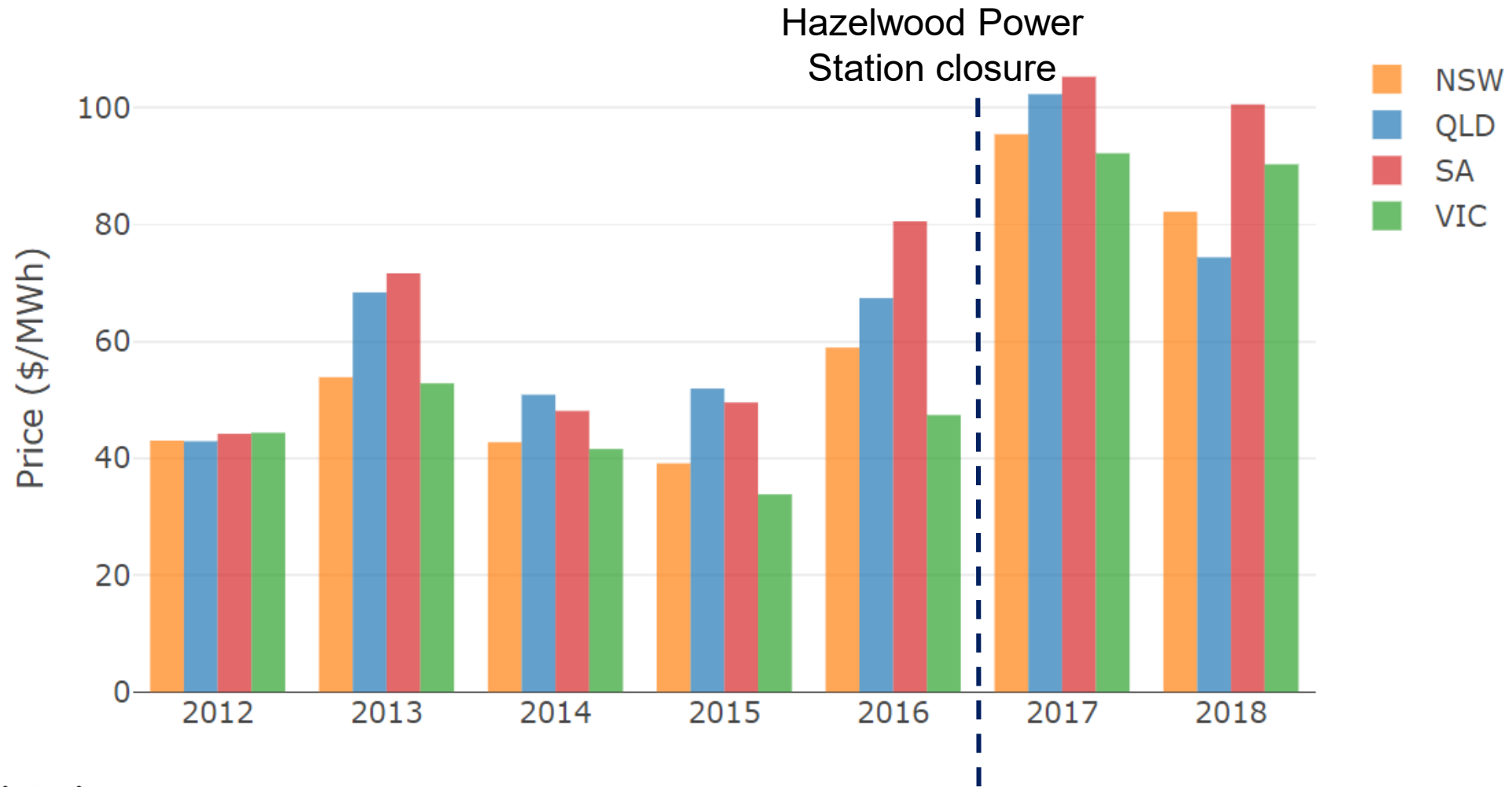


Source: AEMO

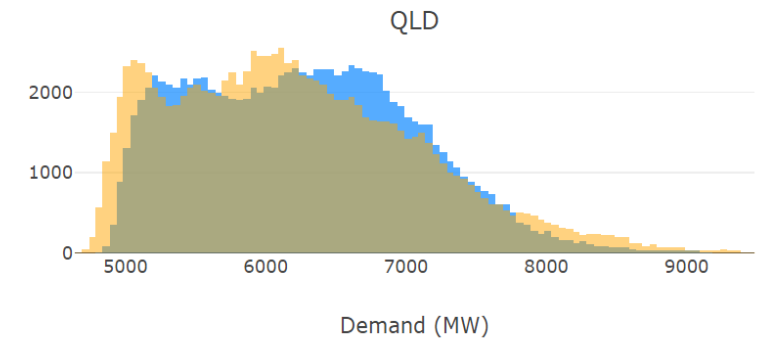
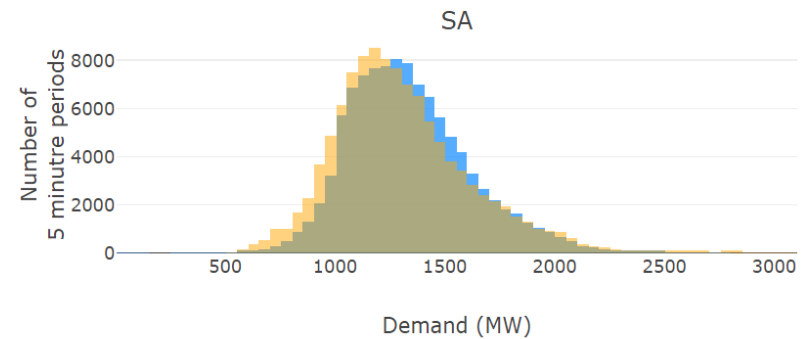
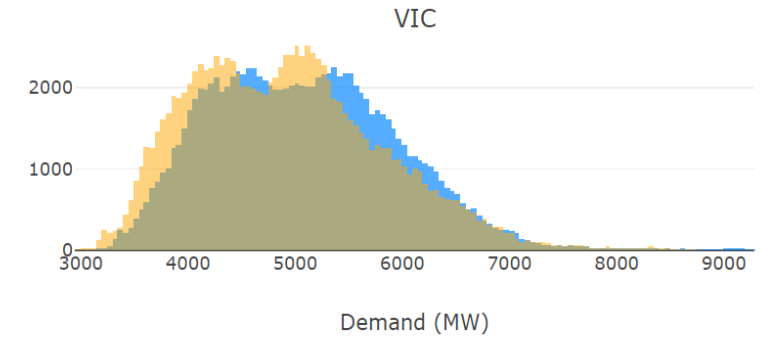
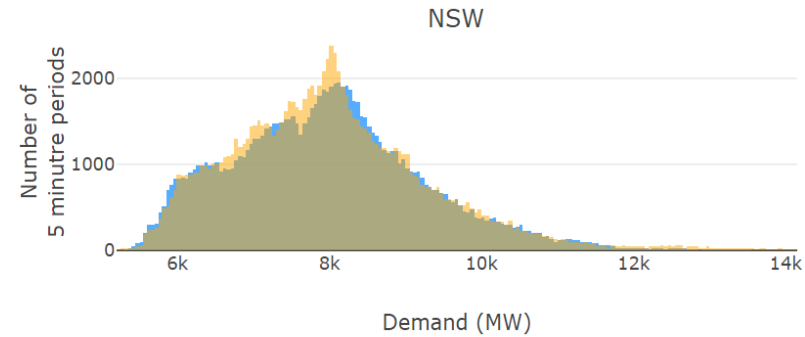
The National Energy Market

- ▶ Five NEM regions with five regional interconnectors
- ▶ 77% of energy from coal, 9% from gas
- ▶ Black coal generation in NSW and QLD, brown coal in VIC.
- ▶ 5 Minute dispatch, 30 minute spot price
- ▶ Hazelwood Power Station closed on 31 March 2017 (5% of NEM production)

NEM-wide prices increased sharply after HW closed



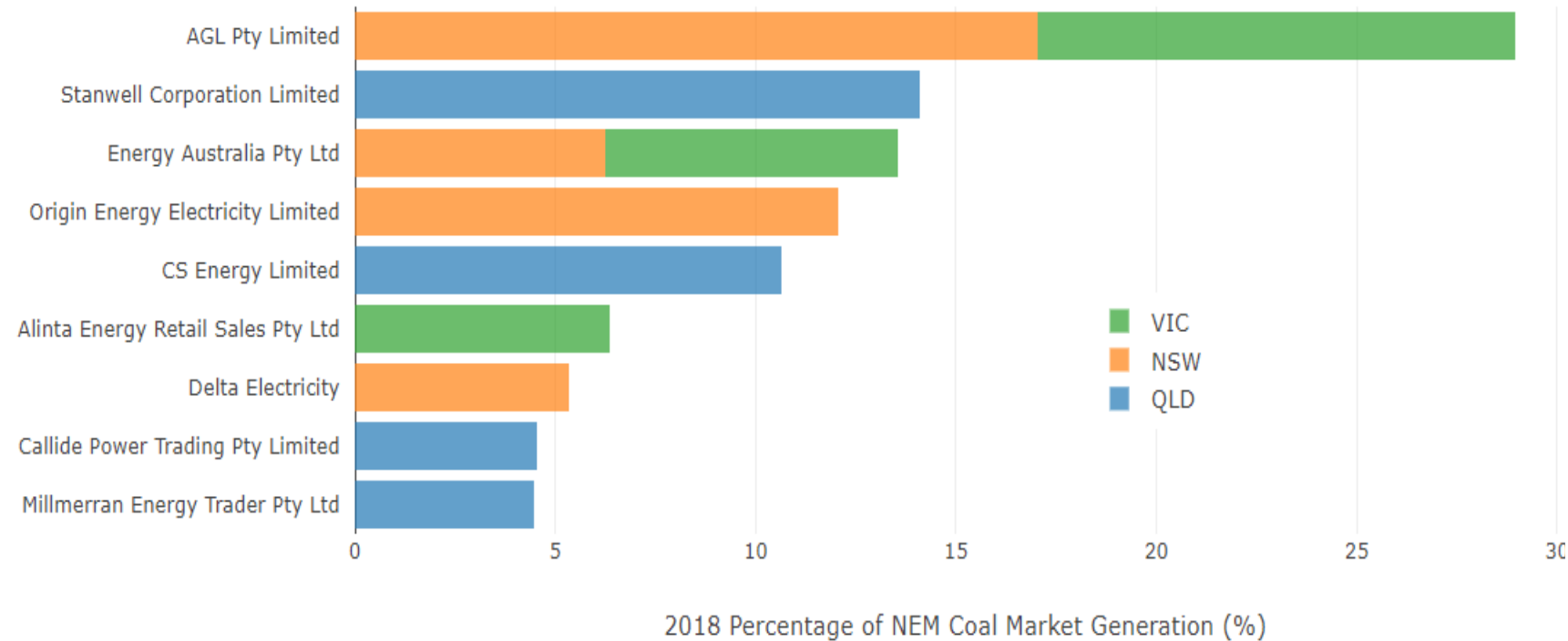
The demand for each region has remained largely unchanged since the Hazelwood Closure



Calendar year 2016 Calendar Year 2017

The top four coal generators own 70% of the coal market share

The HHI shows that the coal generation market is highly concentrated



| HHI | New South Wales | Queensland | Victoria | All regions |
|------|-----------------|------------|----------|-------------|
| 2016 | 3229 | 3224 | 2637 | 1494 |
| 2017 | 3105 | 3240 | 3114 | 1536 |

$$HHI = \sum_{i=1}^N MS_i^2$$

The Victorian
1,600MW
Hazelwood Power
Station closed on 31
March 2017 (5% of
NEM production)

| | VIC | NSW | QLD | TOTAL |
|---|-------------------|------------------|------------------|-------------------|
| Coal generation year before HW closed | 36 TWh | 57 TWh | 52 TWh | 146 TWh |
| Coal generation year after HW closed | 45 TWh | 54 TWh | 50 TWh | 151 TWh |
| Difference | -9.456 TWh | 3.177 TWh | 1.874 TWh | -4.403 TWh |
| | -26% | 5% | 4% | -3% |

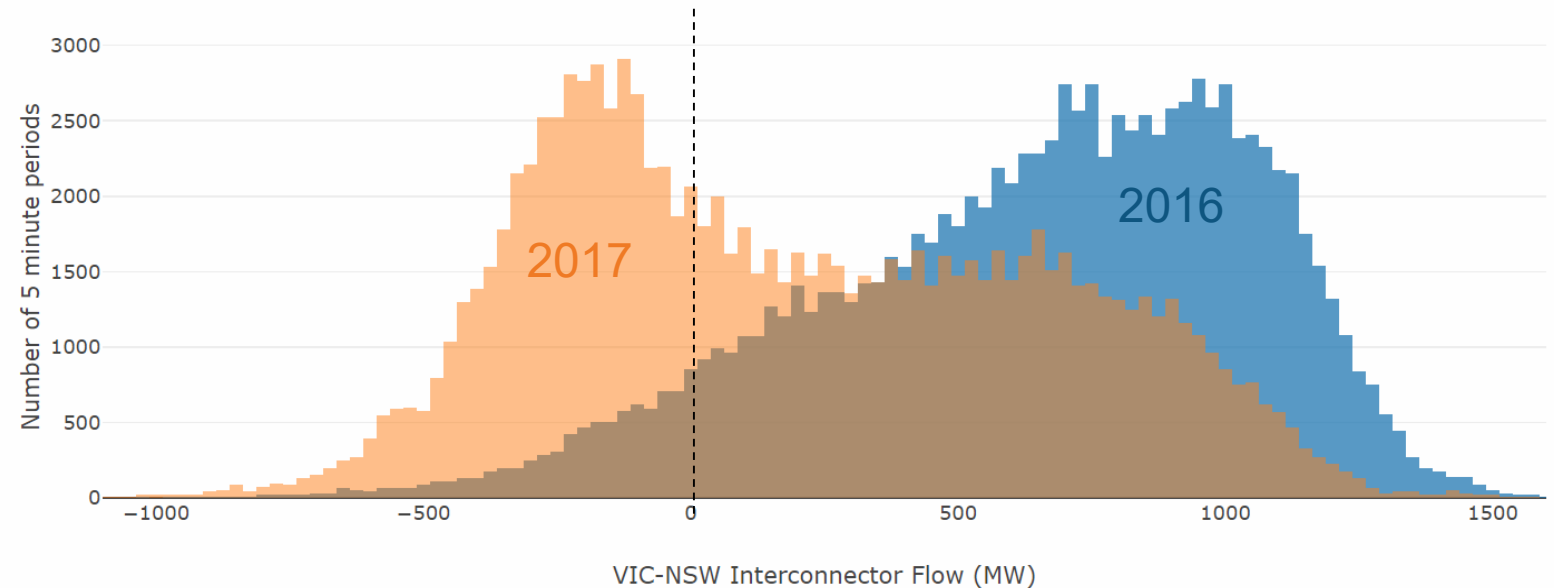
NSW and QLD increased production a bit to replace part of lost Hazelwood production. Coal generation 3% lower NEM-wide one year after HW closed

Regional Interconnectors

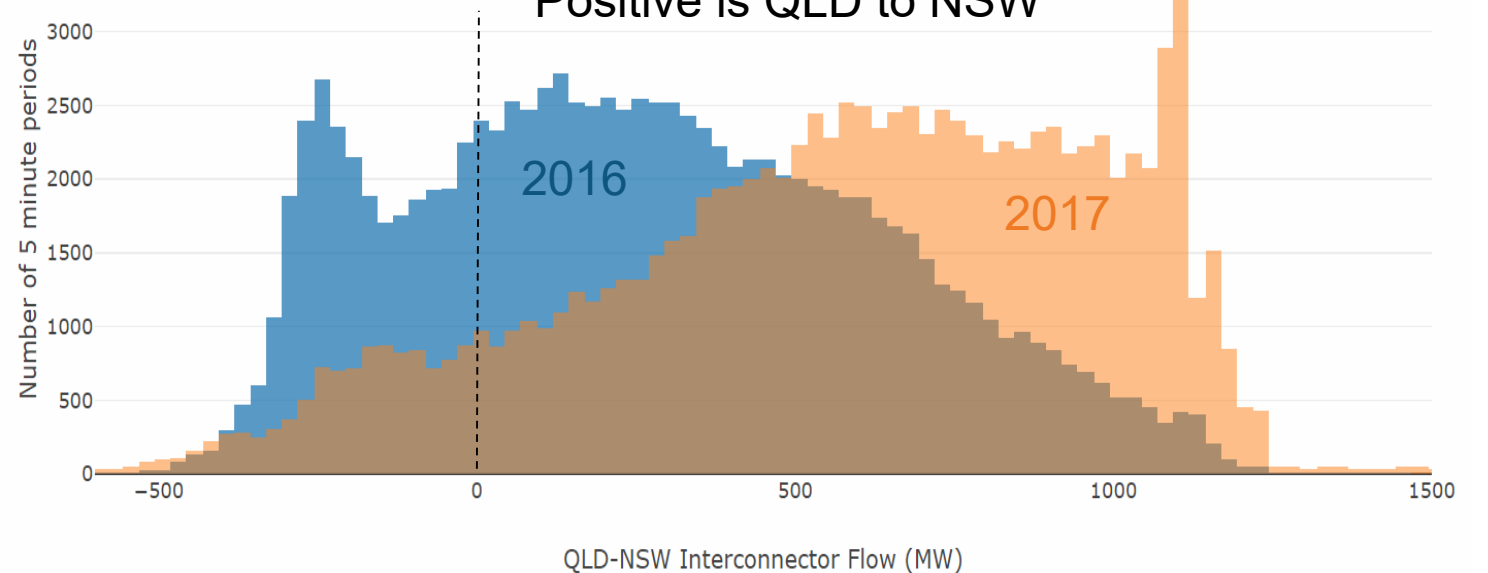
After Hazelwood closed NSW was frequently exporting electricity to Victoria

After Hazelwood closed NSW was more frequently importing electricity from Queensland

Positive is VIC to NSW



Positive is QLD to NSW

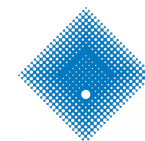


■ 2016 Calendar Year ■ 2017 Calendar Year

Theory



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Theory There are different perspectives

Neoclassical orthodoxy (Marshallian welfare economics): Price = Marginal Cost in competitive markets is starting point. But now widely accepted objections:

- price discrimination and/or two-part pricing to recover sunk costs can be efficient (Ramsey, Boiteaux, Coase, Klein);
- behavioral economics (Thaler, Tversky, Akerlof, Kahneman, Sunstein)
- Austrian economics – markets as discovery processes (Menger, Von Mises, Schumpeter, Kirzner)

Further fundamental objections even if we adopted narrow Marshall/Walras/Pigou welfare economics formulation of competition:

- what is marginal cost “ (often impossible to know objectively)
- regulation also fails (Klein, Levine, Coase, Stigler): market failure is a relative not absolute concept.

So how have we thought about it?

- ▶ Ultimately assessment of market competitiveness is an empirical question that requires judgement.
- ▶ Oligopolistic competition provides a model to evaluate generator behavior:
 - ▶ Objective function is the maximisation, across firms, of the difference between revenues and costs.
 - ▶ Optimal mark-up (differential of objective function with respect to offer price) for i^{th} generator occurs when:
 - ▶ Inframarginal rent is maximised (i.e. does a generator price its output so as to maximise inframarginal rent?); and
 - ▶ Residual demand is inelastic (does a generator seek to exercise market power when its competitors are least able to respond?)
- ▶ So, our conceptual framework is, first, to look at the gap between price and (avoidable) cost and second to examine whether bidding behavior is consistent with the optimal market-up rule. If both are satisfied, and not explained by exogenous constraints, we conclude that market power is being exercised.

Generator prices and volumes



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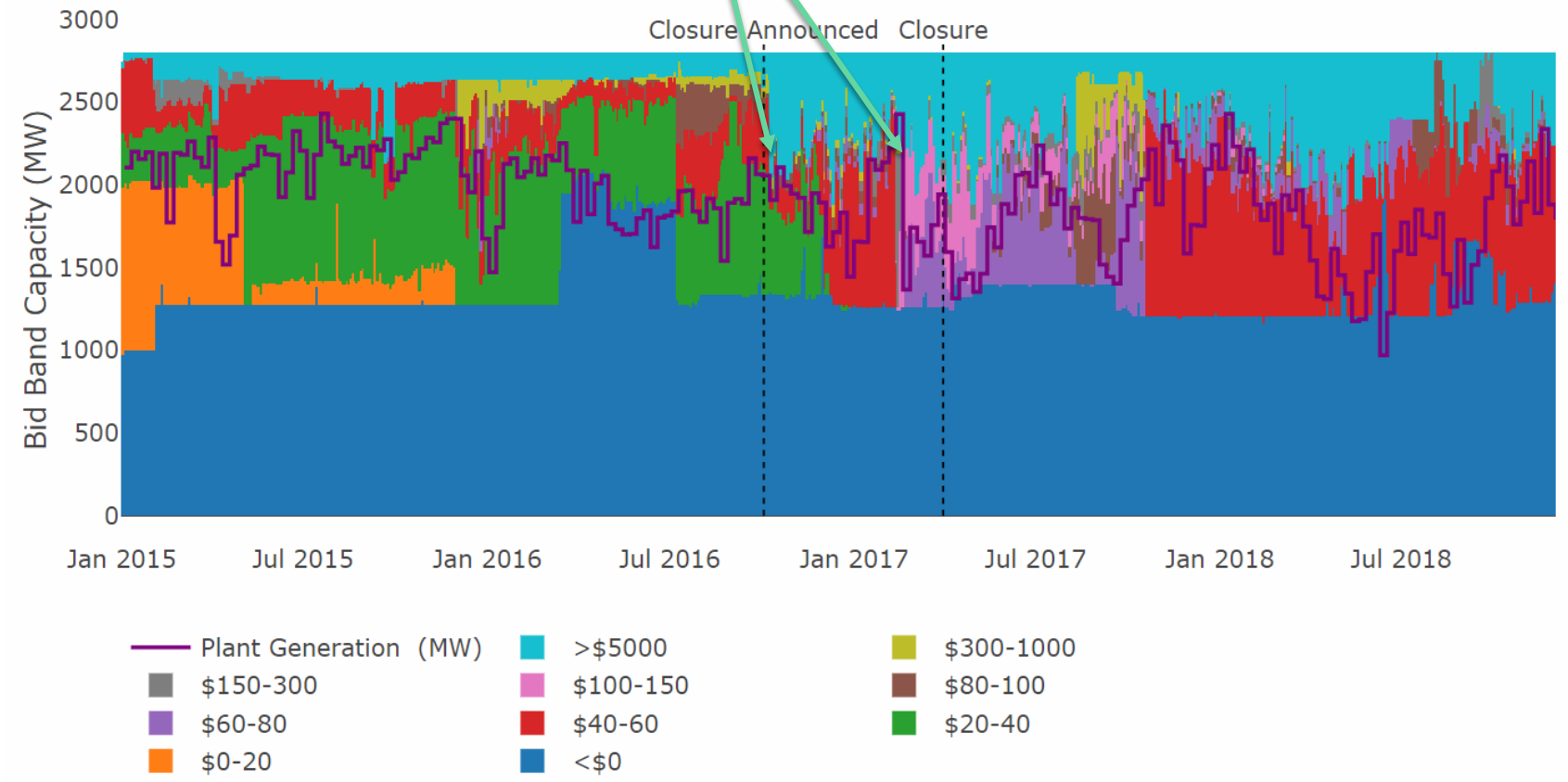
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NSW Coal Generator

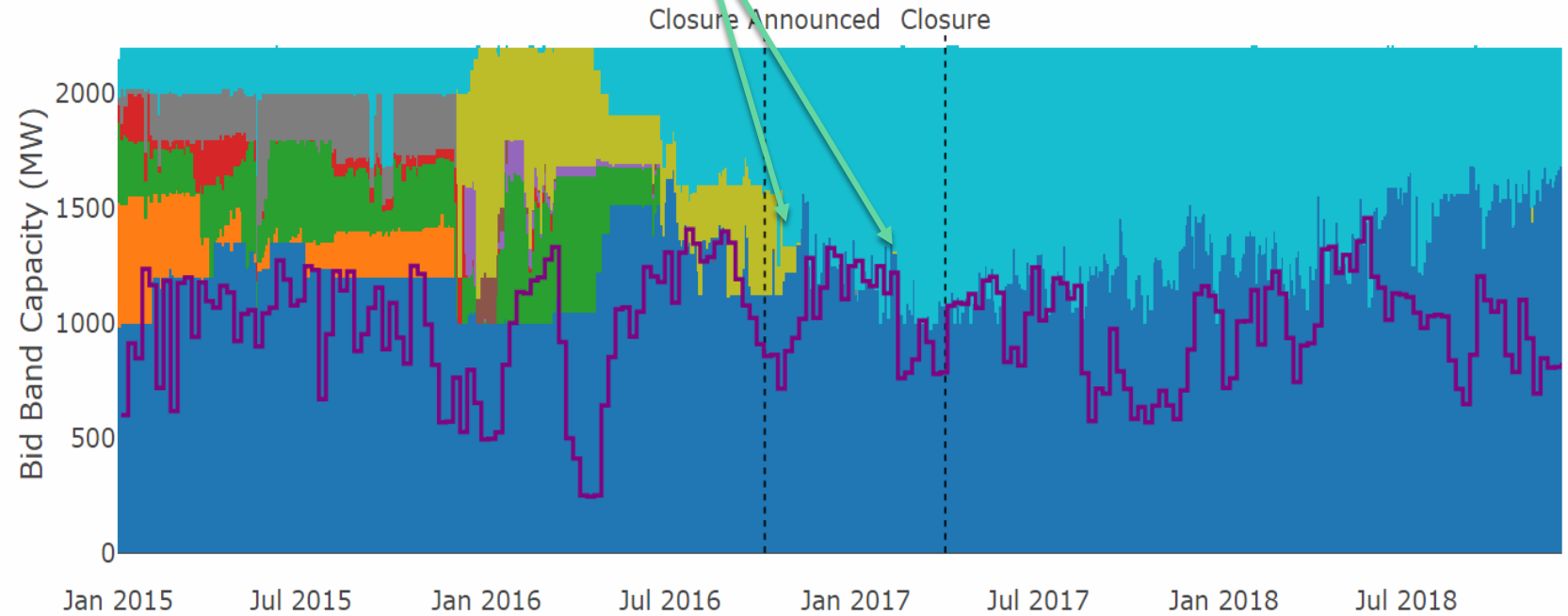
Bayswater Power Station (AGL)

AGL increased Bayswater prices



NSW Coal Generator Liddell Power Station (AGL)

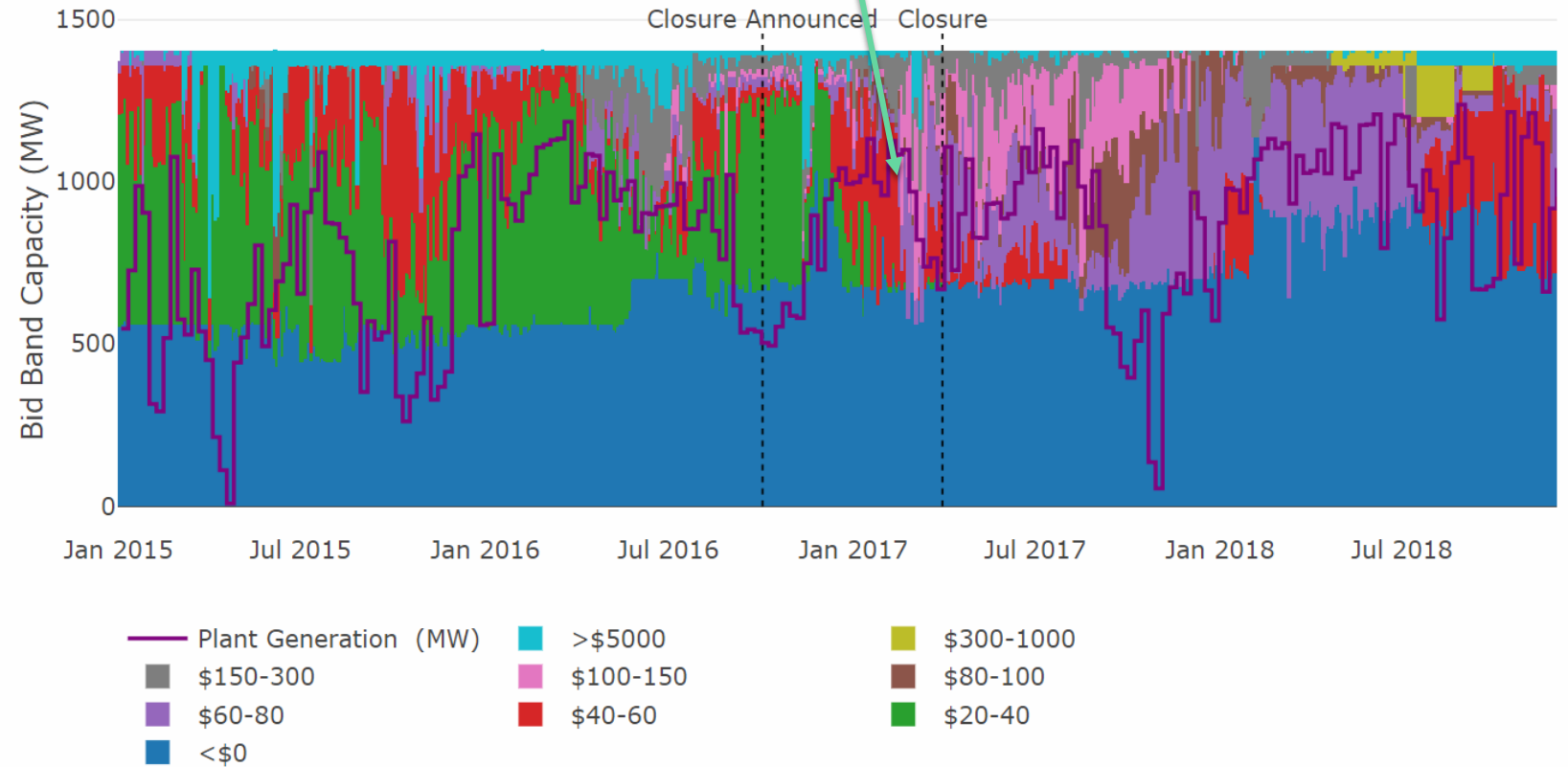
Coincident with Bayswater, AGL bid up Liddell's output



NSW Coal Generator

Mt Piper Power Station (Energy Australia)

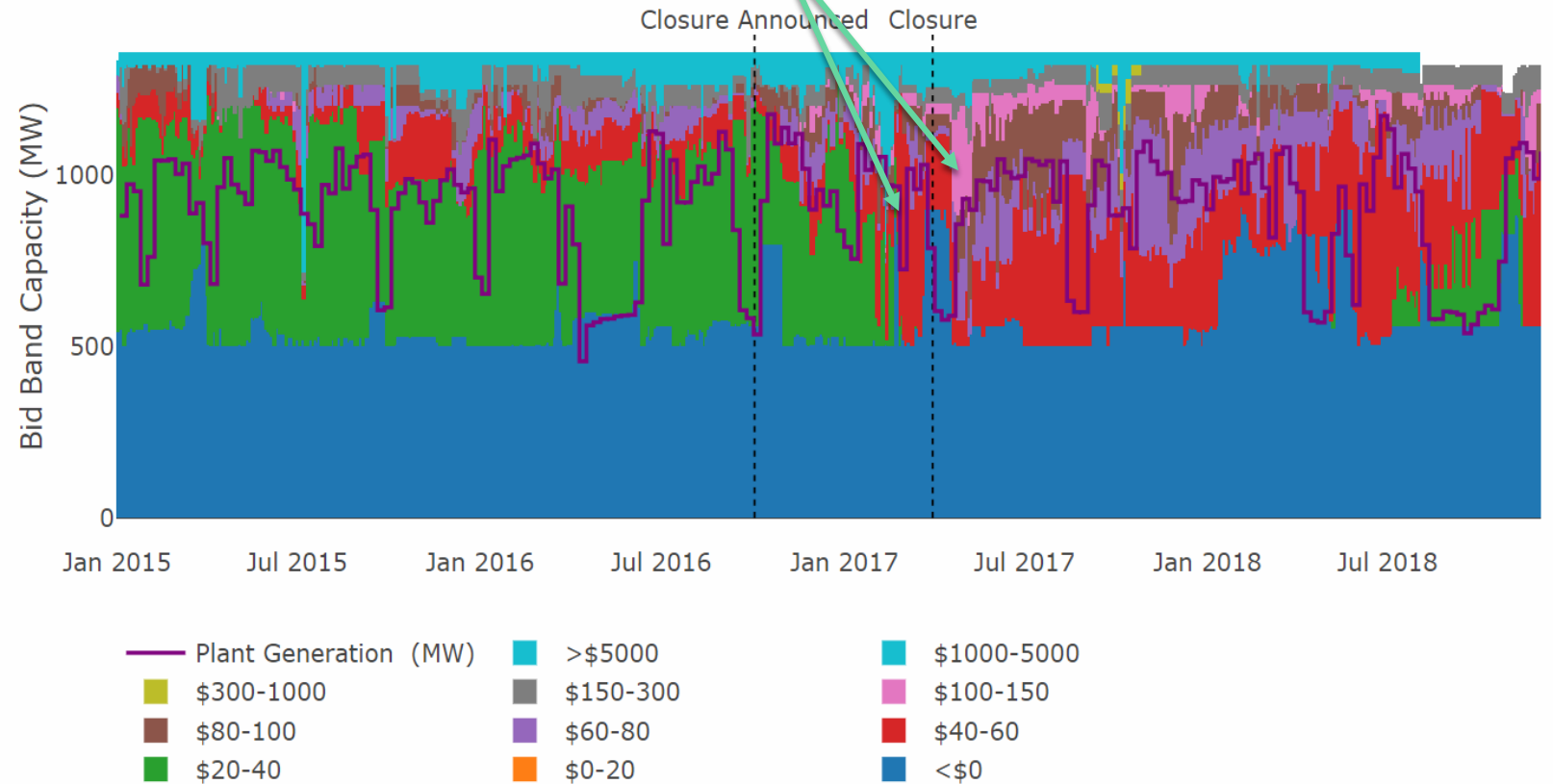
Energy Australia stepped up Mt Piper bids after Bayswater



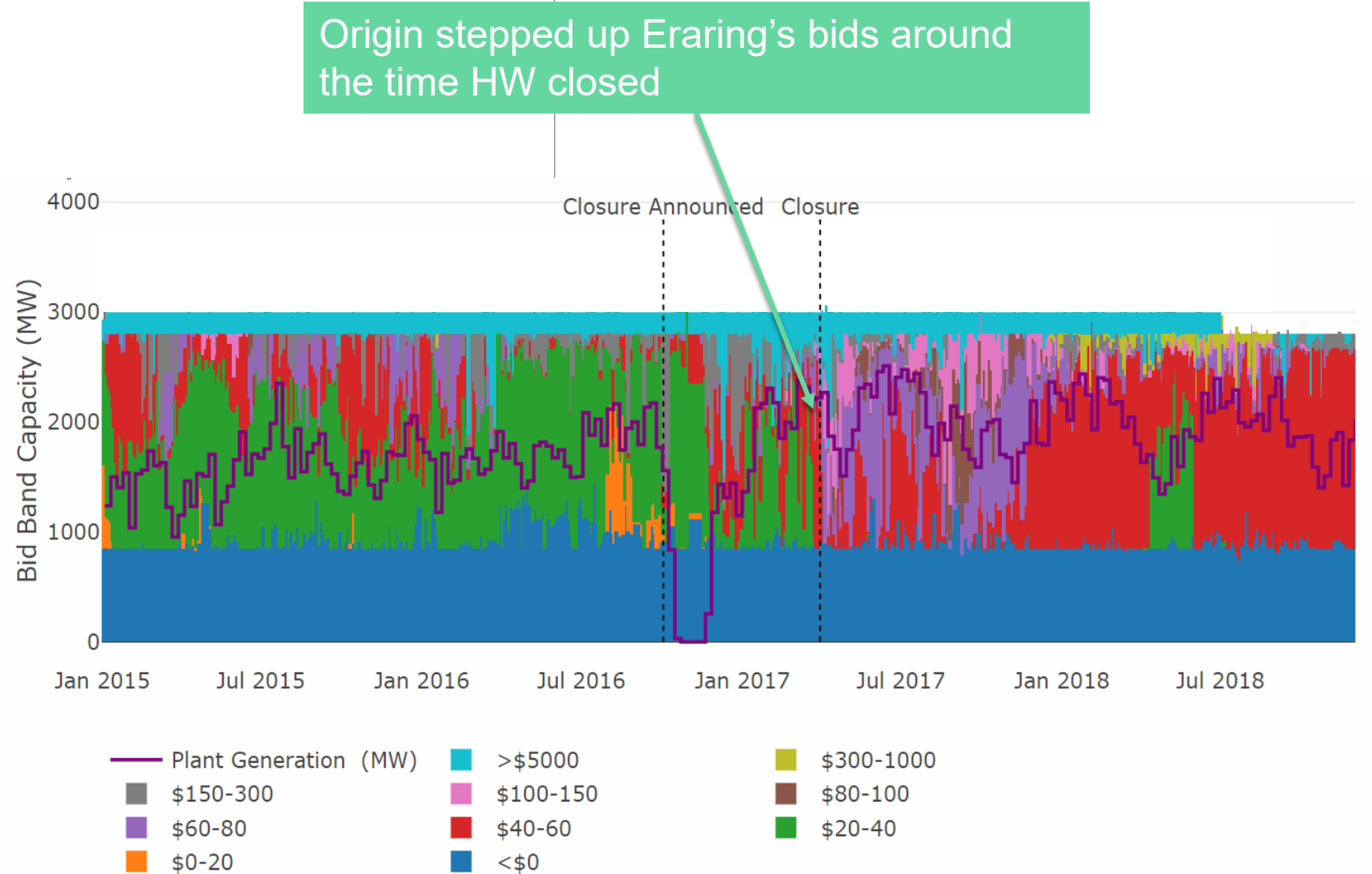
NSW Coal Generator

Vales Point "B" Power Station (Delta/Sunset Power)

Delta stepped up Vales Point bids after
Bayswater

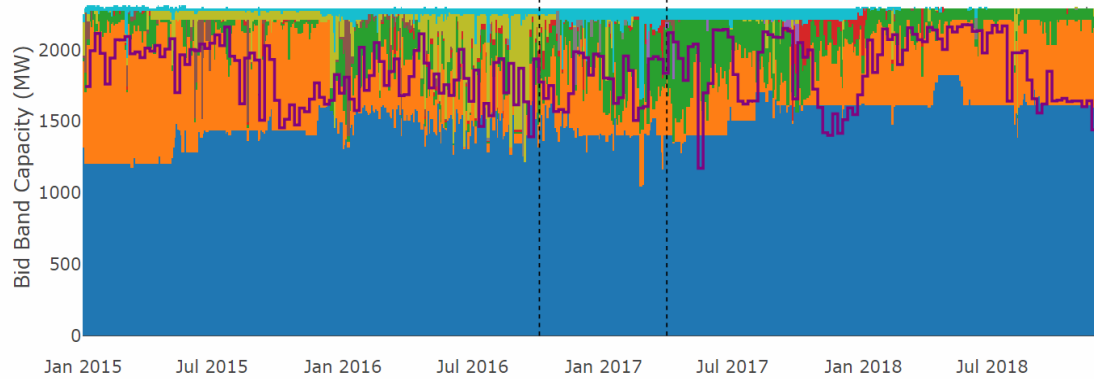


NSW Coal Generator Eraring Power Station (Origin)

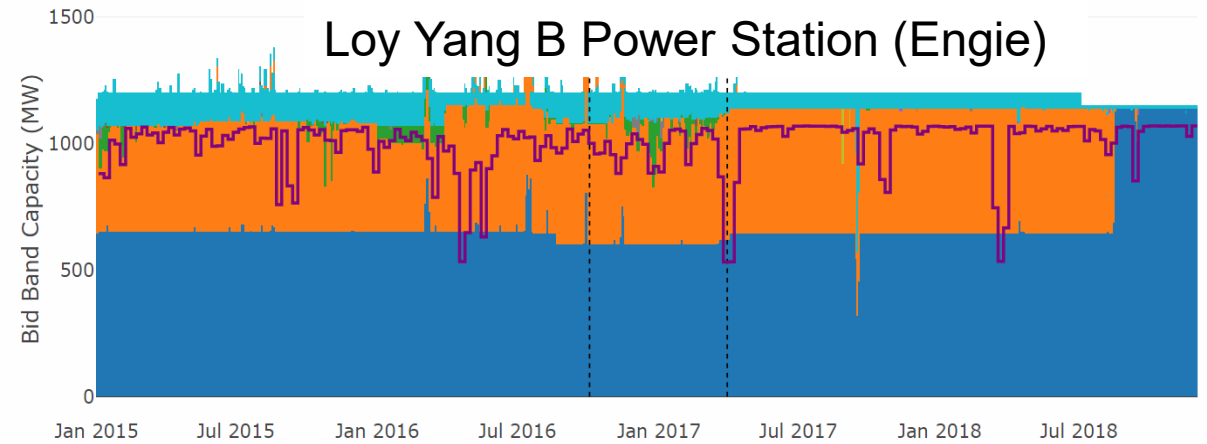


How did the Victoria generators respond?

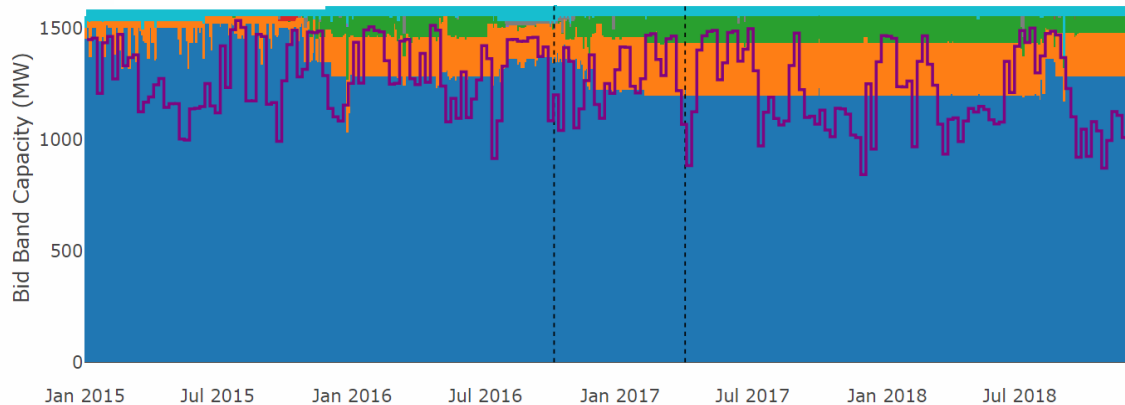
Loy Yang A Power Station (AGL)



Loy Yang B Power Station (Engie)



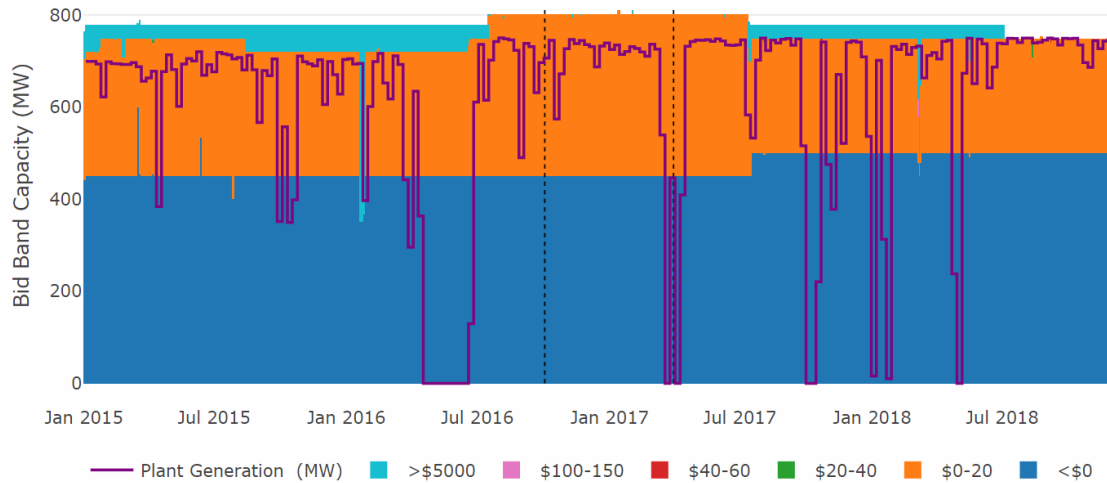
Yallourn 'W' Power Station (Energy Australia)



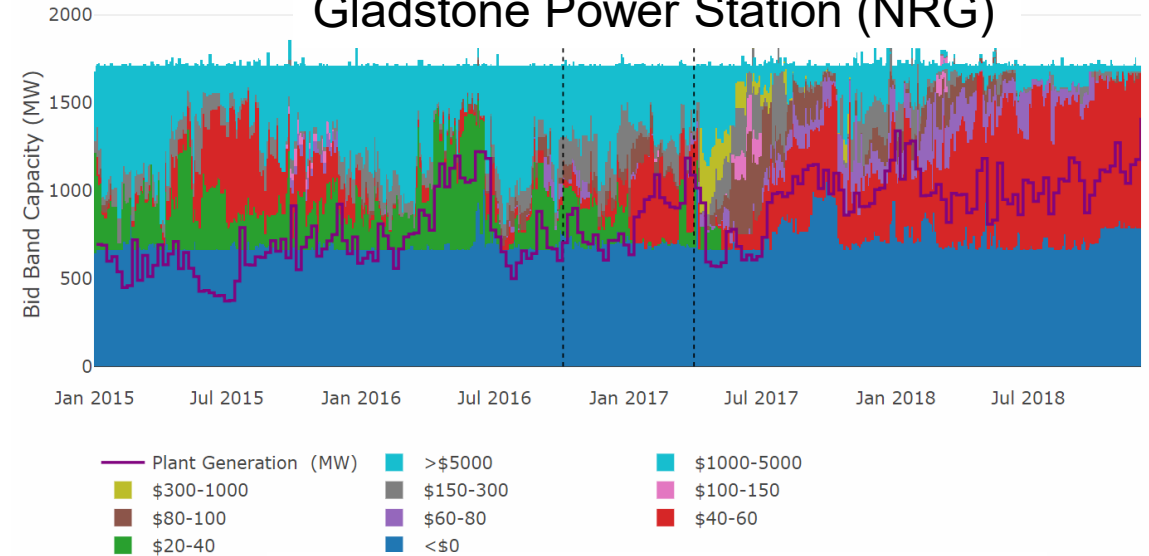
No significant change
in Victoria bids

How did the Queensland generators respond?

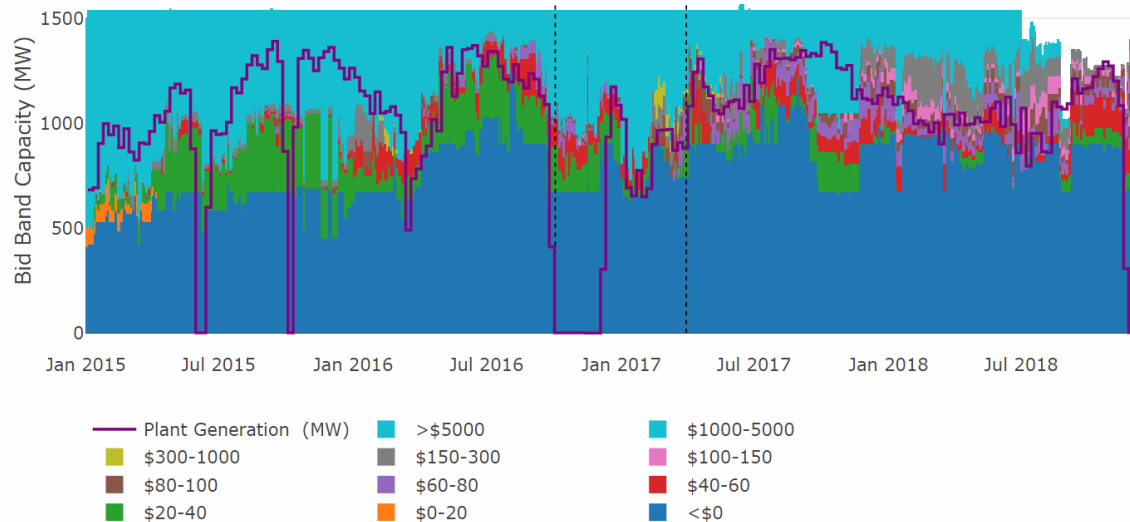
Millmerran Power Plant (InterGen)



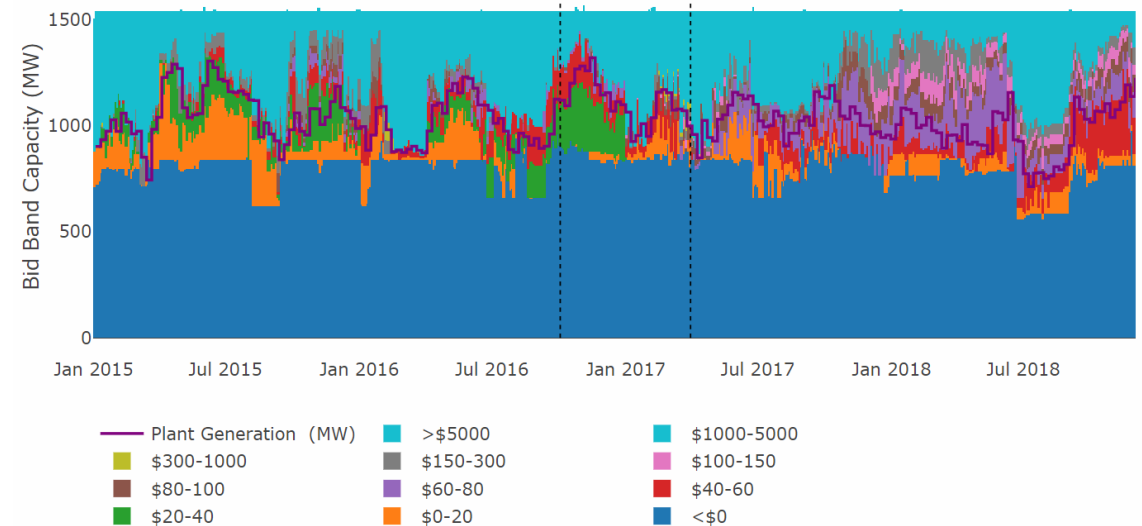
Gladstone Power Station (NRG)



Tarong Power Station (Stanwell)



Stanwell Power Station (Stanwell)

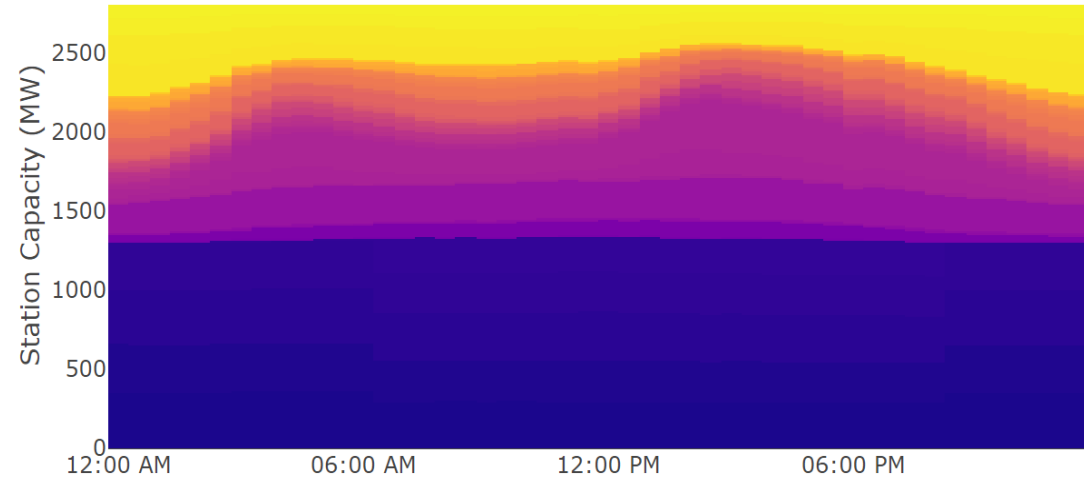
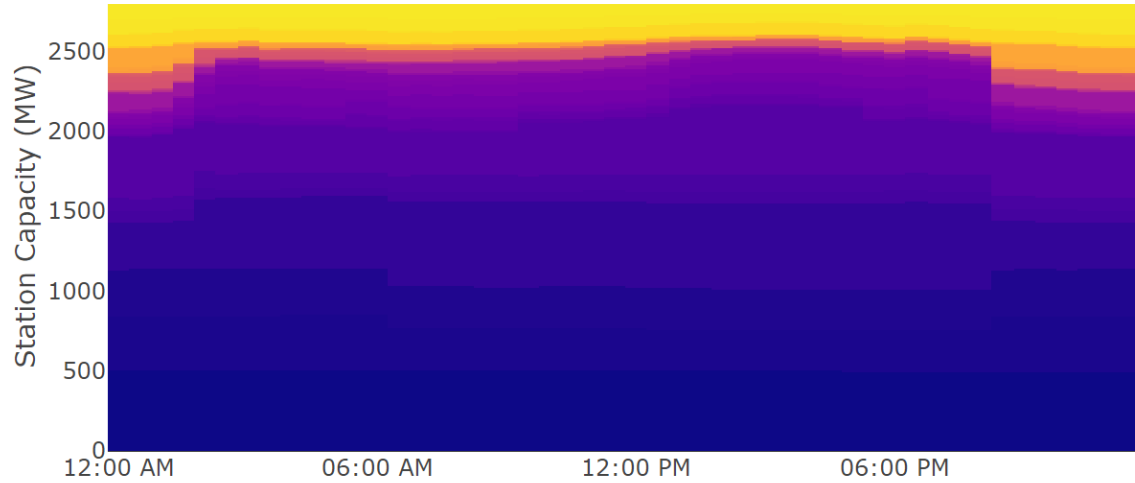


How did the average Bayswater and Liddell bids change throughout the day?

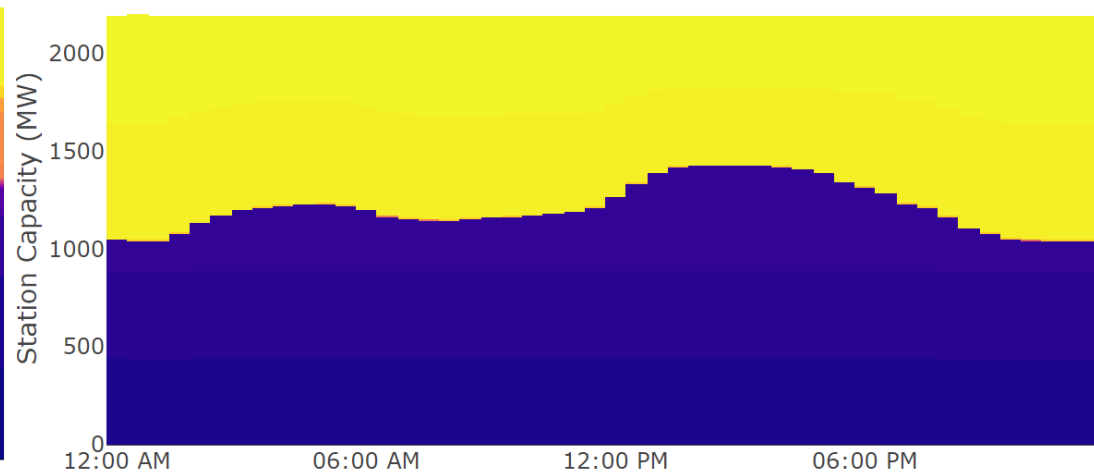
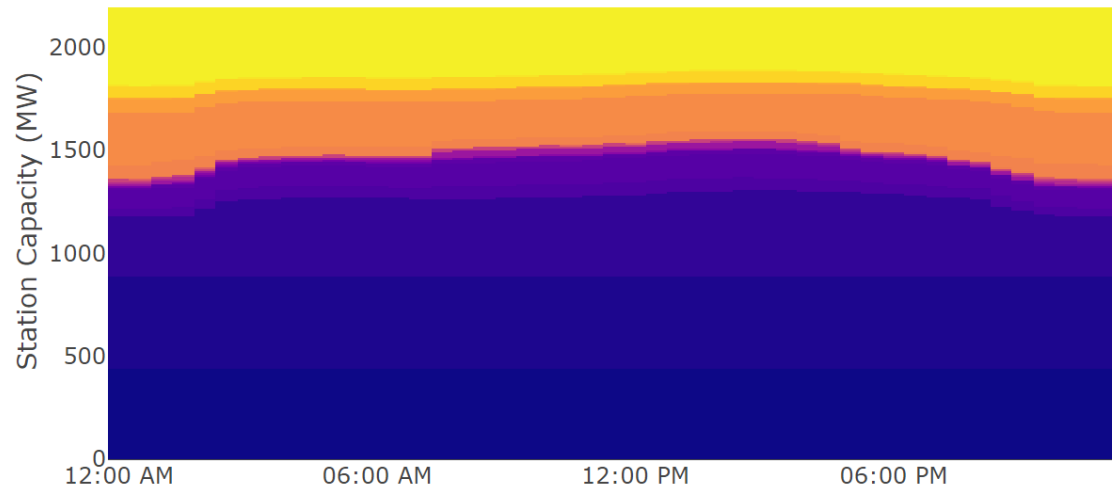
2016

2017

Bayswater

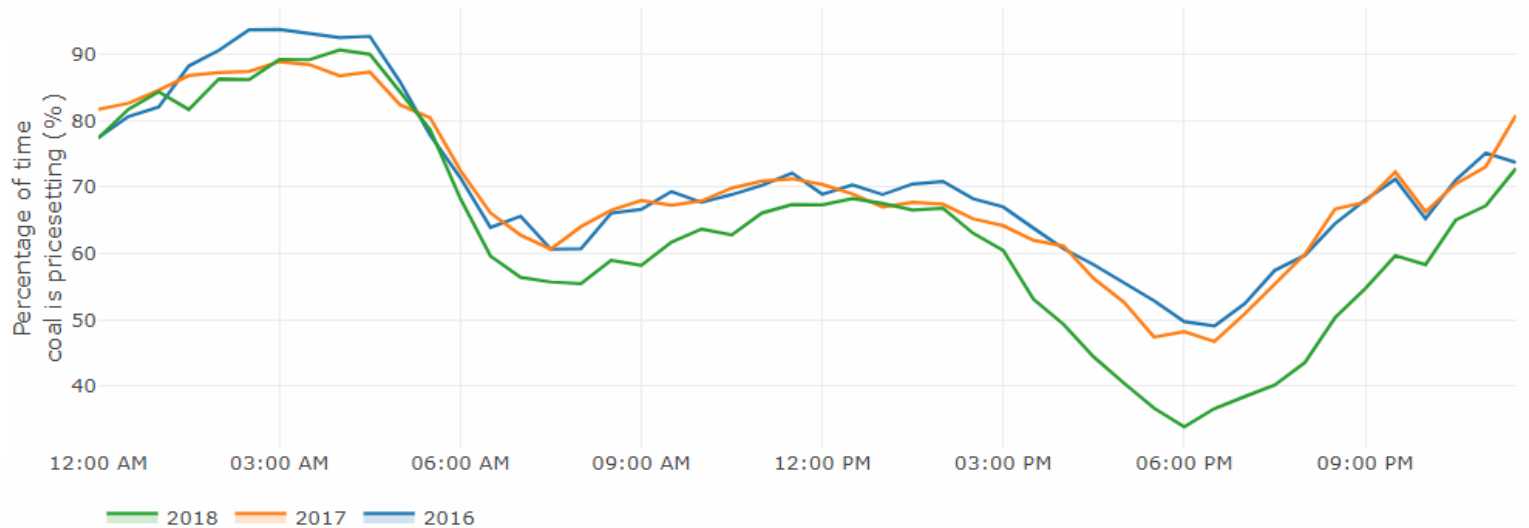
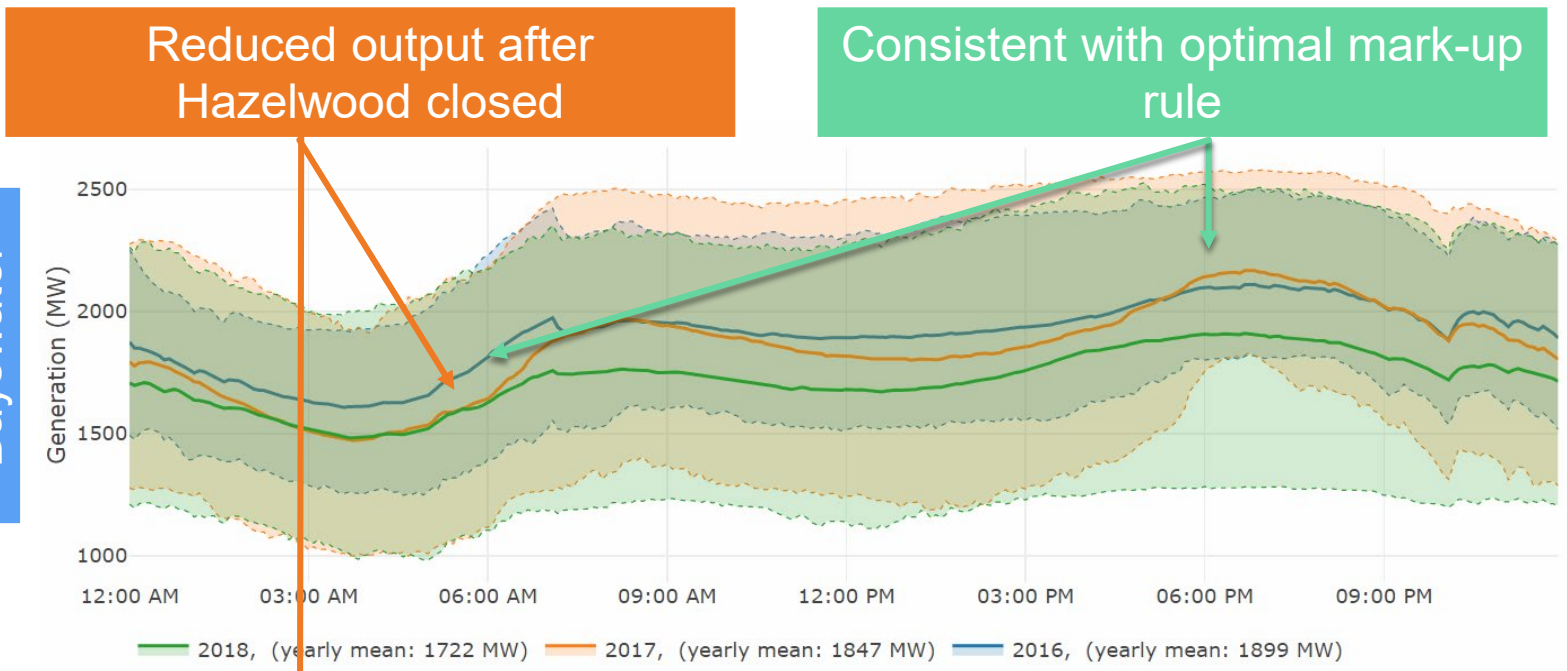


Liddell



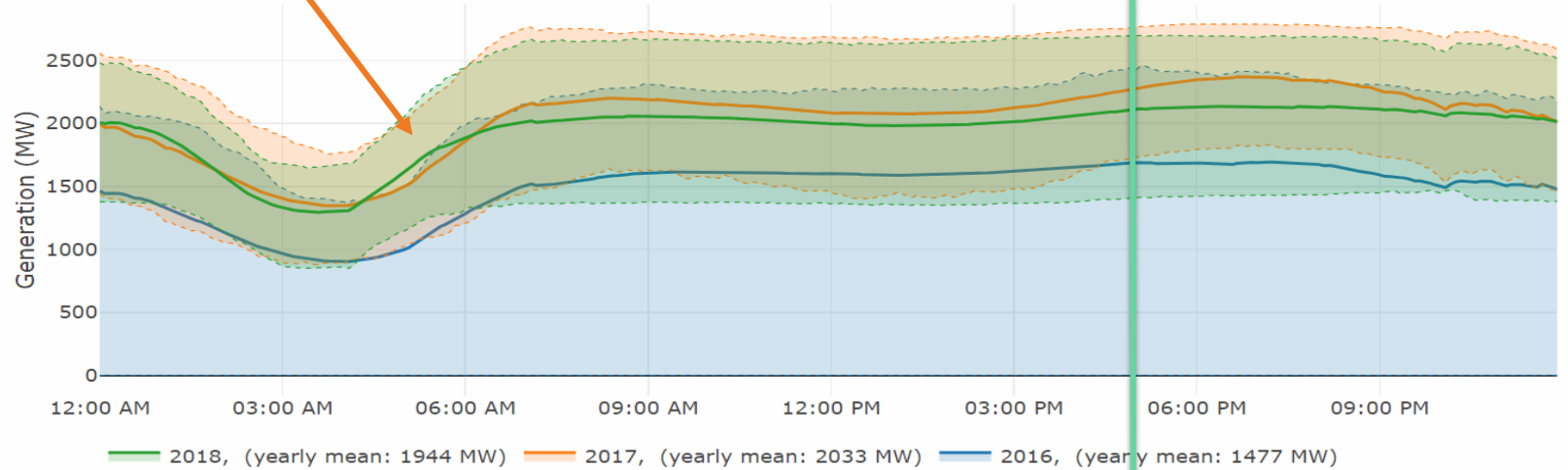
What did the average daily output of the AGL generators look like?

Bayswater

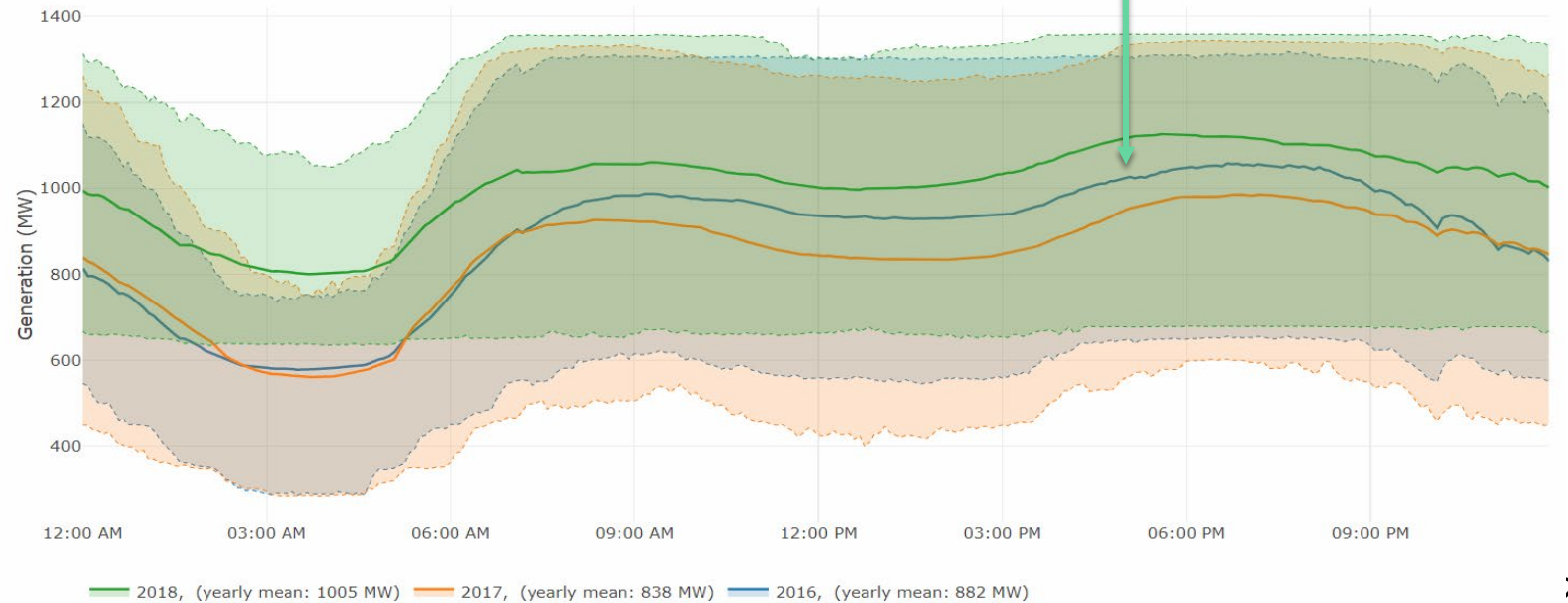


What did the daily output of the other NSW generators look like?

Eraring

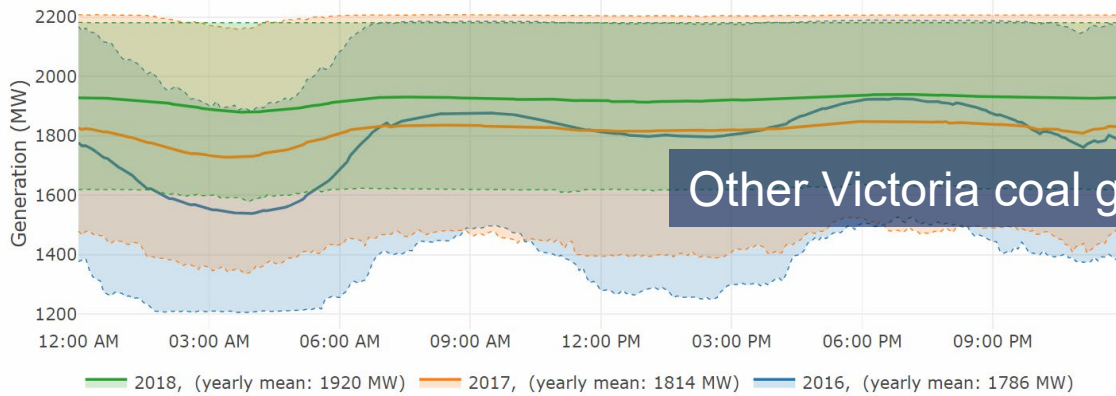


Mount Piper

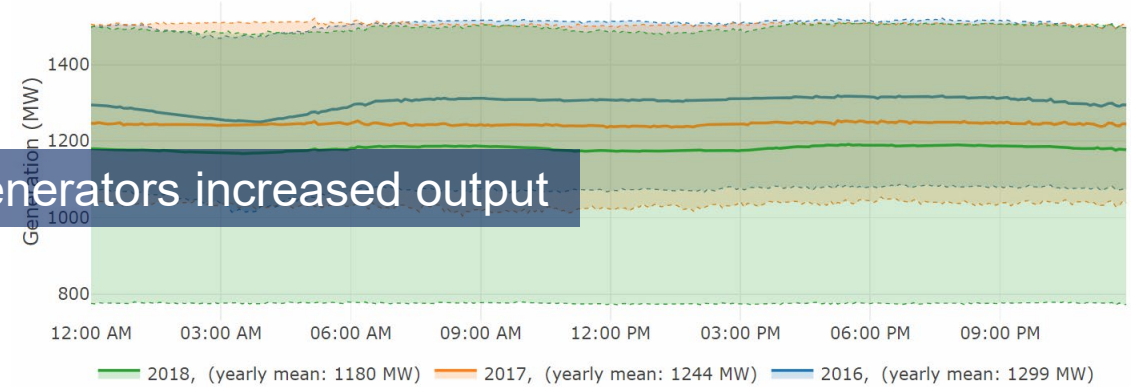


What about Victoria and Queensland?

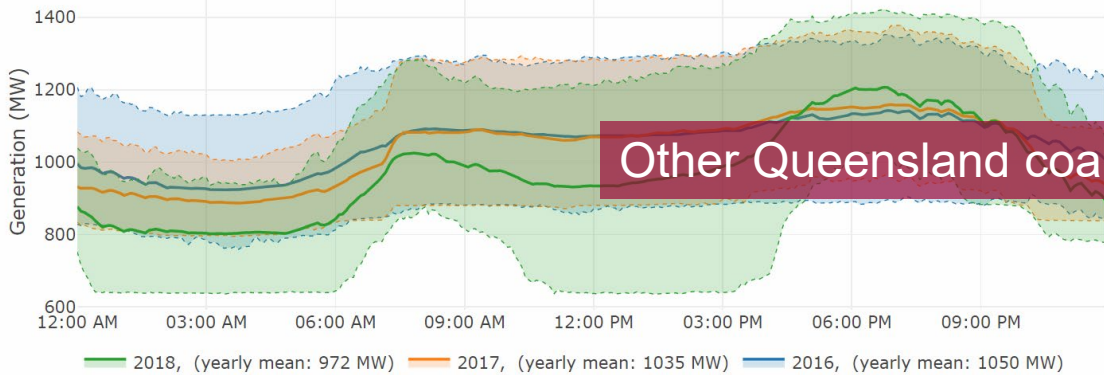
Loy Yang A - Increased



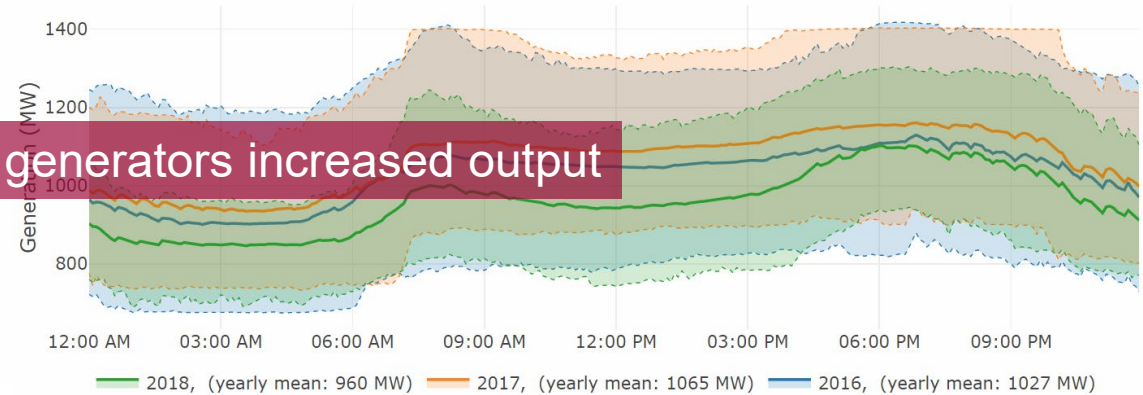
Yallourn 'W' - Reduced



Stanwell Power Station – Approx. the same



Tarong – Increased in 2017 and reduced 2018



**How did coal generator bids
affect spot prices when coal
was setting the price?**



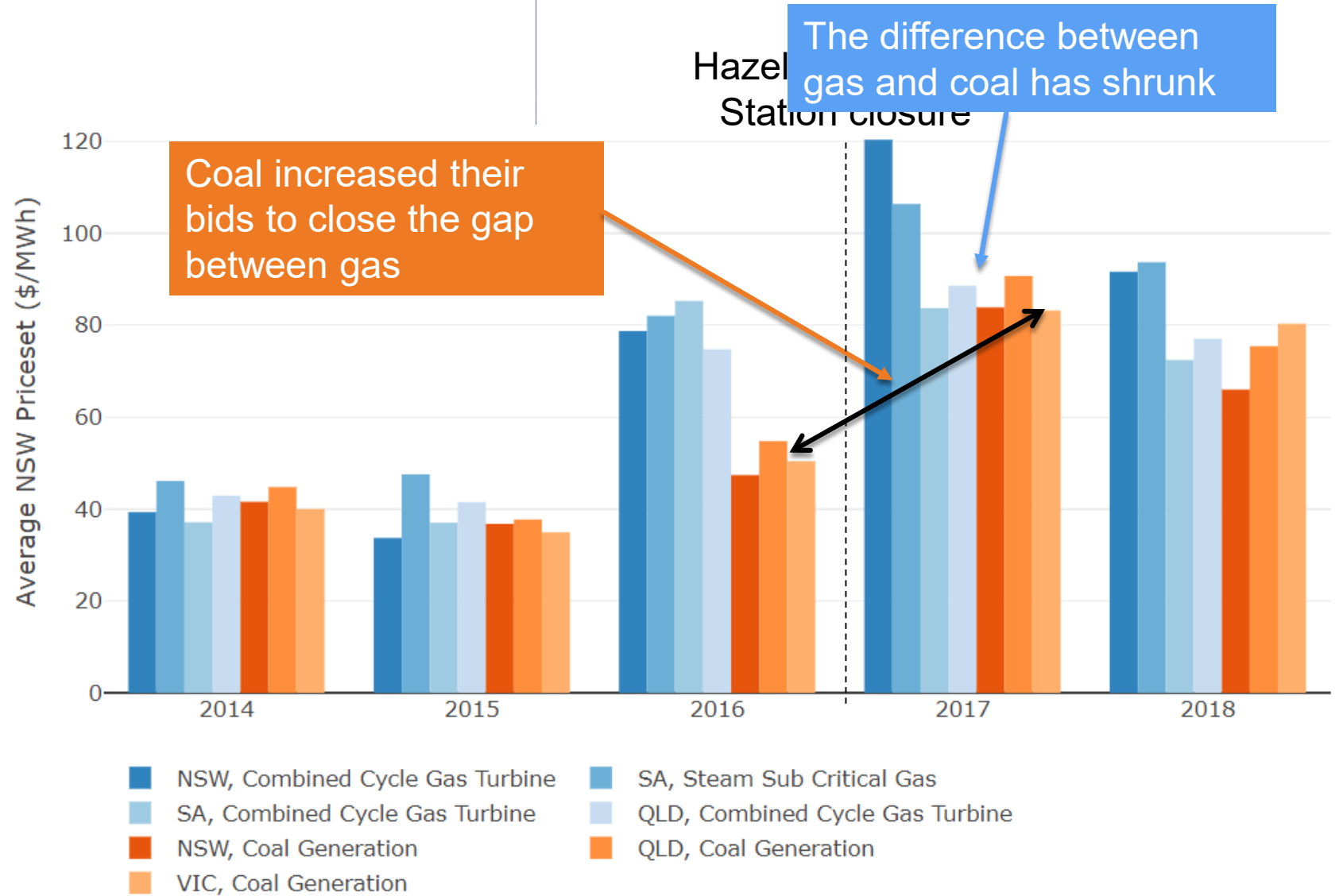
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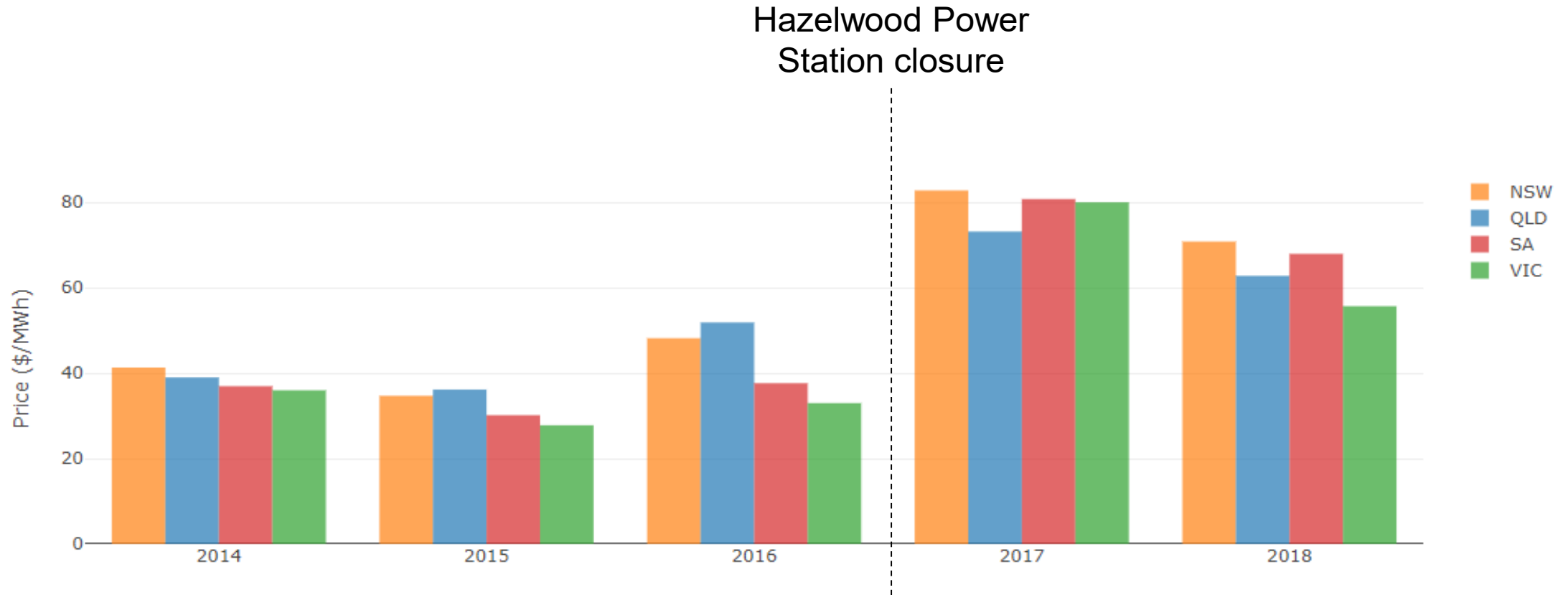
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How have NSW spot prices changed when coal and gas generators set the price ?



The weighted average spot price roughly doubled in all markets in the year that Hazelwood closed



Contrived or genuine scarcity?



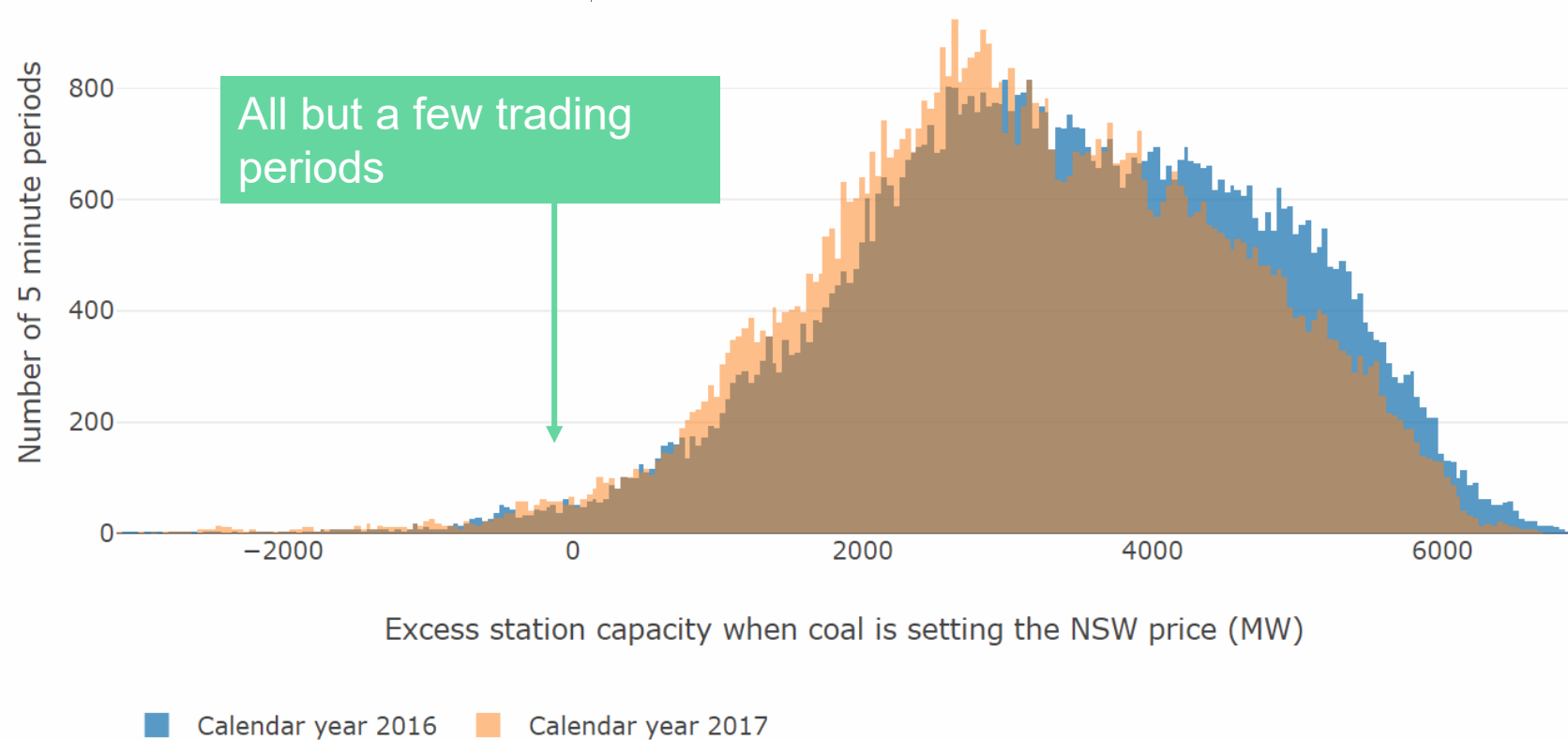
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No shortage of production capacity at most times when coal setting prices



Do higher coal prices explain higher generator prices ?

| | | Bayswater | Eraring | Liddell | Mt Piper | Vales Point |
|--|---|-----------|---------|---------|----------|-------------|
| Average price received in 2017 when setting spot prices | | \$86/MWh | \$ 77 | \$107 | \$78 | \$85 |
| Upper estimate of short term price | Newcastle coal spot price | \$48 | \$48 | \$51 | \$47 | \$49 |
| Estimate based on contract costs | Wood Mackenzie coal price forecast | \$14 | \$22 | \$15 | \$22 | \$22 |
| Estimate based on contract costs | AGL Entitlement Issue coal price estimates in 2017 | \$13 | \$25 | \$14 | \$24 | \$24 |

But what about upstream (coal supply) constraints ?

Did AGL and/or its competitors suffer coal supply constraints in the period after Hazelwood closed ?

1. **Vales Point** produced after Hazelwood closed much as it did before. Boiler limitations on sustained high production seem credible;
2. **Mt Piper** seemed to have had reasonable concerns with its Springvale mine to explain initial post-Hazel reduction (and Mt Piper has since raised production);
3. **Eraring** increased production by a little over a third in the year after Hazelwood closure relative to before;
4. By comparison AGL boasted of its superior coal supply arrangements (three suppliers, direct rail access, excellent conveyors and coal handling) relative to its competitors when it acquired the Macquarie Generation assets. Its pricing of **Bayswater and Liddell** after Hazelwood closure (and even now two years' later) if consistent with market power and/or coal supply constraints. But where are those constraints? AGL said it explained this in detail to ACCC and AER and it is commercial-in-confidence. Why ? If AGL's explanation is credible then it is at the root of a doubling of prices received by coal generators across the NEM. This surely demands a public explanation.

What did it mean for consumer prices and producer profits?



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What did it mean for prices?

Method 1: Take (2016) pre-hazelwood closure average coal generation prices (when coal was setting spot prices) and apply them to (2017) post-closure production and then compare to actual 2017 (post-closure) coal generation spot revenues. Gives \$3.47bn.

Method 2: Take AGL's change in electricity revenues in closest full financial years' before and after Hazelwood closure (\$947m) and extrapolate to full market using AGL's relative share of coal generation. Gives \$3.3bn

What did it mean for supplier profits?

AGL: In full financial years before and after closure, AGL increased electricity wholesale gross margin by \$832m and electricity EBIT by \$789m.

Energy Australia: Over same period, EA increased wholesale gross margin by \$616m and electricity EBIT by \$581m.

Origin: data to calculate electricity-specific calculation is not available but Origin says wholesale price increases were passed through to consumers.

Conclusions and policy implications

- ▶ Large impact on consumer prices and supplier profits, as discussed.
- ▶ Negative impact on supply-side efficiency (deviation from least-cost dispatch)
- ▶ Environment impact will be mixed (higher prices stimulate supply side-response in renewables but market power also inflates value of emission-intensive production and will require more demanding policy response (at greater expense) to deliver needed GHG emission reductions.
- ▶ Serious questions about design, operation and oversight of wholesale markets to be answered.
- ▶ Many possible solutions to this, and its time to start thinking seriously about them.

Thank you.

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