

3 – 9 July 2016

Introduction

The AER is required to publish the reasons for significant variations between forecast and actual price and is responsible for monitoring activity and behaviour in the National Electricity Market. The Electricity Report forms an important part of this work. The report contains information on significant price variations, movements in the contract market, together with analysis of spot market outcomes and rebidding behaviour. By monitoring activity in these markets, the AER is able to keep up to date with market conditions and identify compliance issues.

Spot market prices

Figure 1 shows the spot prices that occurred in each region during the week 3 to 9 July 2016. There was one occasion where the spot price exceeded \$5000/MWh on 7 July in South Australia. The AER will be writing a report into the events on the day that caused the price to exceed \$5000/MWh as required under the Rules.

Figure 1: Spot price by region (\$/MWh)

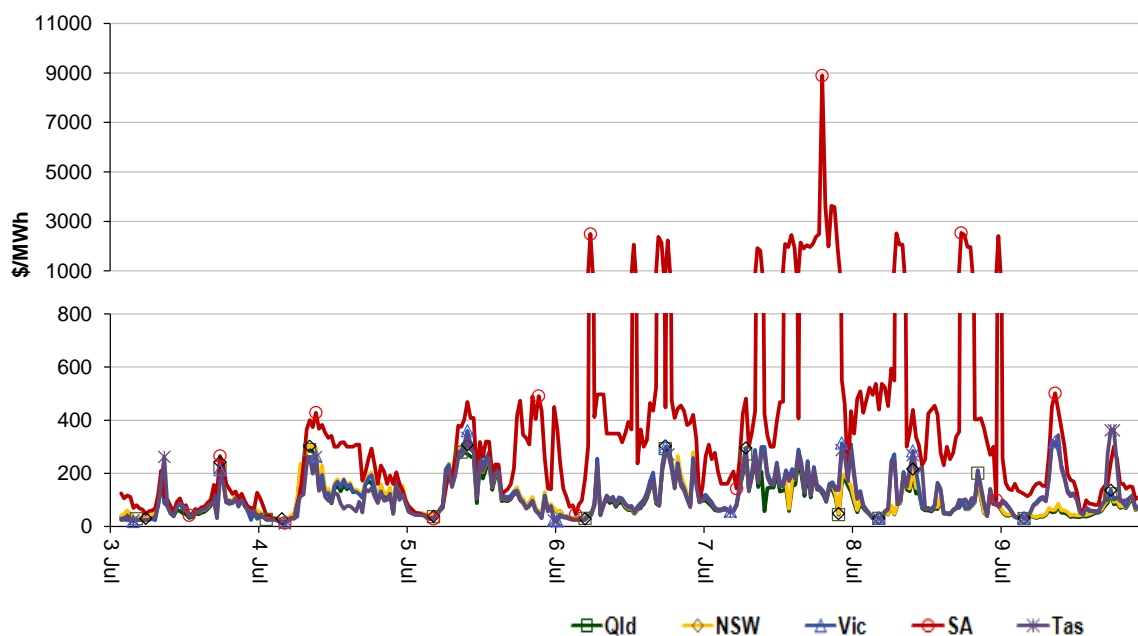


Figure 2 shows the volume weighted average (VWA) prices for the current week (with prices shown in Table 1) and the preceding 12 weeks, as well as the VWA price over the previous 3 financial years.

Figure 2: Volume weighted average spot price by region (\$/MWh)

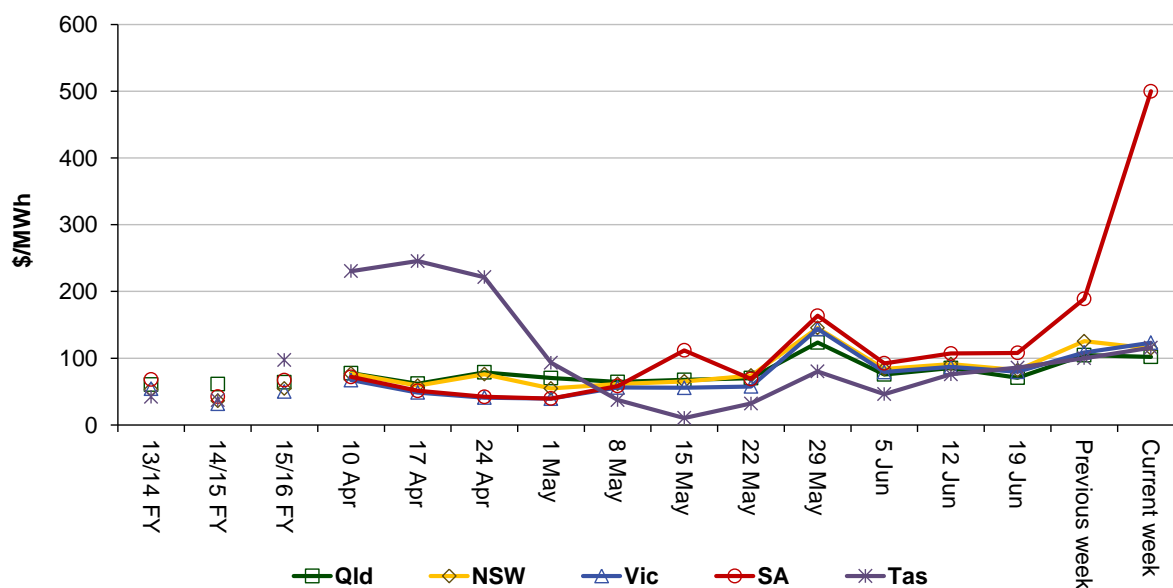


Table 1: Volume weighted average spot prices by region (\$/MWh)

Region	Qld	NSW	Vic	SA	Tas
Current week	102	115	123	500	116
15-16 financial YTD	30	37	35	59	35
16-17 financial YTD	101	117	119	430	111

Longer-term statistics tracking average spot market prices are available on the [AER website](#).

Spot market price forecast variations

The AER is required under the National Electricity Rules to determine whether there is a significant variation between the forecast spot price published by the Australian Energy Market Operator (AEMO) and the actual spot price and, if there is a variation, state why the AER considers the significant price variation occurred. It is not unusual for there to be significant variations as demand forecasts vary and participants react to changing market conditions. A key focus is whether the actual price differs significantly from the forecast price either four or 12 hours ahead. These timeframes have been chosen as indicative of the time frames within which different technology types may be able to commit (intermediate plant within four hours and slow start plant within 12 hours).

There were 317 trading intervals throughout the week where actual prices varied significantly from forecasts. This compares to the weekly average in 2015 of 133 counts and the average in 2014 of 71. Reasons for the variations for this week are summarised in Table 2. Based on AER analysis, the table summarises (as a percentage) the number of times when the actual price differs significantly from the forecast price four or 12 hours ahead and the major reason for that variation. The reasons are classified as availability (which means that there is a change in the total quantity or price offered for generation), demand forecast inaccuracy, changes to network capability or as a combination of factors (when there is not one dominant reason). An instance where both four and 12 hour ahead forecasts differ significantly from the actual price will be counted as two variations.

Table 2: Reasons for variations between forecast and actual prices

	Availability	Demand	Network	Combination
% of total above forecast	5	47	0	1
% of total below forecast	32	11	0	4

Note: Due to rounding, the total may not be 100 per cent.

Generation and bidding patterns

The AER reviews generator bidding as part of its market monitoring to better understand the drivers behind price variations. Figure 3 to Figure 7 show, the total generation dispatched and the amounts of capacity offered within certain price bands for each 30 minute trading interval in each region.

Figure 3: Queensland generation and bidding patterns

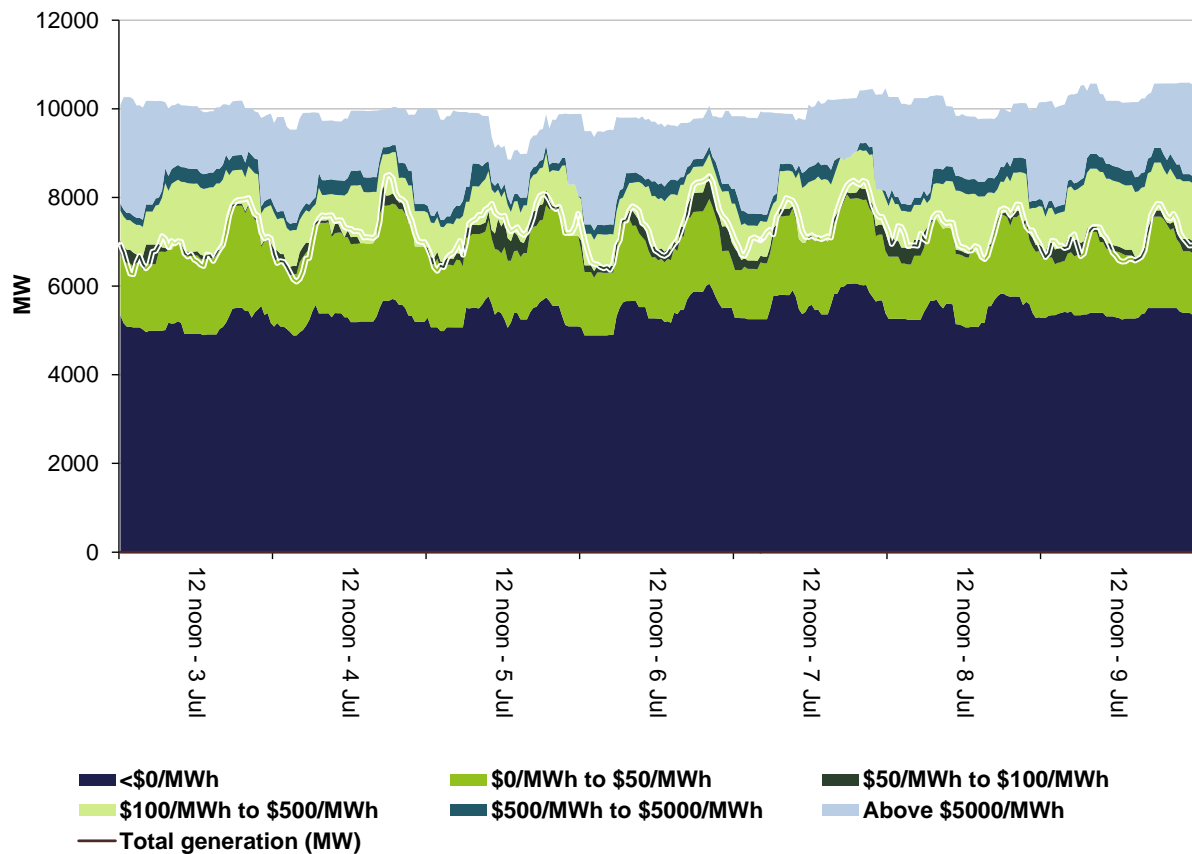


Figure 4: New South Wales generation and bidding patterns

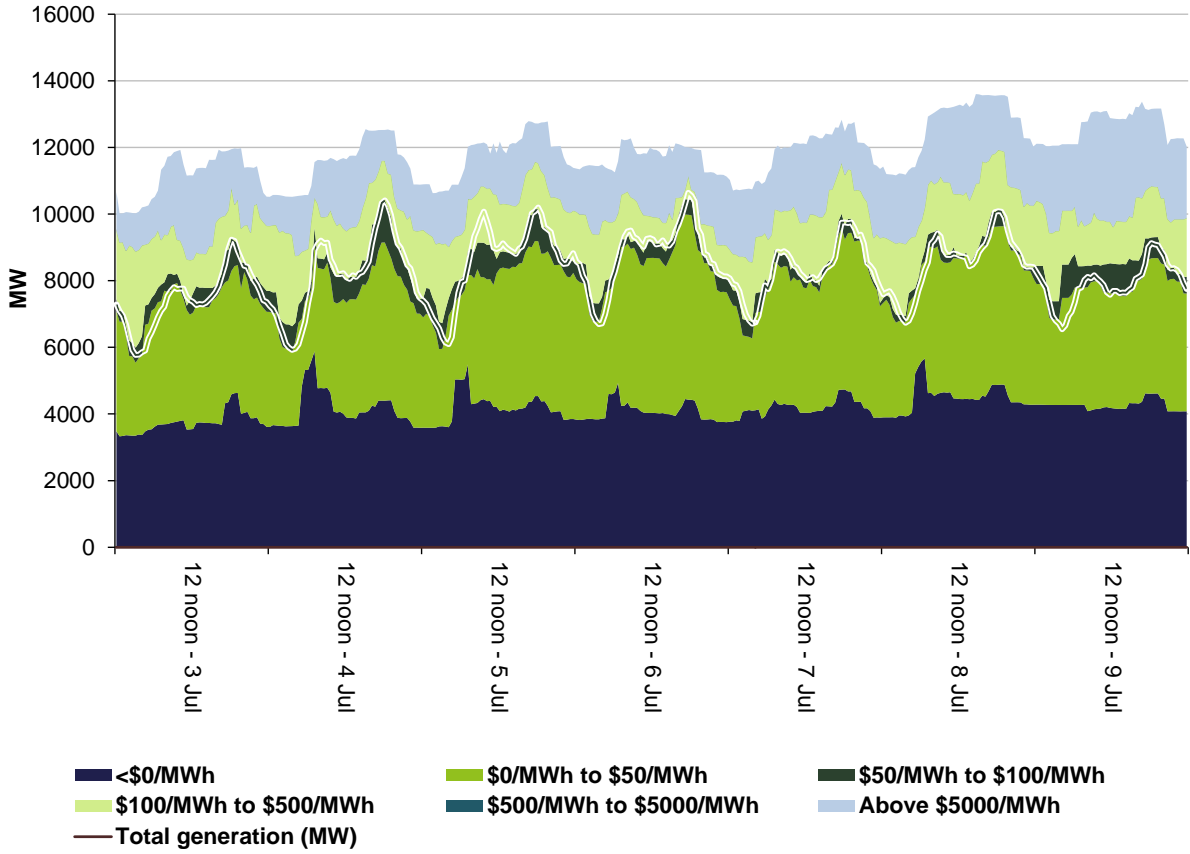


Figure 5: Victoria generation and bidding patterns

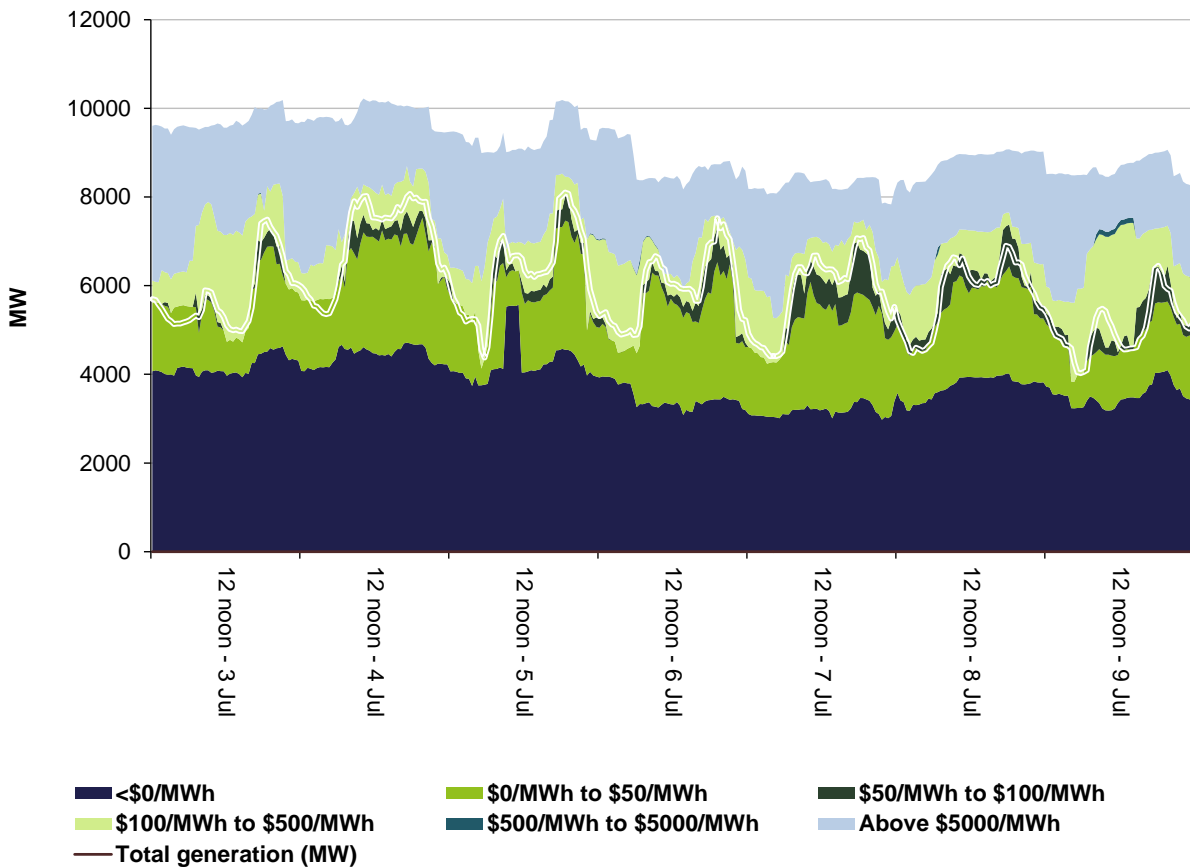
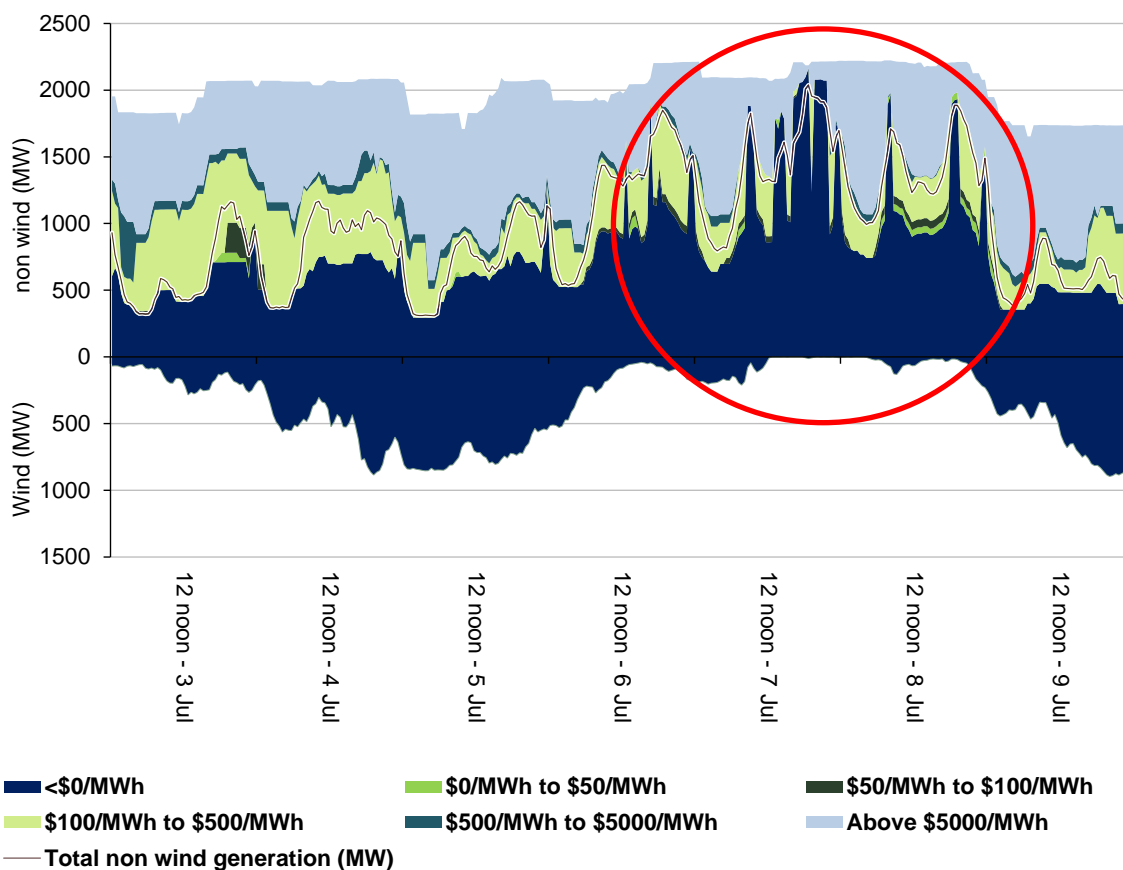


Figure 6: South Australia generation and bidding patterns

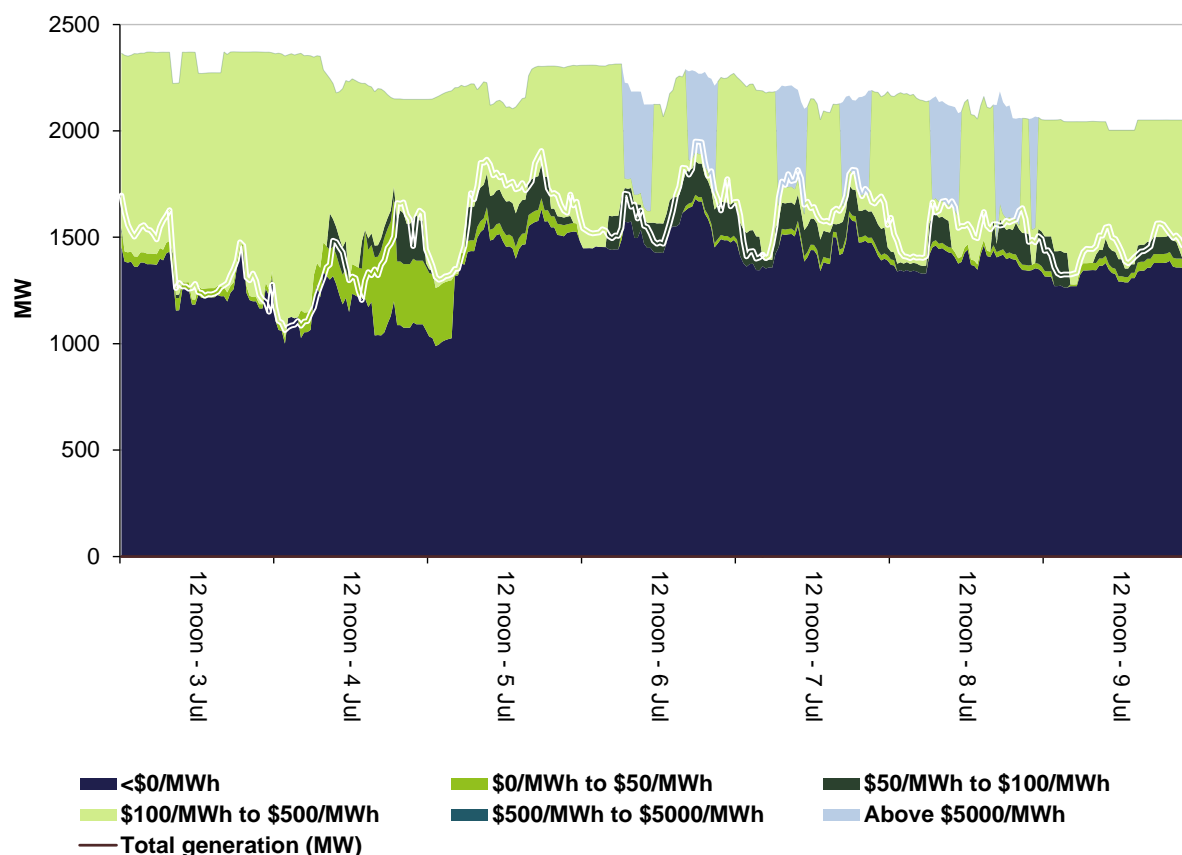


The red ellipse on Figure 6 encloses a number of factors.

- The period of low/no wind that exacerbated supply conditions in South Australia.
- The close proximity of the generation line to the top of the area chart highlights the local capacity situation and the dependence on regional interchange via interconnectors.
- The variations in the volumes offered at prices less than \$0/MWh (dark blue area graph for the non-wind generators). The significant increase in low priced capacity offered immediately following high dispatch prices on some occasions resulted in negative dispatch prices in intervals up to the end of the trading interval. This behaviour is financially rational: - when a high dispatch price occurs early in a settlement/trading interval, generators have the incentive to increase their output for the rest of the trading interval. They do this by quickly rebidding their capacity to low prices, thereby driving their dispatch levels up and prices down.

A more detailed explanation of the reasons for the high prices is provided in the *Detailed market analysis of significant price events* section.

Figure 7: Tasmania generation and bidding patterns



Frequency control ancillary services markets

Frequency control ancillary services (FCAS) are required to maintain the frequency of the power system within the frequency operating standards. Raise and lower regulation services are used to address small fluctuations in frequency, while raise and lower contingency services are used to address larger frequency deviations. There are six contingency services:

- fast services, which arrest a frequency deviation within the first 6 seconds of a contingent event (raise and lower 6 second)
- slow services, which stabilise frequency deviations within 60 seconds of the event (raise and lower 60 second)
- delayed services, which return the frequency to the normal operating band within 5 minutes (raise and lower 5 minute) at which time the five minute dispatch process will take effect.

The Electricity Rules stipulate that generators pay for raise contingency services and customers pay for lower contingency services. Regulation services are paid for on a “causer pays” basis determined every four weeks by AEMO.

The total cost of FCAS on the mainland for the week was \$1 498 500 or less than 1 per cent of energy turnover on the mainland.

The total cost of FCAS in Tasmania for the week was \$380 000 or around 1.5 per cent of energy turnover in Tasmania.

Figure 8 shows the daily breakdown of cost for each FCAS for the NEM, as well as the average cost since the beginning of the previous financial year.

Figure 8: Daily frequency control ancillary service cost

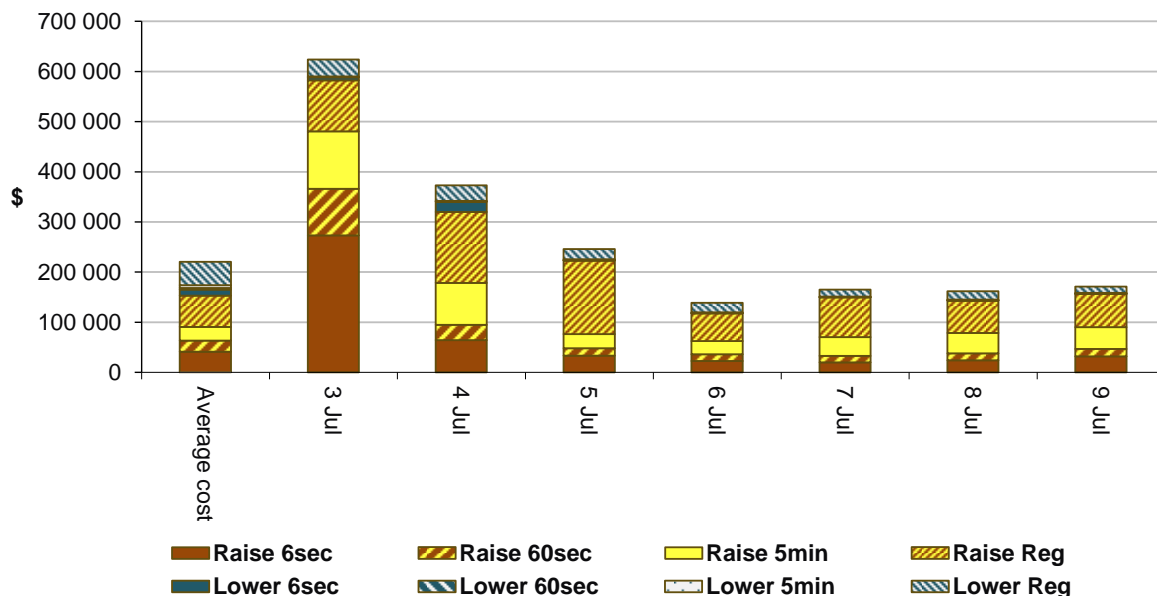


Figure 8 shows that daily FCAS costs were significantly higher than the average cost since the beginning of the previous financial year. The majority of the cost occurred on the mainland. The high FCAS costs were due to limited availability of low priced raise FCAS in the NEM. The maximum price for raise regulation services reached \$292/MW.

Detailed market analysis of significant price events

We provide more detailed analysis of events where the spot price was greater than three times the weekly average price in a region and above \$250/MWh or was below -\$100/MWh.

South Australia

There were thirty two occasions where the spot price in South Australia was greater than three times the South Australia weekly average price of \$500/MWh and above \$250/MWh.

Wednesday, 6 July

Table 3: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
6 am	2490.65	124.99	299.99	1129	1155	1190	2155	2349	2270

Conditions at the time saw demand close to forecast and available generation around 200 MW less than forecast four hours ahead. This difference was due to wind at 375 MW, 200 MW below that forecast four hours ahead.

With no rebids of consequence, little capacity priced between \$160/MWh and \$10 000/MWh the lower than forecast wind generation and a small demand increase saw the dispatch price increase from \$300/MWh at 5.55 am to \$14 000/MWh at 6 am.

Table 4: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
1 pm	2064.99	300.50	13 481.81	1531	1518	1595	2073	2293	2330
5 pm	2374.75	578.81	13 481.81	1757	1693	1755	2136	2183	2344
5.30 pm	2139.30	410.76	10 757.81	1824	1797	1834	2260	2267	2421
6.30 pm	2229.44	578.81	14 000.00	2042	2078	2091	2280	2281	2410

Conditions at the time saw demand close to forecast and availability up to 220 MW less than forecast four hours ahead. Wind generation was around 145 MW at the time of high prices.

A planned outage of the Taillem Bend West Bus and one circuit of the South East to Taillem Bend line, as part of the Heywood interconnector upgrade, and the dispatch of semi-scheduled and non-scheduled wind and thermal generation in the South East resulted in around 30 MW flowing into Victoria. Murraylink was importing at its limit of 220 MW.

Prices were forecast above \$10 000/MWh 12 hours ahead but dropped to less than \$600/MWh four hours ahead. This change was due to minor changes in wind forecasts and rebidding of capacity from high to low prices by Energy Australia, Engie and Snowy Hydro.

Actual prices, however, were higher than forecast four hours ahead, due to rebidding of capacity from low to high prices during a time of tight supply conditions. At 12.41 pm,

effective from 12.50 pm, Snowy Hydro rebid 63 MW of capacity at Port Stanvac from the price floor to the price cap. The reason given was “12:40 A SA: act price \$168.12 lower than 5mpd 12:45 @ 12:36”. This saw the price increase from \$411/MWh at 12.45 am to \$10 758/MWh at 12.50 pm.

For the 5 pm, 5.30 pm and 6.30 pm intervals there was little capacity available priced between \$300/MWh and \$10 000/MWh. With all lower priced capacity either fully dispatched or ramp rate limited the dispatch price spiked once in each interval when there was a minor increase in demand. Prices were \$13 330/MWh at 4.40 pm and \$10 758/MWh at 5.30 pm and 6.25 pm.

Thursday, 7 July – South Australia

Table 5: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
9 am	1916.92	10 586.12	13 481.81	1920	1872	1898	2175	2156	2137
9.30 am	1818.99	578.81	13 481.81	1891	1851	1880	2143	2152	2127

Conditions at the time saw demand slightly higher than forecast and availability close to forecast four hours ahead. Wind generation was up to 90 MW at the time of high prices.

Table 6: Rebids for 9 am trading interval

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
6.22 am		GDF Suez	Dry Creek	20	13 990	<300	0622A SA PRICE \$495.10 > \$299.99 30 MPD HHE 06:30 SL
6.22 am		GDF Suez	Snuggery	42	11 989	-856	0622A SA PRICE \$495.10 > \$299.99 30 MPD HHE 06:30 SL
7.08 am		EnergyAustralia	Hallett	10	13 571	<422	07:04 A BAND ADJ SA 5PD PRICES ABOVE 30PD
8.37 am	8.45 am	Snowy Hydro	Lonsdale	20	14 092	-1007	08:35 A SA: ACT PRICE \$10,118.17 HGR THN 5MPD 08:40@08:31
8.37 am	8.45 am	Snowy Hydro	Pt Stanvac	61	14 023	-1002	08:35 A SA: ACT PRICE \$10,118.17 HGR THN 5MPD 08:40@08:31
8.45 am	8.55 am	EnergyAustralia	Hallett	15	13 571	-1007	08:45 A BAND ADJ DUE TO PRICE ABOVE FORECAST SL

The 9 am price was less than that forecast four and 12 hours ahead due to the above rebidding which increased the overall level of low priced capacity.

The reduction in price in the four hour forecast compared to 12 hour forecast was a result of small reduction in forecast demand.

For the 9.30 am trading interval, there was no capacity priced between \$500/MWh and \$11 000/MWh. The actual price was higher than the four hour forecast price as a result of an increase in actual demand.

Table 7: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
1.30 pm	2089.86	10 586.13	10 586.12	1565	1594	1567	2080	2084	2077
2 pm	1963.94	10 586.13	10 586.12	1605	1594	1587	2085	2082	2076
2.30 pm	2450.46	410.53	10 586.12	1632	1561	1585	2086	2099	2092
3 pm	1940.90	300.10	10 586.12	1634	1532	1589	2086	2100	2092
4 pm	2145.90	495.10	10 586.13	1586	1579	1632	2131	2143	2140
4.30 pm	1901.42	13 329.90	10 586.12	1699	1642	1684	2208	2209	2211
5 pm	2036.19	13 329.90	13 481.81	1768	1715	1747	2209	2204	2212
5.30 pm	1960.53	13 329.90	10 586.12	1871	1835	1853	2209	2204	2214
6 pm	2086.58	13 481.81	13 999.99	2008	1987	1995	2209	2204	2215
6.30 pm	2375.11	14 000.00	14 000.00	2151	2151	2144	2208	2208	2218
7 pm	2481.97	14 000.00	14 000.00	2159	2226	2206	2199	2214	2219
7.30 pm	8897.80	14 000.00	14 000.00	2140	2233	2206	2221	2215	2225
8 pm	3604.79	14 000.00	14 000.00	2110	2204	2177	2217	2215	2230
8.30 pm	1984.87	13 329.90	14 000.00	2089	2127	2151	2214	2215	2233
9 pm	3624.04	13 329.90	13 999.99	2042	2087	2106	2218	2220	2237
9.30 pm	3580.14	13 329.90	13 999.99	1998	2057	2064	2216	2227	2238
10 pm	1914.91	13 329.90	14 000.00	1909	1974	1985	2217	2237	2243

Events of 7 July 2016 which led to the South Australian spot price reaching \$8898/MWh and the remaining prices in the above table will be discussed in the relevant spot prices above \$5000/MWh report which will be available on the AER website.

Friday, 8 July - South Australia

Table 8: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
7.30 am	2513.39	578.81	495.10	1689	1664	1670	2268	2264	2282
8 am	2061.15	578.81	495.10	1829	1794	1791	2285	2262	2276
8.30 am	2061.54	13 481.81	13 481.81	1936	1902	1887	2296	2257	2271

Demand and availability were slightly higher than forecast four hours ahead. Wind generation was up to 83 MW and close to forecast.

Murraylink was importing at its limit of 220 MW. The planned outage of the Tailem Bend West Bus and one circuit of the South East to Tailem Bend line and the dispatch of semi-scheduled and non-scheduled wind and thermal generation in the South East limited the interconnectors capability such that flows into South Australia varied -5 MW and 13 MW (-ve refers to flows into Victoria).

Capacity offers were such that there was only around 45 MW priced between \$500/MWh and \$12 500/MWh so small changes in market conditions could have a significant impact on price.

At 7.30 am there was a 40 MW increase in demand and with low-priced capacity either fully dispatched the dispatch price reached \$13 330/MWh. At 7.55 am a 65 MW increase in demand resulted in a \$10 758/MWh price.

The 8.30 am trading interval price was lower than forecast due to rebidding of capacity from high to low prices by Engie, Energy Australia, AGL and Origin.

Table 9: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
6 pm	2531.06	495.10	495.10	1871	1960	1920	2236	2221	2212

During the high price period Murraylink was importing at its 220 MW limit and the planned outage of the Tailem Bend West Bus and the South East to Tailem Bend line and generation in the South East resulted in flows up to 17 MW into Victoria. Wind generation was 39 MW at the time of high prices.

Table 10: Rebids for 6 pm trading interval

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.53 pm		Origin Energy	Quarantine	23	-993	13 239	1451A DEC IN SA DEM - 5PD 1446MW < 30PD 1535MW @ 1530 SL

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
2.54 pm		Origin Energy	Quarantine	23	-993	13 904	1451A DEC IN SA DEM - 5PD 1446MW < 30PD 1535MW @ 1530 SL
5.08 pm		Lumo	Angaston	34	-995	13 932	17:02 A SA: 30MPD PRICE \$49.81 LWR THN 30MPD 17:35@16:32

Generators bids were such that there was only around 50 MW of capacity priced between \$500/MWh and \$12 500/MWh meaning small changes in market conditions could have a significant impact on price.

The above rebidding and a 51 MW increase in demand at 6 pm saw the dispatch price reach \$13 338/MWh at 6 pm.

Table 11: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
6.30 pm	2446.95	13 481.81	14 000.00	2029	2102	2077	2224	2222	2215
7 pm	1971.06	13 481.81	14 000.00	2062	2129	2133	2224	2222	2216
7.30 pm	1960.20	13 481.81	14 000.00	2035	2103	2151	2232	2215	2217

Conditions at the time saw demand lower than forecast and availability close to that forecast. Wind generation was between 38 MW and 56 MW at the time of high prices.

Table 12: Rebids 6.30 pm to 7.30 pm trading intervals

Submitted time	Time effective	Participant	Station	Capacity rebid (MW)	Price from (\$/MWh)	Price to (\$/MWh)	Rebid reason
3.33 pm		GDF Suez	Snuggery	42	11 989	-856	1517A SA PRICE LESS THAN 30MPD: \$160.98 < \$299.99 HHE 16:00
5.58 pm	6.05 pm	GDF Suez	Dry Creek	10	13 990	-999	1757A RESPONSE TO SA MPC @ 18:00
6.12 pm	6.20 pm	Snowy Hydro	Lonsdale	21	14 092	-1007	18:10 A SA: ACT PRICE \$12,919.48 HGR THN 5MPD 18:15@18:06
6.17 pm	6.25 pm	Origin Energy	Quarantine	24	13 239	-993	1815A UNFORECAST DISPATCH VOLATILITY @ DI 1815 SL
6.22 pm	6.30 pm	GDF Suez	Dry Creek	72	>300	-999	1822A RESPONSE TO SA MPC HHE 18:30

The 6.30 pm to 7.30 pm spot prices were lower than forecast due to the above rebidding.

Table 13: Price, Demand and Availability

Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
Midnight	2403.45	184.68	97.19	1815	1838	1841	2313	2447	2479

At 11.35 pm, demand increased by 207 MW due to the hot water load. With lower priced generation fully dispatched the price increased from \$87/MWh at 11.30 pm to \$14 000/MWh at 11.35 pm.

Tasmania

There were two occasions where the spot price in Tasmania was greater than three times the Tasmania weekly average price of \$116/MWh and above \$250/MWh.

Saturday, 9 July

Table 14: Price, Demand and Availability

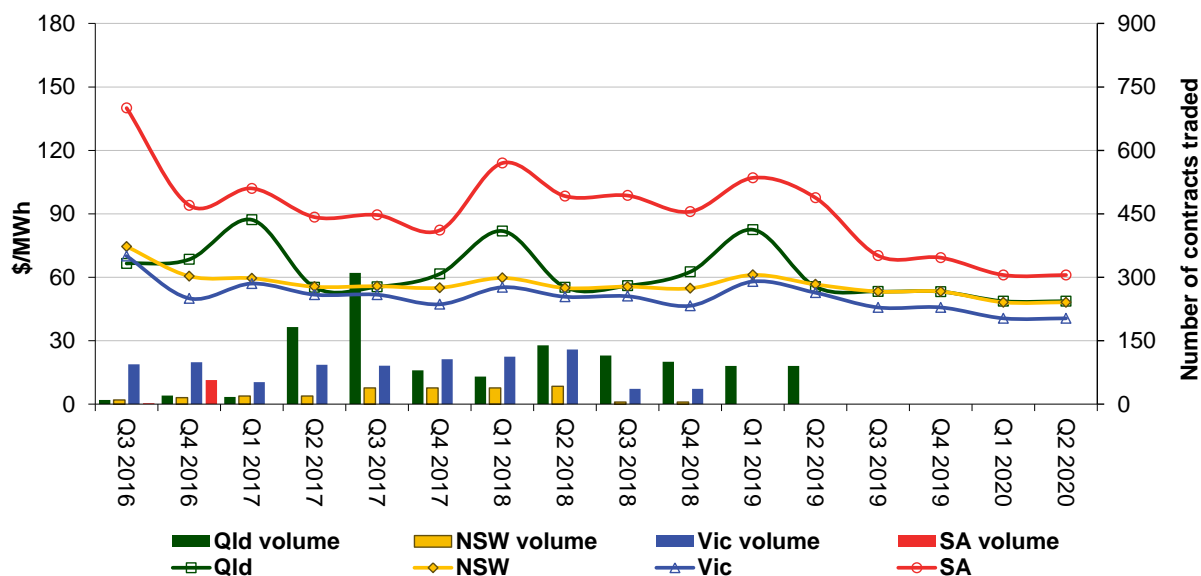
Time	Price (\$/MWh)			Demand (MW)			Availability (MW)		
	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast	Actual	4 hr forecast	12 hr forecast
6 pm	361.95	362.26	241.99	1402	1414	1425	2051	2054	2059
6.30 pm	361.95	362.26	295.98	1400	1411	1432	2051	2052	2060

Prices were close to forecast.

Financial markets

Figure 9 shows for all mainland regions the prices for base contracts (and total traded quantities for the week) for each quarter for the next four financial years. Two trades were recorded for South Australia Q3 2016 contracts.

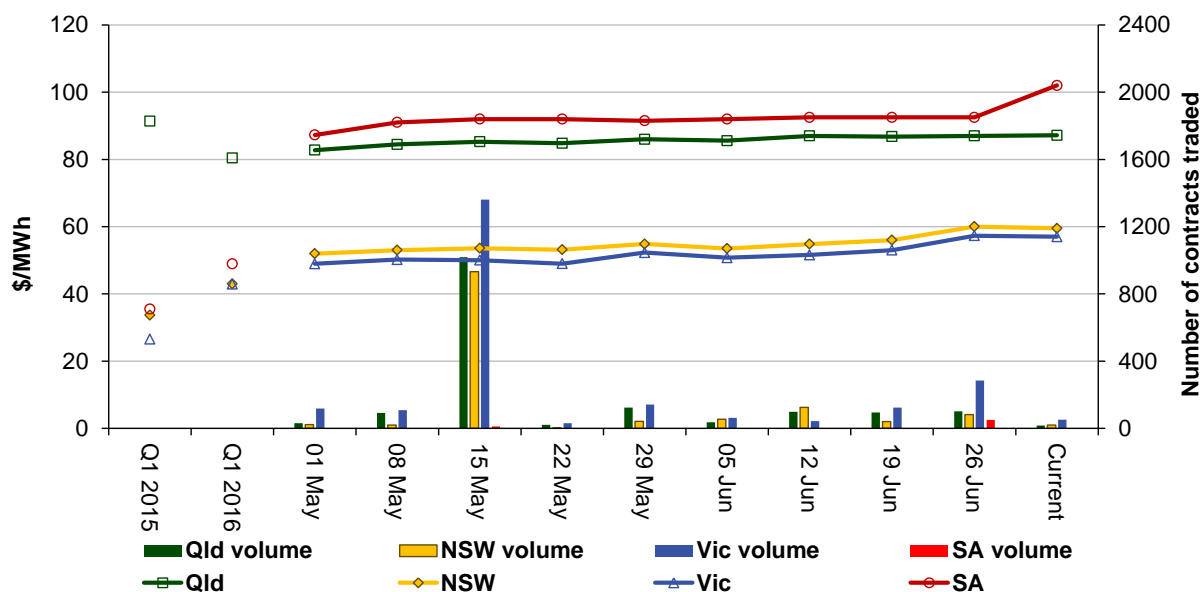
Figure 9: Quarterly base future prices Q3 2016 – Q2 2020



Source: ASXEnergy.com.au

Figure 10 shows how the price for each regional quarter 1 2017 base contract has changed over the last 10 weeks (as well as the total number of trades each week). The closing quarter 1 2015 and quarter 1 2016 prices are also shown. The AER notes that data for South Australia is less reliable due to very low numbers of trades and on this occasion no trades were recorded for South Australian Q1 2017 base and cap contracts.

Figure 10: Price of Q1 2017 base contracts over the past 10 weeks (and the past 2 years)



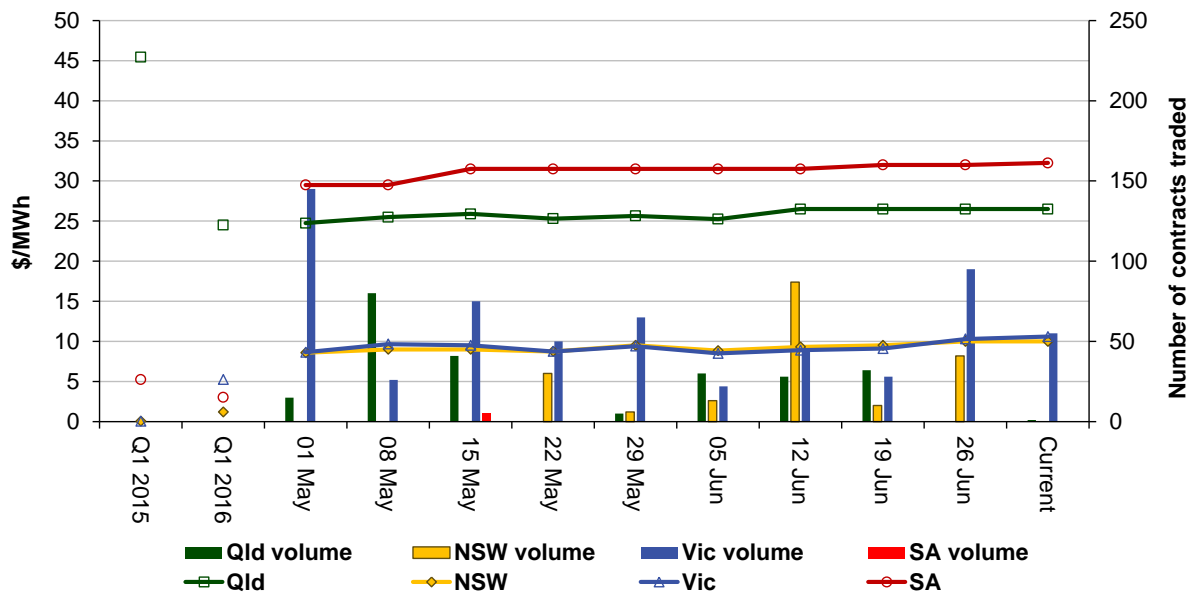
Note. Base contract prices are shown for each of the current week and the previous 9 weeks, with average prices shown for periods 1 and 2 years prior to the current year.

Source: ASXEnergy.com.au

Prices of other financial products (including longer-term price trends) are available in the [Industry Statistics](#) section of our website.

Figure 11 shows how the price for each regional Quarter 1 2017 cap contract has changed over the last 10 weeks (as well as the total number of trades each week). The closing quarter 1 2015 and quarter 1 2016 prices are also shown.

Figure 11: Price of Q1 2017 cap contracts over the past 10 weeks (and the past 2 years)



Source: ASXEnergy.com.au

Australian Energy Regulator
July 2016