Report into market ancillary service prices above $5000/MW

South Australia, 13 & 14 October 2017

12 January 2018

AUSTRALIAN ENERGY REGULATOR

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1 Obligation

The Australian Energy Regulator regulates energy markets and networks under national legislation and rules in eastern and southern Australia, as well as networks in the Northern Territory. Its functions include:

- monitoring wholesale electricity and gas markets to ensure energy businesses comply with the legislation and rules, and taking enforcement action where necessary;
- setting the amount of revenue that network businesses can recover from customers for using networks (electricity poles and wires and gas pipelines) that transport energy;
- regulating retail energy markets in Queensland, New South Wales, South Australia, Tasmania (electricity only), and the ACT;
- operating the Energy Made Easy website, which provides a retail price comparator and other information for energy consumers;
- publishing information on energy markets, including the annual State of the energy market report, to assist participants and the wider community.

The AER is required to monitor significant variations between forecast and actual prices and publish a report where:

- prices for a market ancillary service over a period significantly exceed the relevant spot price for energy; and
- prices for a market ancillary service exceed $5000/MW for a number of trading intervals within that period.

In accordance with the clause 3.13.7(e) of the National Electricity Rules, the report must:

- describe the significant factors that contributed to the ancillary service prices exceeding $5000/MW;
- identify any linkages between spot prices in the energy market and ancillary service prices contributing to the occurrence; and
- assess whether rebidding pursuant to clause 3.8.22 contributed to prices exceeding $5000/MW.

These reports examine the reasons for the high price outcomes—they are not compliance reports. We deal separately with compliance issues that come to our attention during the preparation of these reports.

2 Summary

Lower and raise regulation frequency control ancillary services (regulation services) are used to manage small fluctuations in supply or demand.

On 13 and 14 October 2017 the price for local regulation services in South Australia exceeded $5000/MW for multiple hours in the morning on both days. This was much higher than the wholesale (or spot) price for electricity in South Australia, which was below $160/MWh during the same period.

A planned network outage in Victoria affecting the Heywood interconnector ran from 7.05 am to 3.45 pm on 13 October and 6.05 am to 3.40 pm on 14 October (notified to the market over a fortnight earlier). This outage put South Australia on a single contingency which created the risk of South Australia becoming electrically isolated from the National Electricity Market (NEM). To manage this risk, and in line with its procedures, the market operator (AEMO) invoked constraints requiring 35 MW of regulation services to be sourced locally in South Australia for the duration of the outage.

On both days, while there was greater than 35 MW of regulation services available, only 33 MW of each service was priced below $5000/MW. As a result prices increased above $5000/MW when the requirement was introduced.

Prices weren't above $5000/MW for the entire time of the outage as AGL rebid more low priced capacity available on 13 October and there was a step change in their offers on 14 October.

3 Analysis

The following sections explain the reasons for the high regulation services prices. To summarise, in response to a planned network outage over two days in Victoria on the Heywood interconnector, AEMO required 35 MW of regulation services to be sourced locally in South Australia. While participants offered more than 35 MW of regulation services, on occasions only 33 MW was offered at prices lower than $5000/MW and therefore higher priced capacity was needed to meet the requirement.

The price for both services reached or exceeded $9500/MW for all dispatch intervals from 7.05 am to 1.30 pm (lower) and 7.05 am to 12.30 pm (raise) on October 13 and 6.05 am to 8 am (lower) and 6.05 am to 9 am (raise) on October 14 as forecast.

High prices on 13 October didn't last as long as forecast as AGL rebid capacity from high to low prices.

3.1 Planned network outage

Market notice 59304 (published on 27 September and replicated in Appendix E) advised the market there would be an outage on the Heywood No.1 500 kV busbar in Victoria from 6 am to 4 pm on 13 and 14 October, putting South Australia on a single contingency. Under such conditions AEMO requires South Australia to source 35 MW of regulation services locally. Box 1 explains how AEMO manages an outage on the interconnector.

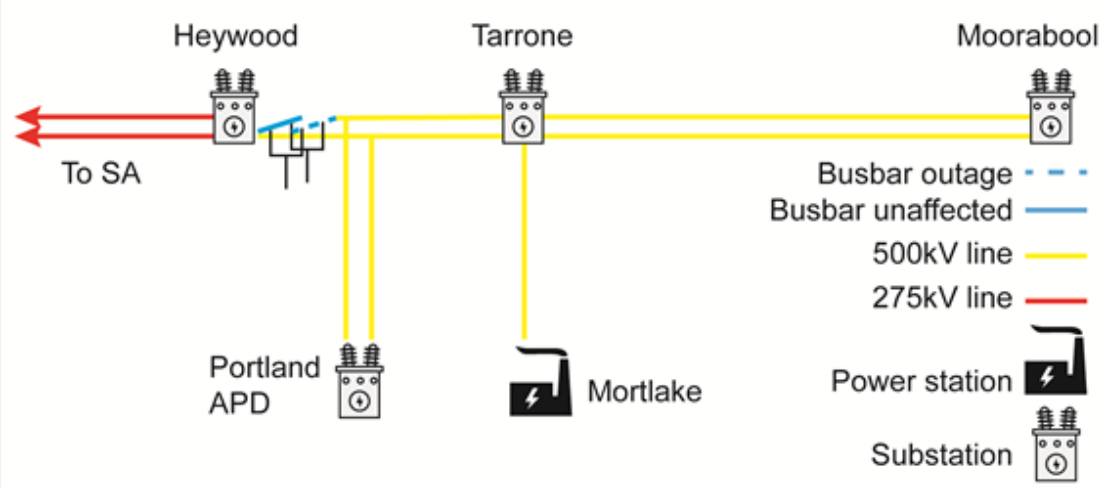
Market notice 59476 (published 12 October and replicated in Appendix E) updated the market that the outage would now run from 7 am to 5 pm on 13 October and 6 am to 4 pm on 14 October.

On the days of the outage it actually ran from 7 am to 3.45 pm (13 October) and 6 am to 3.40 pm (14 October).

All market notices relating to the outage are at Appendix E.

Box 1: Heywood Interconnector and line outage management

South Australia is electrically connected to Victoria by the Heywood and Murraylink interconnectors. Murraylink is a direct current interconnector that cannot provide FCAS. The Heywood Interconnector is an alternating current high voltage transmission link which can transfer FCAS from the rest of the NEM. The figure below is a simplified representation of the network around the interconnector.



When any one of the four lines going through the Heywood substation is on an outage, the South Australian region is on a single contingency. This means that South Australia is at risk of being electrically isolated from the rest of the NEM as only one line is connecting South Australia to Victoria. When this occurs AEMO invokes constraints requiring 35 MW of local regulation services. This ensures adequate regulation services are immediately available to manage the frequency (around 50Hz) within South Australia if the remaining line trips.

Further details on the 35 MW requirement can be found in Appendix B.

3.2 Regulation FCAS capacity, forecast prices and price outcomes

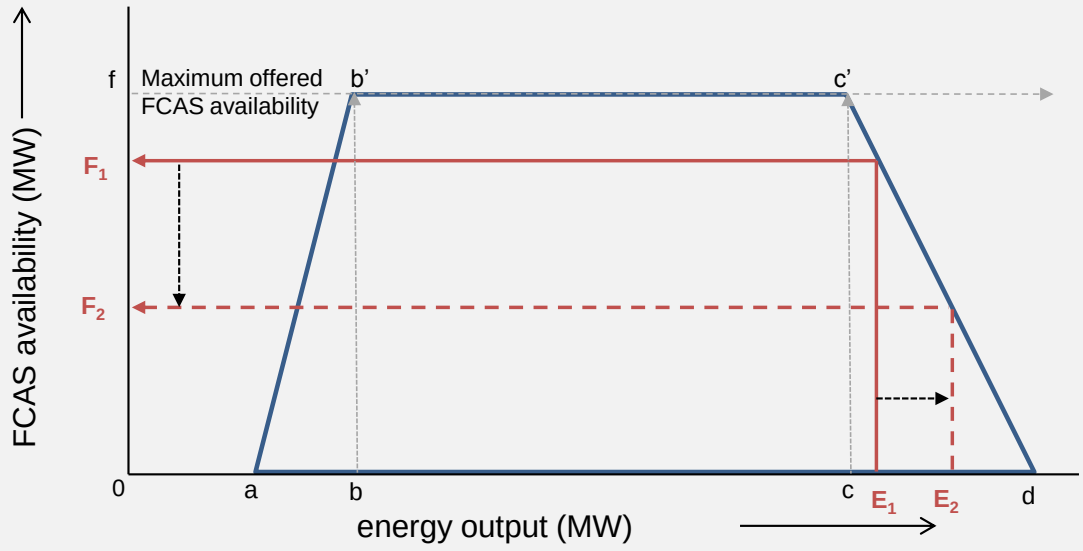
This section discusses participants' FCAS offers and price outcomes.

Box 2: Relationship between generator FCAS and energy offers

Generators must register with AEMO to provide FCAS and offer FCAS capacity in a similar manner to energy into the market.

Participants offer the maximum amount of FCAS (f in the diagram below) and energy, in mega-watts (MW), they are willing to supply across ten price bands, ranging between -$1000 and $14 200 for a trading day. Trading days starts at 4 am. Participants also offer the limits at which they can be dispatched in FCAS (a, b, c, d in the diagram below). The relationship between the provision of FCAS and energy determines the effective availability of FCAS. For example in the diagram below, if a generator's energy output is at E_1 then its effective FCAS availability is F_1. If its output in energy increases to E_2 then its effective FCAS availability drops to F_2.

For every dispatch interval the National Electricity Market Dispatch Engine (NEMDE) co-optimises market participants' FCAS and energy offers to arrive at the least cost outcome while maintaining system security.



3.2.1 FCAS capacity

Of the 26 power stations (including wind farms) in South Australia only four are registered to provide FCAS. Table 1 shows the power stations that were registered to provide raise and lower regulation FCAS in South Australia on the day and their maximum registered capacity. Table 1 shows each power station, if fully operational, was individually capable of providing the local requirement.

Table 1: Registered maximum regulation FCAS capacity by station

Power Station	Registered Capacity (MW)	
	Lower regulation	Raise regulation
Osborne (Origin Energy)	36	36
Quarantine (Origin Energy)	50	50
Pelican Point (Engie)	100	100
Torrens Island (AGL)	200	260
Total	**386**	**446**

On 13 October, Quarantine power station, half of Pelican Point and five units at Torrens Island power station were unavailable.

On 14 October, Osborne power station, half of Pelican Point and six units at Torrens Island power station were unavailable.

So, although the registered capacity is as shown in Table 1, participants only offered around 120 MW of lower regulation and around 150 MW of raise regulation services on 13 October and around 130 MW of lower regulation and around 160 MW of raise regulation services on 14 October. This is still well above the 35 MW requirement imposed by AEMO.

3.2.2 Forecast prices

As only 33 MW of low-priced (below $5000/MW) raise and lower regulation services capacity was initially offered for the duration of the outage on both days, prices for regulation services were initially expected to be:

- above $10 900/MW from 6 am to 4 pm on 13 October
- $9500/MW from 6 am to 9 am (raise) and 6 am to 7.30 am (lower) on 14 October
    - The forecast high prices for lower regulation services extended by half an hour, to 8 am, after a rebid by AGL made the day before

3.2.3 Price outcomes

Figure 1 and Figure 2 show actual price (purple line)[1] and effective available capacity over the high price period. The (constant) 35 MW requirement is shown as a red line. The blue shaded areas indicate effective available capacity priced below $5000/MW and effective available capacity priced above $5000/MW is indicated by the light orange shaded areas. The figures show that, as there was not enough low priced capacity (blue shaded area) to meet the requirement (red line), high priced capacity (light orange shaded area) was required. This resulted in prices exceeding $9 500/MW for all dispatch intervals from 7.05 am to 1.30 pm (lower) and 7.05 am to 12.30 pm (raise) on October 13 and 6.05 am to 8 am (lower) and 6.05 am to 9 am (raise) on October 14.

[1] Individual prices are contained in the Price Setter at Appendix F

Figure 1 and Figure 2 show on both days, prices decrease before the 35 MW requirement (red line) is removed.

For 13 October the fall in prices occurred earlier than initially forecast as a result of two rebids submitted the day prior, by AGL at its Torrens Island power station. The net effect increased low priced capacity (shaded blue area) and reduced high prices by two and a half hours in lower regulation services and three and a half hours in raise regulation services, compared to the initial forecast.

For 14 October the fall in prices eventuated as AGL made more than 35 MW of capacity priced less than $5000/MW available at Torrens Island from 8 am in lower regulation services and 9 am in raise regulation services. This was slightly later than initially forecast in lower regulation services due to a rebid which removed low priced capacity for the 8 am trading interval by AGL at Torrens Island.

The full details of the rebids can be seen in Appendix C below.

Figure 1: Lower regulation effective offers, requirement and price

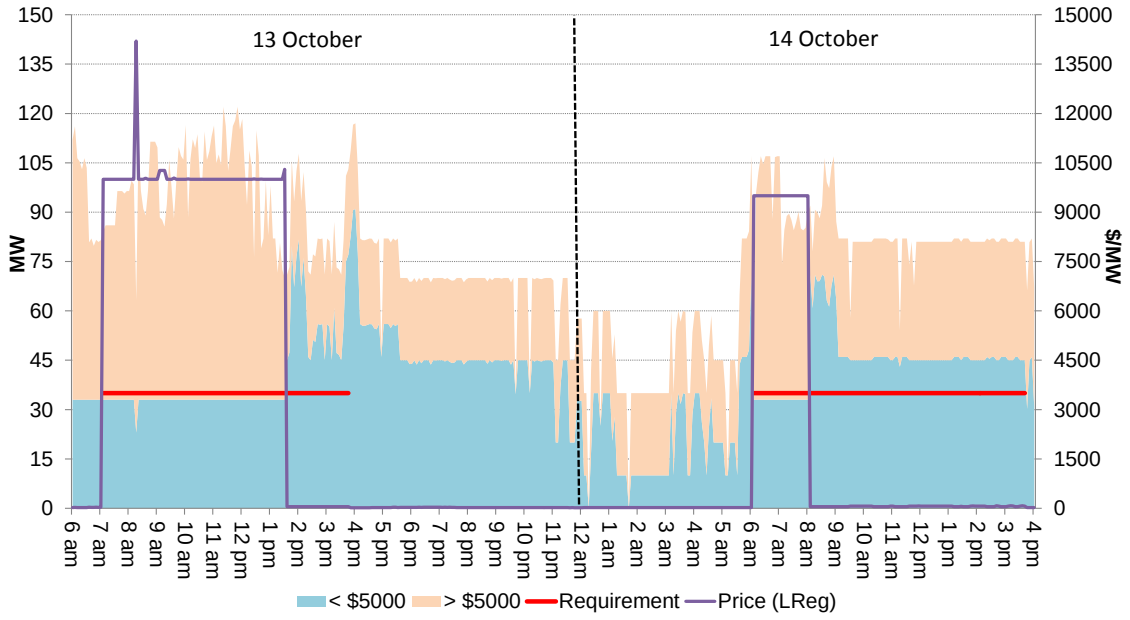
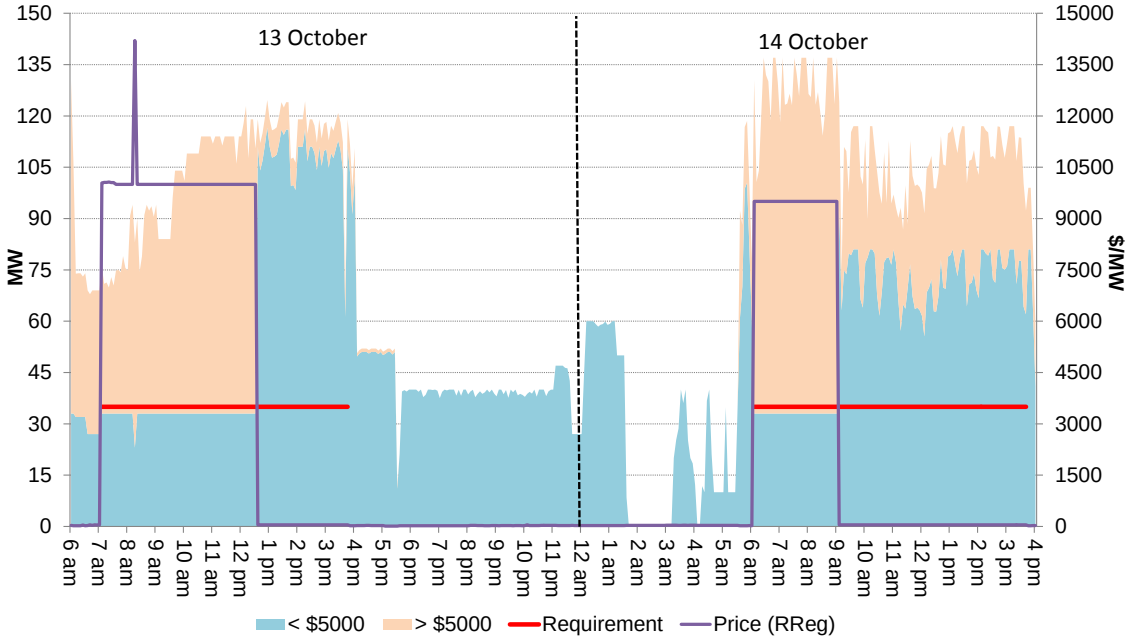


Figure 2: Raise regulation effective offers, requirement and price



3.2.3.1 13 October – 8.15 am price spike

Figure 1 and Figure 2 show prices for raise and lower regulation services spike to $14 200/MW at 8.15 am on 13 October, when Pelican Point's output increased past the limit in which they can provide FCAS (point d in Box 2). This effectively removed all of Pelican Point's regulation services, 10 MW of which was priced below $5000/MW (dip in the blue shaded area), resulting in the need for higher priced capacity to meet the 35 MW requirement.

Australian Energy Regulator

January 2018

Appendix A: Explanation of FCAS

Frequency control ancillary services (FCAS) are required to maintain the frequency of the power system within the frequency operating standards. The two general categories of FCAS are:

- Regulation services, which continuously adjust to small changes in demand or supply (changes that cause the frequency to move by only a small amount away from 50 Hz). There are regulation services to increase the frequency (raise regulation or RREG) and services to decrease the frequency (lower regulation or LREG).
- Contingency services, which manage large changes in demand or supply that occur relatively rarely and move the frequency by a large amount. There are three contingency services to increase the frequency and three contingency services to decrease the frequency. Raise contingency FCAS are required to be available to correct frequency excursions that have arisen from a credible contingency event that leads to a decrease in frequency. As these contingency events usually involve step reductions in supply side, the Electricity Rules stipulate that generators pay for these services. Lower contingency FCAS are the services required to be available to correct the frequency excursions that arise from a credible contingency event that leads to an increase in frequency. As these contingency events usually involve step reductions in customer demand, the Electricity Rules stipulate that customers pay for these services.

Participants providing regulation services receive adjusted dispatch targets every 5 minutes via their automatic generation control (AGC) signals from AEMO. Participants are paid through the FCAS markets in accordance with their offered volumes. Their energy production, which may be higher or lower depending on the AGC signals they receive, are settled in accordance with energy market prices.

There are three lower and three raise contingency services:

- fast services, which arrest a frequency deviation within the first six seconds of a contingent event (L6 and R6);
- slow services, which stabilise frequency deviations within sixty seconds of the event (L60/R60); and
- delayed services, which stabilise frequency deviations within five minutes of the event (L5/R5).

Participants offering to provide contingency services are enabled in accordance with the “trapezium” supplied in their offers. While participants will not necessarily be supplying these services until a contingency occurs they are paid in accordance with their enablement.

Frequency Control Ancillary Service Settlement

AEMO settles the FCAS markets on a weekly basis, as follows[2].

- Regulation FCAS: Cost recovery on a "causer pays" basis using the Causer Pays Procedure[3] developed by AEMO in accordance with the appropriate NER procedures.
- Contingency FCAS: Generators pay for Raise Services and customers pay for Lower Services.

The 'Causer Pays' Procedure allocates regulation FCAS costs to those market generators, customers and small generation aggregators with facilities that have the metering capable of determining their contribution to frequency deviations at any time.

Every four weeks based on historical data AEMO calculates a causer pays contribution factor for each generator. Broadly, the contribution factor is determined from historical 4 second generator output and frequency information and is a measure of how each generator contributed to managing changes in the system frequency. If a generators' output changes such that it supports maintaining the system frequency its contribution factor is positive. Conversely, if a generators' output changes such that it exacerbates a frequency deviation, its contribution factor will be negative. The causer pays contribution factors for a portfolio of generators effectively represent the aggregation of the individual performance of the generators in that portfolio.

Settlement is determined by allocating the FCAS costs incurred in the current period in accordance with the causer pays contribution factor for that portfolio from the preceding period. Thus cost allocation to a participant is not dependent on the amount of energy purchased or consumed in that period but by the performance of that participant in managing system frequency in the previous period.

Consequently a portfolio of generators with a negative factor in a particular period will still pay a share of FCAS costs irrespective of how much it generates in the current period.

Since not all of the costs will be recovered from generators, the residual costs are recovered from market customers (including retailers) in the relevant region, based on the amount of energy each market customer is purchasing.

2 For a full description go to https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data/Ancillary-Services/Ancillary-Services-Payments-and-Recovery

3 For a full description go to https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Ancillary-services/Ancillary-services-causer-pays-contribution-factors

Appendix B: Local Frequency Control Ancillary Services

AEMO sets the requirement for FCAS to ensure that the frequency standard (as set by the Reliability Panel) is maintained in the event of step changes in supply or demand that results from credible contingencies. Where a credible contingency results in the loss of an interconnector it is termed a “separation event”.

The standard states that in the event of a “separation event” the frequency must be contained within 49 to 51 Hz or a wider band notified to AEMO by a relevant JSSC. In the case of South Australia the JSSC notified AEMO that the frequency band for separation of the South Australian power system is 47 to 52 Hz and that under frequency relays will operate at frequency levels in the low end of this range.

When there is a potential separation event caused by the loss of an interconnector “local frequency control ancillary services” are usually required.

If the region was exporting at the time the interconnector fails, then as a consequence of the immediate over supply situation local contingency “lower” services are required in the islanded region to lower the frequency (typically generators offer to quickly reduce output to lower frequency). In other words, the loss of the Heywood interconnector when power is flowing from South Australia, results in an oversupply of generation, increasing the frequency in South Australia. Contingency lower services are sourced from registered suppliers in South Australia (typically generators) in proportion to the flow across the interconnector from South Australia to Victoria to quickly reduce that over frequency.

A similar situation exists for contingency “raise” services for all other regions except South Australia where, in accordance with the advice from the JSSC, the raise requirement is covered by under frequency load shedding. In other words, the loss of the Heywood interconnector when power is flowing into South Australia, results in an undersupply of generation decreasing the frequency in South Australia. Under frequency load shedding reduces demand in blocks to arrest the falling frequency until supply matches demand and the frequency is restored.

In either event, in the past, in the period immediately following the separation event AEMO would invoke local regulation services and establish a local regulation reference source to manage frequency until the region can be reconnected to the rest of the NEM. It is this aspect that has been recently changed by AEMO. AEMO will now impose a requirement for local lower and raise regulation services in South Australia prior to the failure of the interconnector so that frequency after an island is formed, and after the contingency services have operated, can be smoothly maintained.

Appendix C: Significant rebids

The rebidding tables highlight the relevant rebids submitted by generators that impacted on market outcomes during the time of high prices. It details the time the rebid was submitted and used by the dispatch process, the capacity involved, the change in the price of the capacity was being offered and the rebid reason.

Table C 1: Significant rebids for 13 October – lower regulation

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MW)	Price to ($/MW)	Rebid reason
1.50 pm (12 Oct)		AGL	Torrens Island	63	>9999	<76	1231~F~90 pd price f/cast higher than agl est~d+1 response
4.42 pm (12 Oct)		AGL	Torrens Island	63	<76	>9999	1603~A~020 AEMO market notice~20 update planned outageof heywood no. 1 500kv busbar in Vic region

* The 1.50 pm rebid is effective from the 1 pm trading interval onwards

** The 4.42 pm rebid is only effective for the 1 pm and 1.30 pm trading intervals

Table C 2: Significant rebids for 13 October – raise regulation

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MW)	Price to ($/MW)	Rebid reason
1.50 pm (12 Oct)		AGL	Torrens Island	93	>9999	<76	1231~F~90 pd price f/cast higher than agl est~d+1 response
4.42 pm (12 Oct)		AGL	Torrens Island	93	<76	>9999	1603~A~020 AEMO market notice~20 update planned outageof heywood no. 1 500kv busbar in Vic region

* The 1.50 pm rebid is effective from the 12 pm trading interval onwards

** The 4.42 pm rebid is only effective for the 12 pm and 12.30 pm trading intervals

Table C 3: Significant rebids for 14 October – lower regulation

Submit time	Time effective	Participant	Station	Capacity rebid (MW)	Price from ($/MW)	Price to ($/MW)	Rebid reason
1.53 pm (13 Oct)		AGL	Torrens Island	38	48	>9499	1231~F~90 pd price f/cast higher than agl est~d+1

* The 1.53 pm rebid is effective for the 8 am trading interval

Appendix D: Closing bids

Figures D1a to D12b highlight for each dispatch interval the lower and raise regulation services closing bids for Origin, AGL and Engie (the participants in South Australia with ancillary service capability). It also shows the dispatch level of the respective services at each station and the dispatch price.

FCAS services are co-optimised with energy offers. For example a generator that is operating at its maximum capacity cannot provide raise services so their effective available capacity for raise services would be zero. Figures denoted with an "a" refer to the quantities offered while those with a "b" refer to the *effective* quantities available to the market after accounting for the interaction between energy and FCAS ("effective available capacity").

13 October Lower Regulation

Figure D1a: Torrens Island (AGL) lower regulation service closing bid prices, dispatch and dispatch price - maximum offers

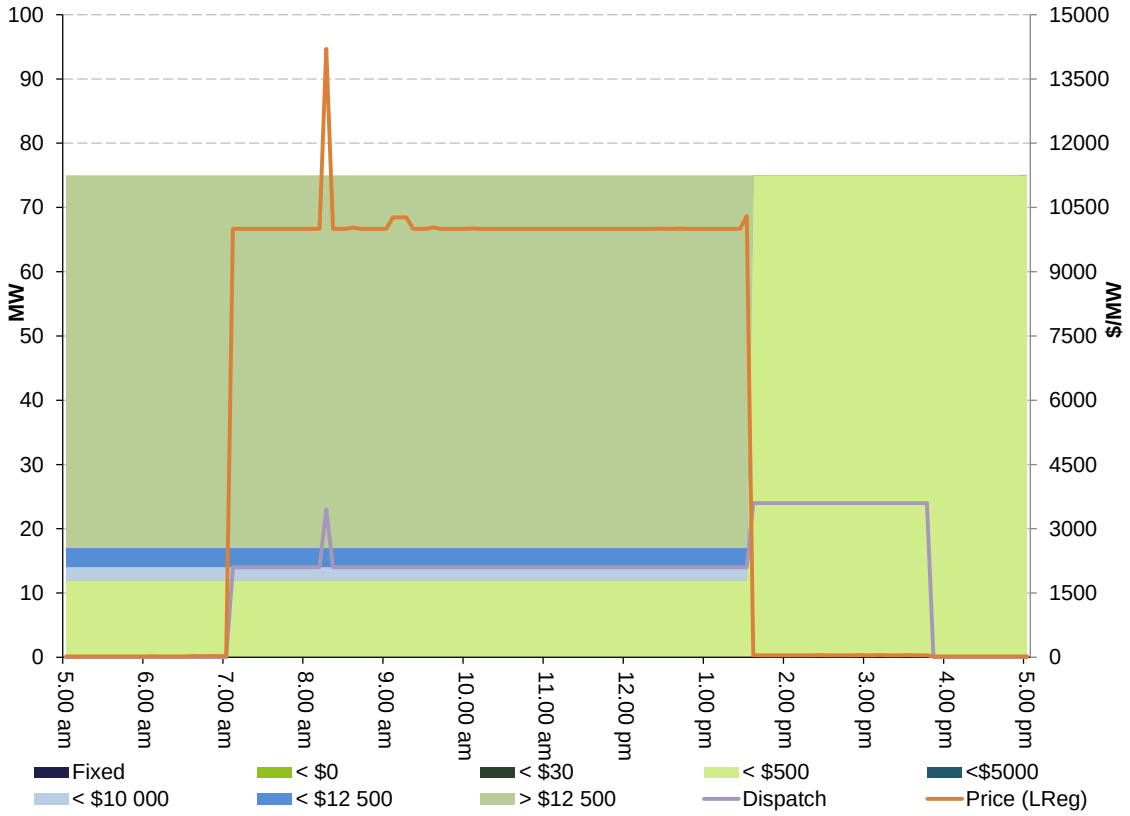


Figure D1b: Torrens Island (AGL) lower regulation service closing bid prices, dispatch and dispatch price – effective offers

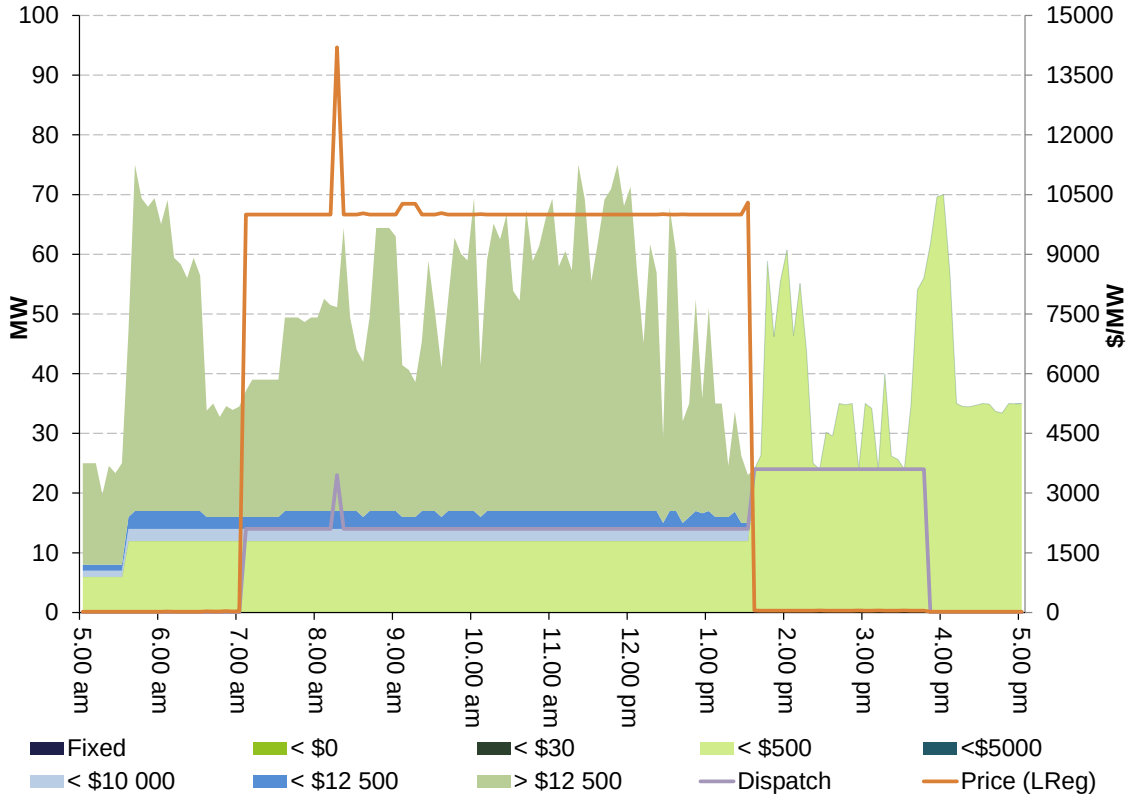


Figure D2a: Pelican Point (Engie) lower regulation service closing bid prices, dispatch and dispatch price – maximum offers

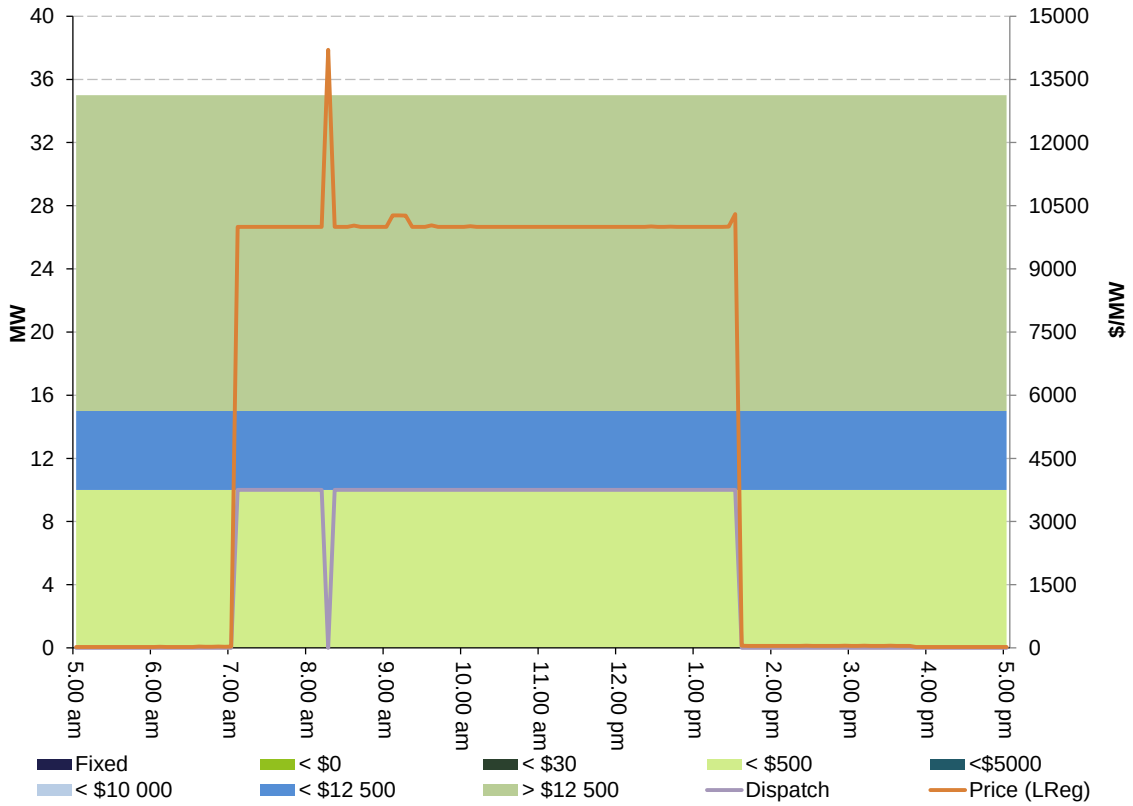


Figure D2b: Pelican Point (Engie) lower regulation service closing bid prices, dispatch and dispatch price – effective offers

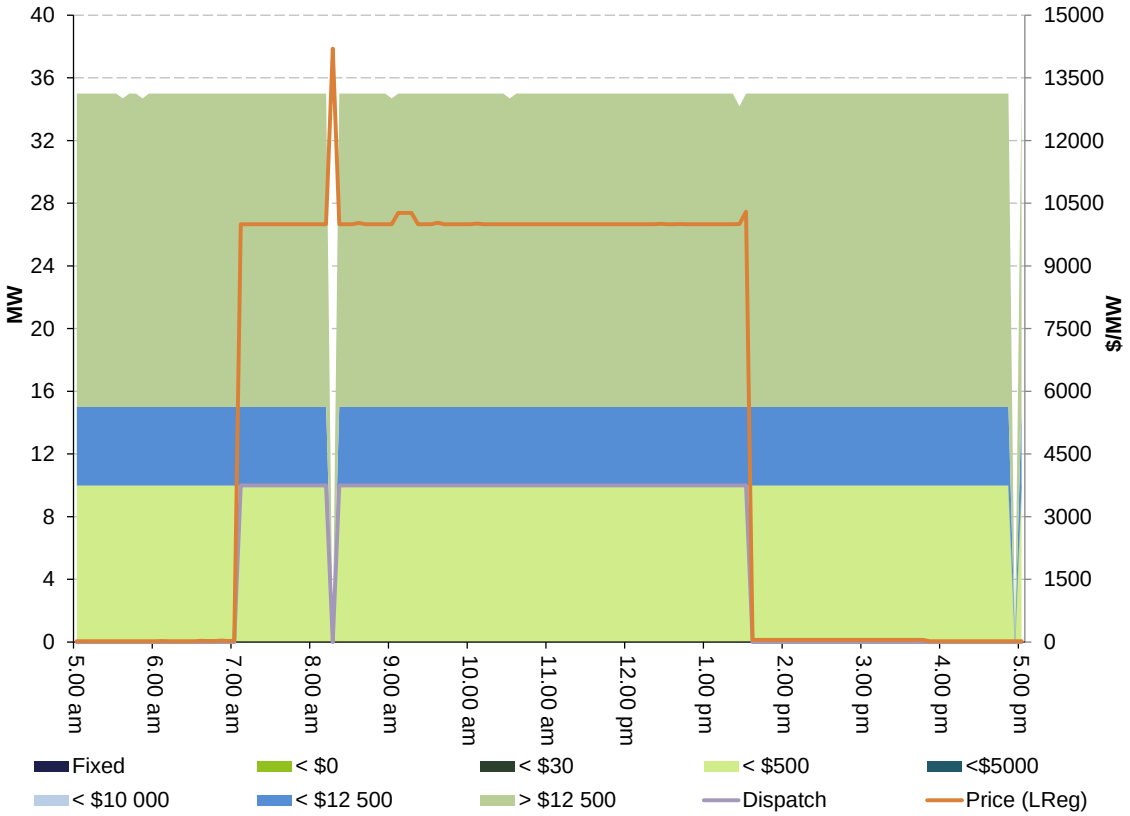


Figure D3a: Osborne (Origin) lower regulation service closing bid prices, dispatch and dispatch price – maximum offers

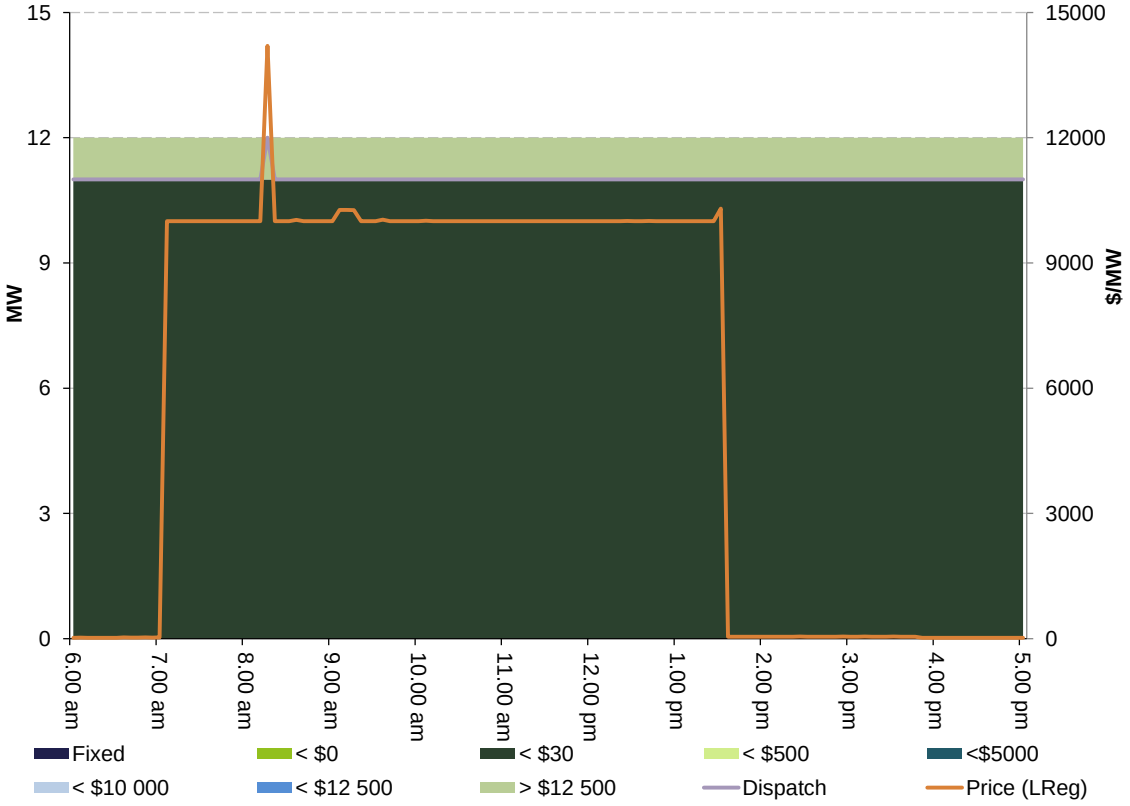
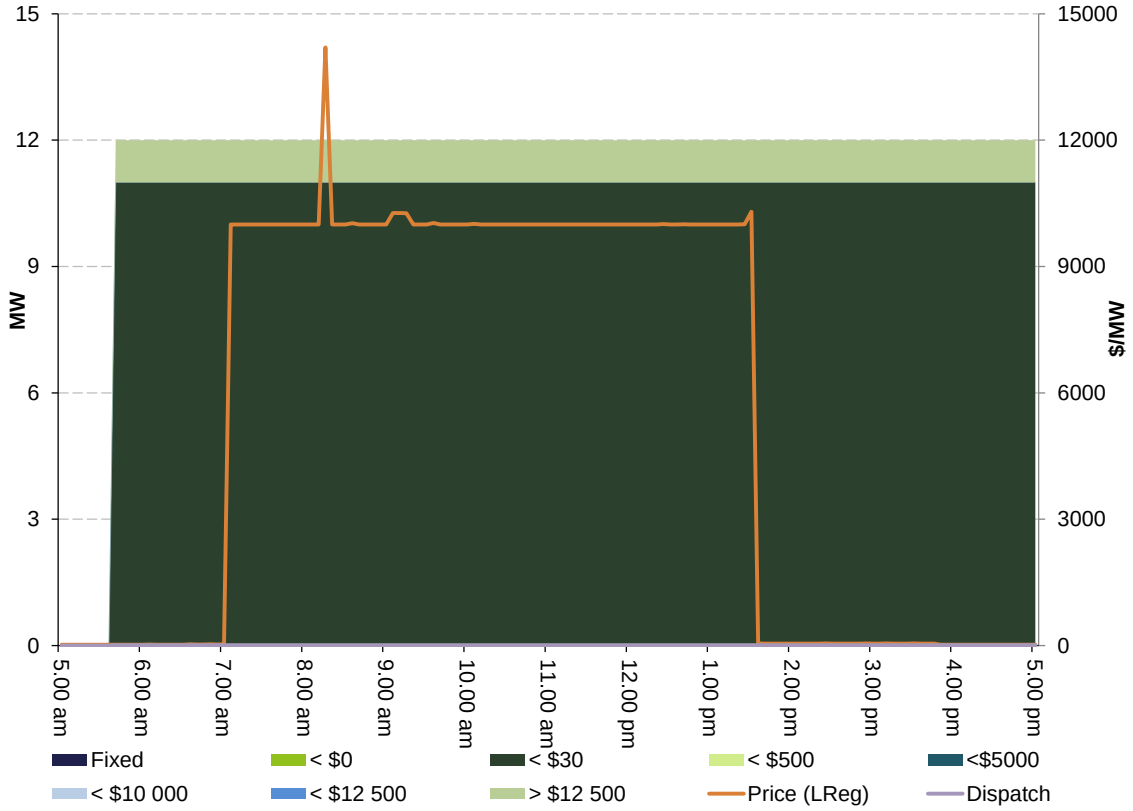


Figure D3b: Osborne (Origin) lower regulation service closing bid prices, dispatch and dispatch price – effective offers



13 October Raise Regulation

Figure D4a: Torrens Island (AGL) raise regulation service closing bid prices, dispatch and dispatch price - maximum offers

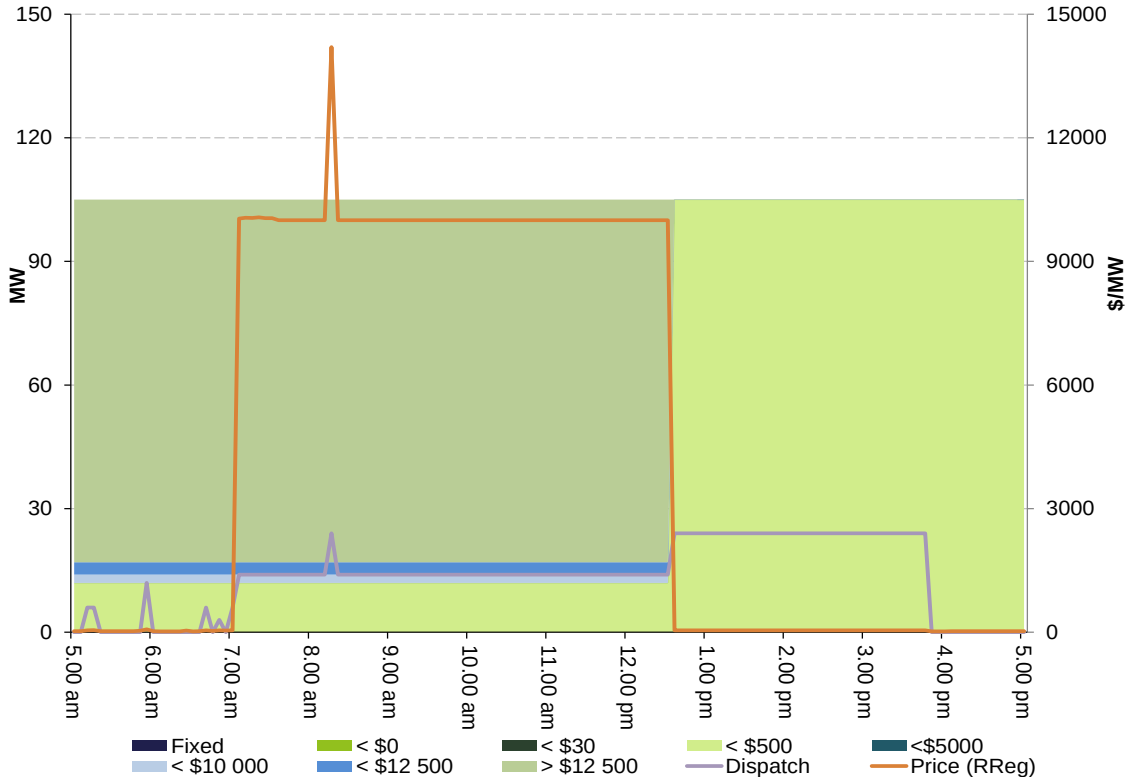


Figure D4b: Torrens Island (AGL) raise regulation service closing bid prices, dispatch and dispatch price - effective offers

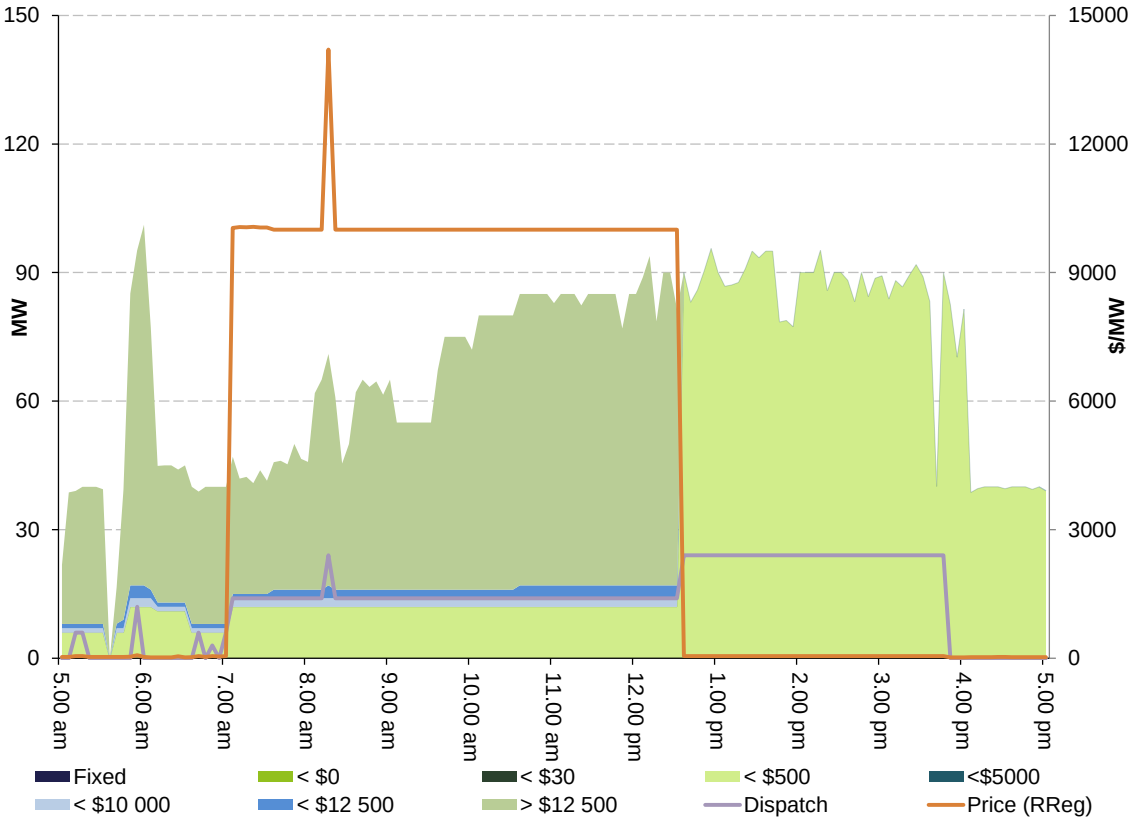


Figure D5a: Pelican Point (Engie) raise regulation service closing bid prices, dispatch and dispatch price – maximum offers

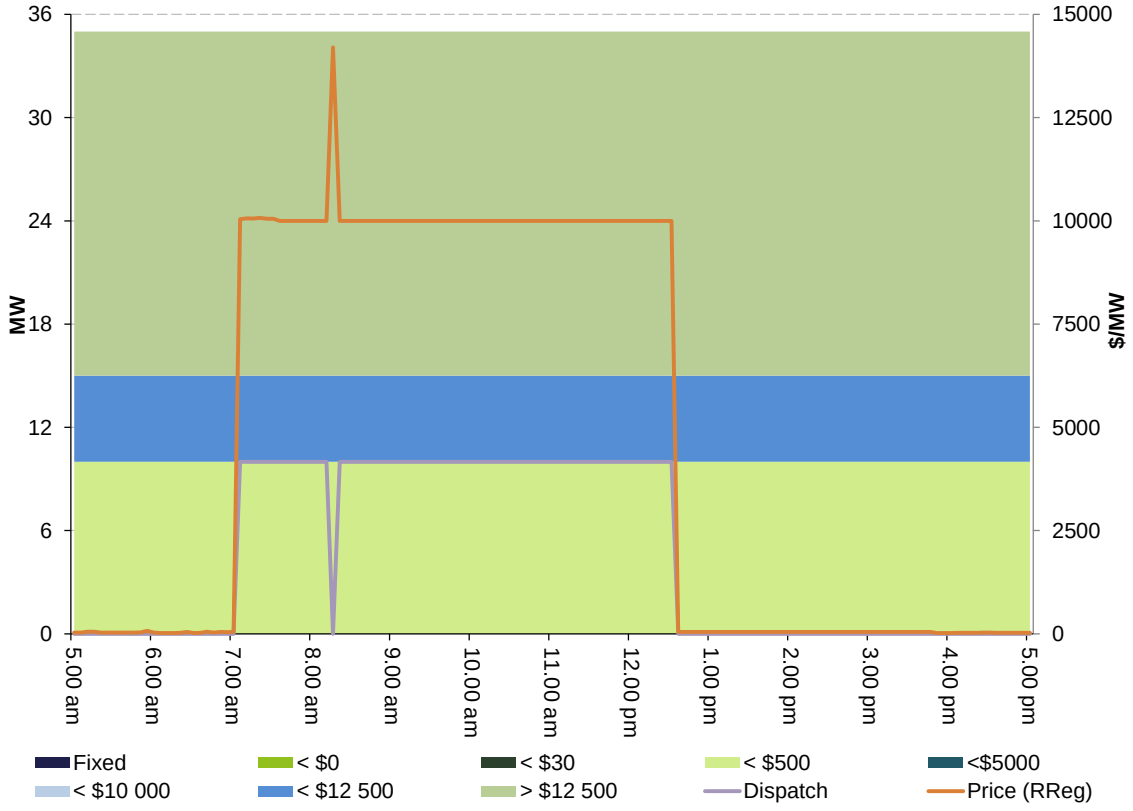


Figure D5b: Pelican Point (Engie) raise regulation service closing bid prices, dispatch and dispatch price – effective offers

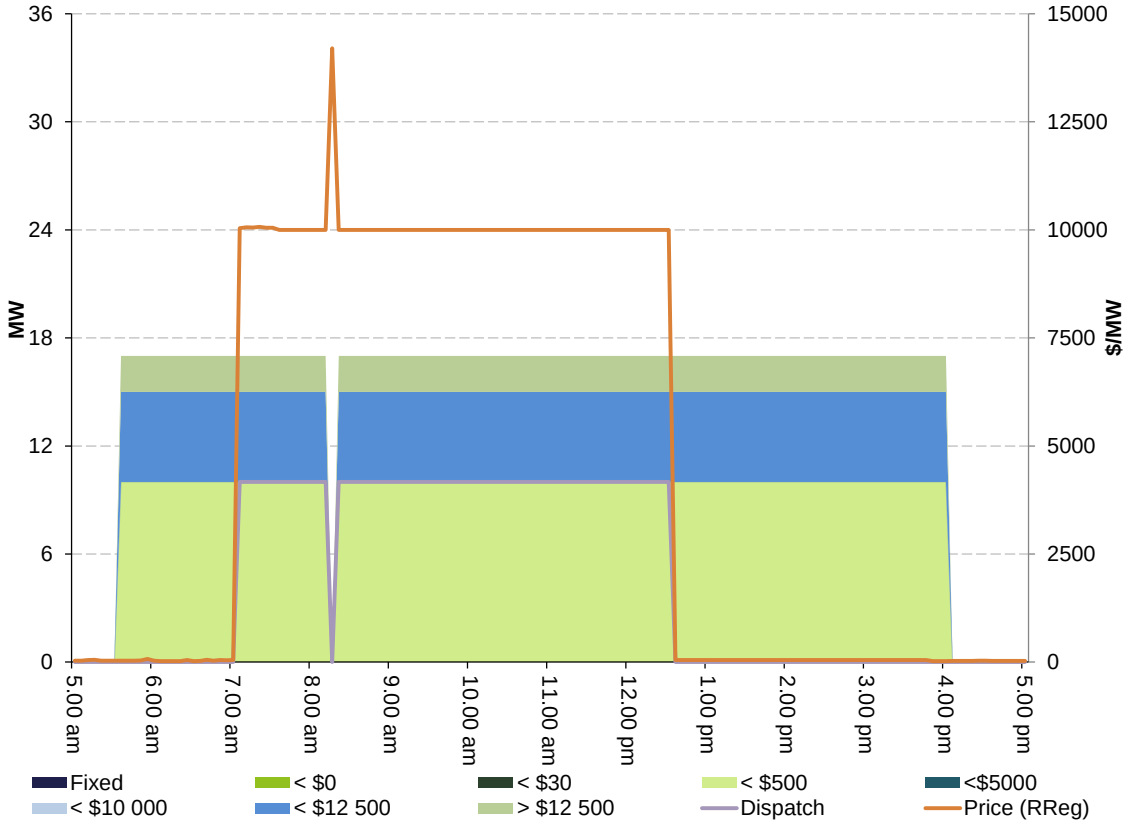


Figure D6a: Osborne (Origin) raise regulation service closing bid prices, dispatch and dispatch price – maximum offers

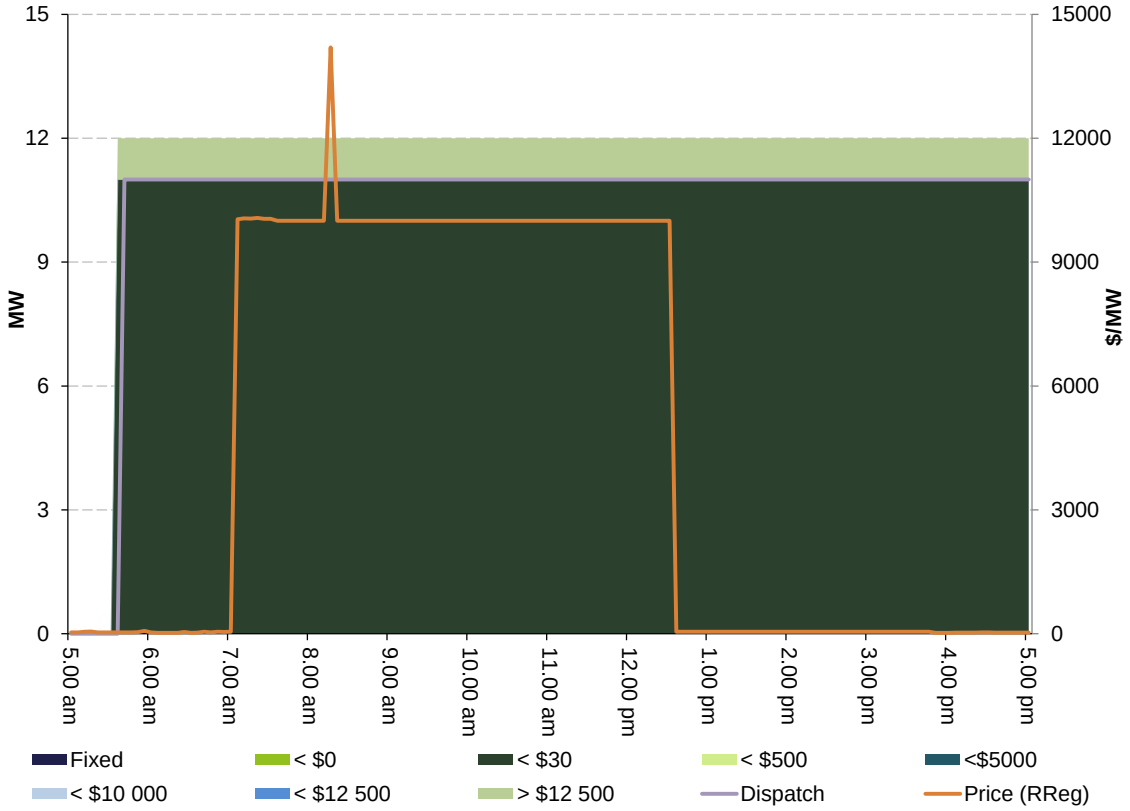
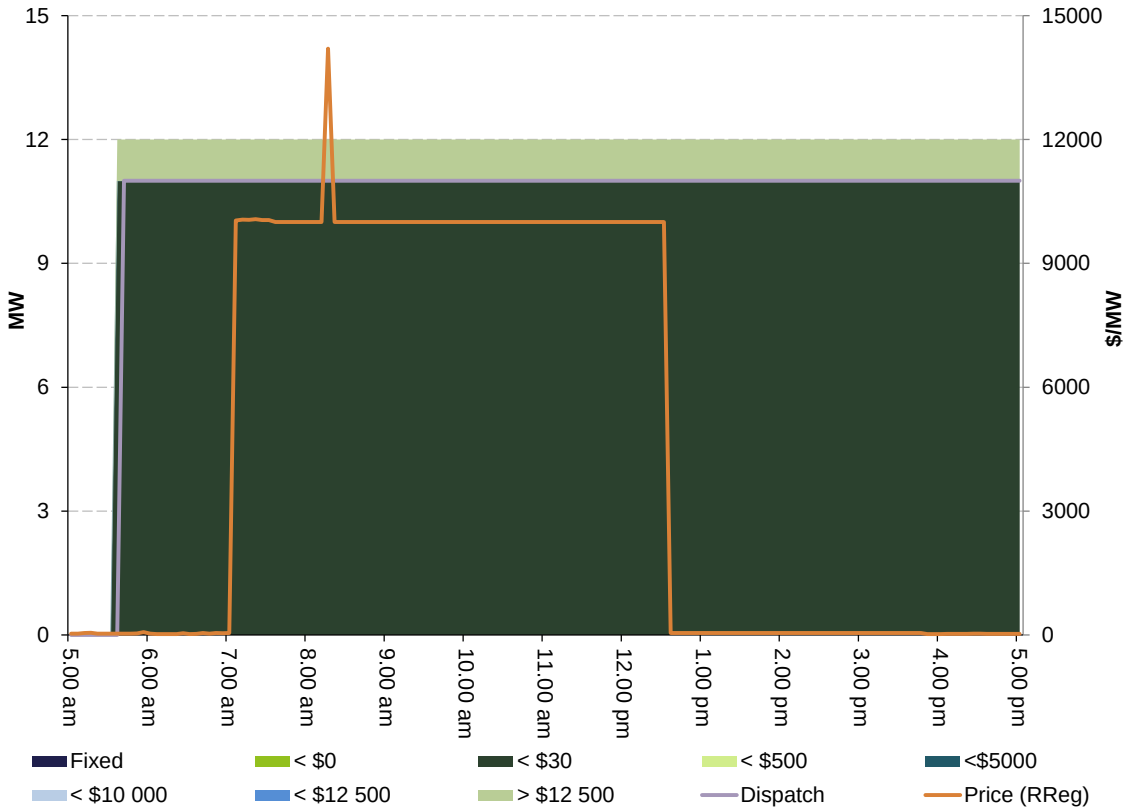


Figure D6b: Osborne (Origin) raise regulation service closing bid prices, dispatch and dispatch price – effective offers



14 October Lower Regulation

Figure D7a: Torrens Island (AGL) lower regulation service closing bid prices, dispatch and dispatch price - maximum offers

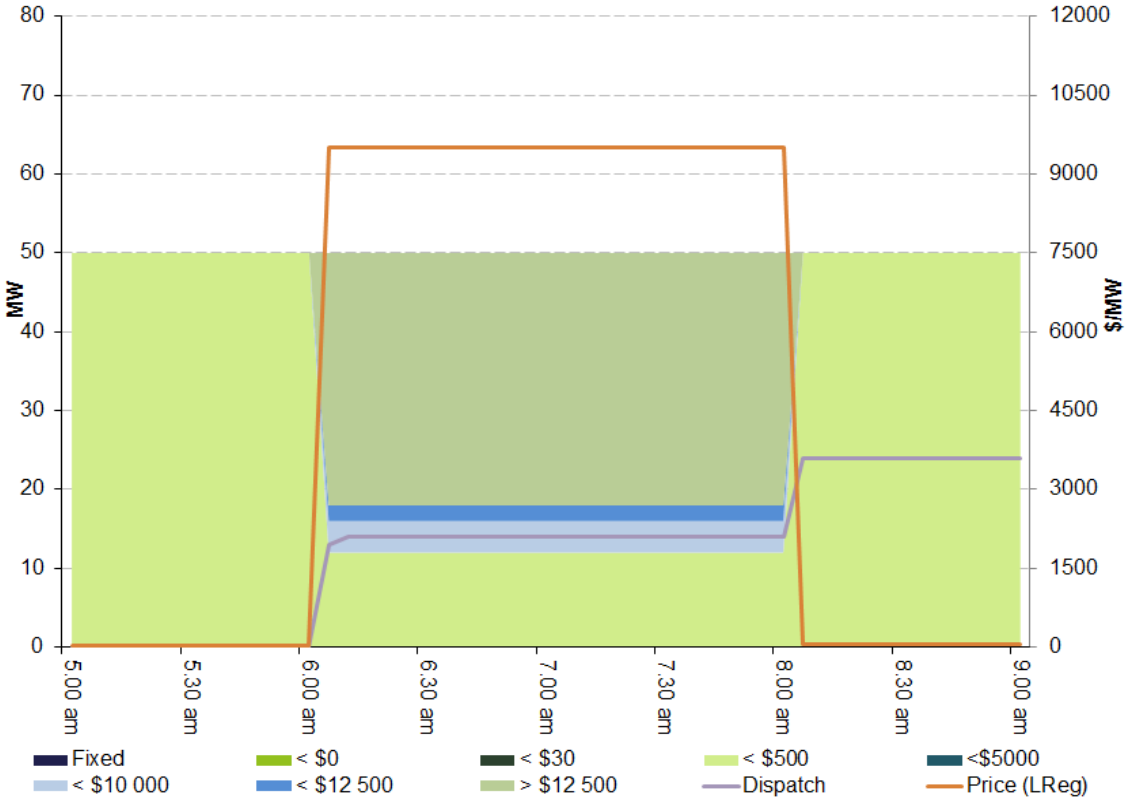


Figure D7b: Torrens Island (AGL) lower regulation service closing bid prices, dispatch and dispatch price – effective offers

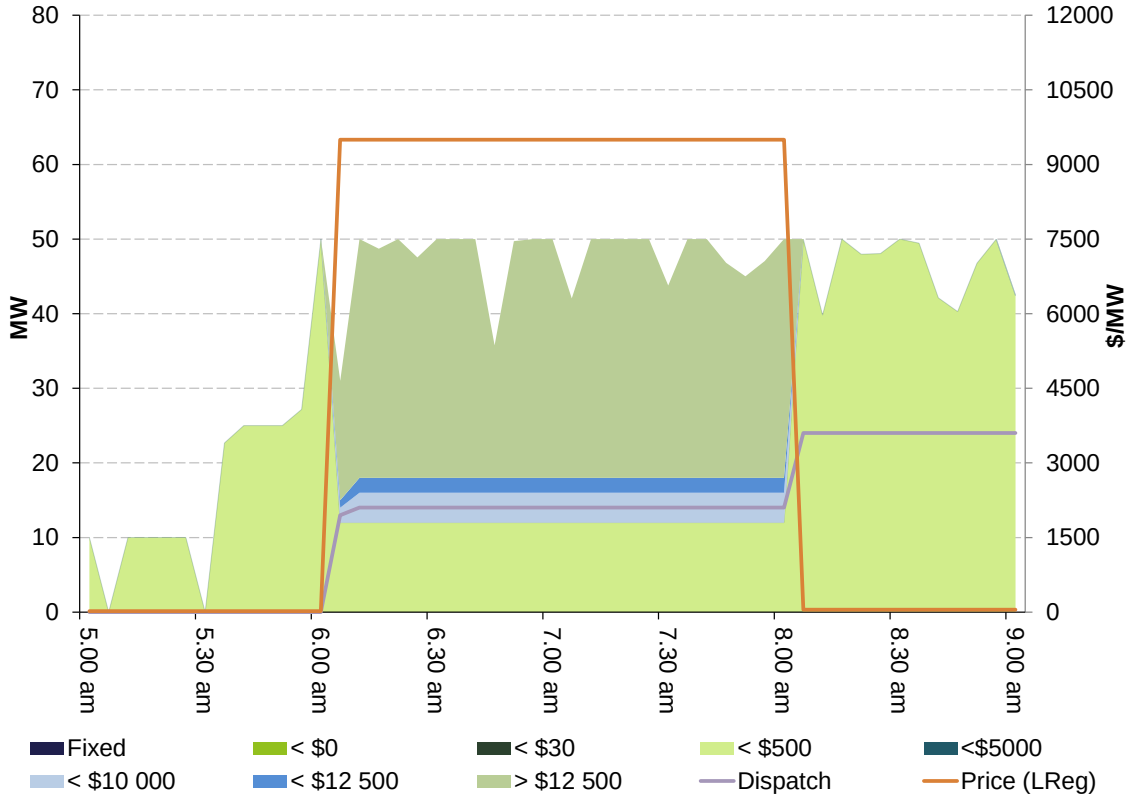


Figure D8a: Pelican Point (Engie) lower regulation service closing bid prices, dispatch and dispatch price – maximum offers

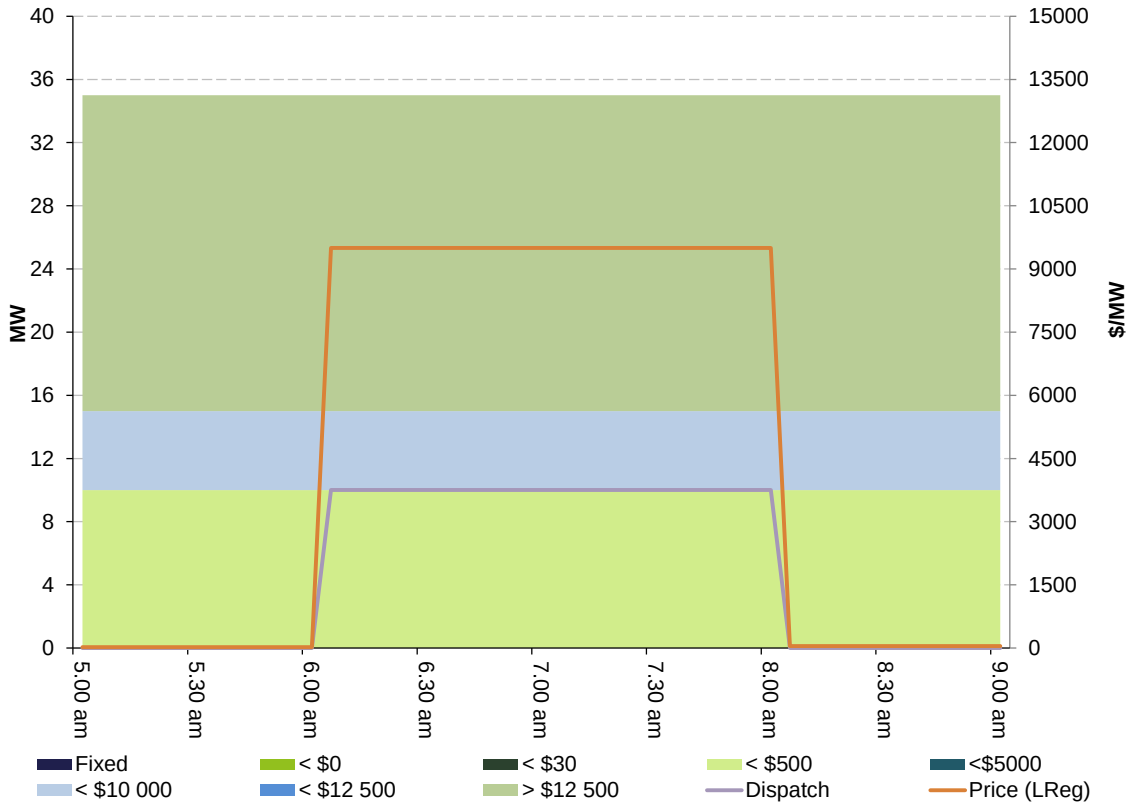


Figure D8b: Pelican Point (Engie) lower regulation service closing bid prices, dispatch and dispatch price – effective offers

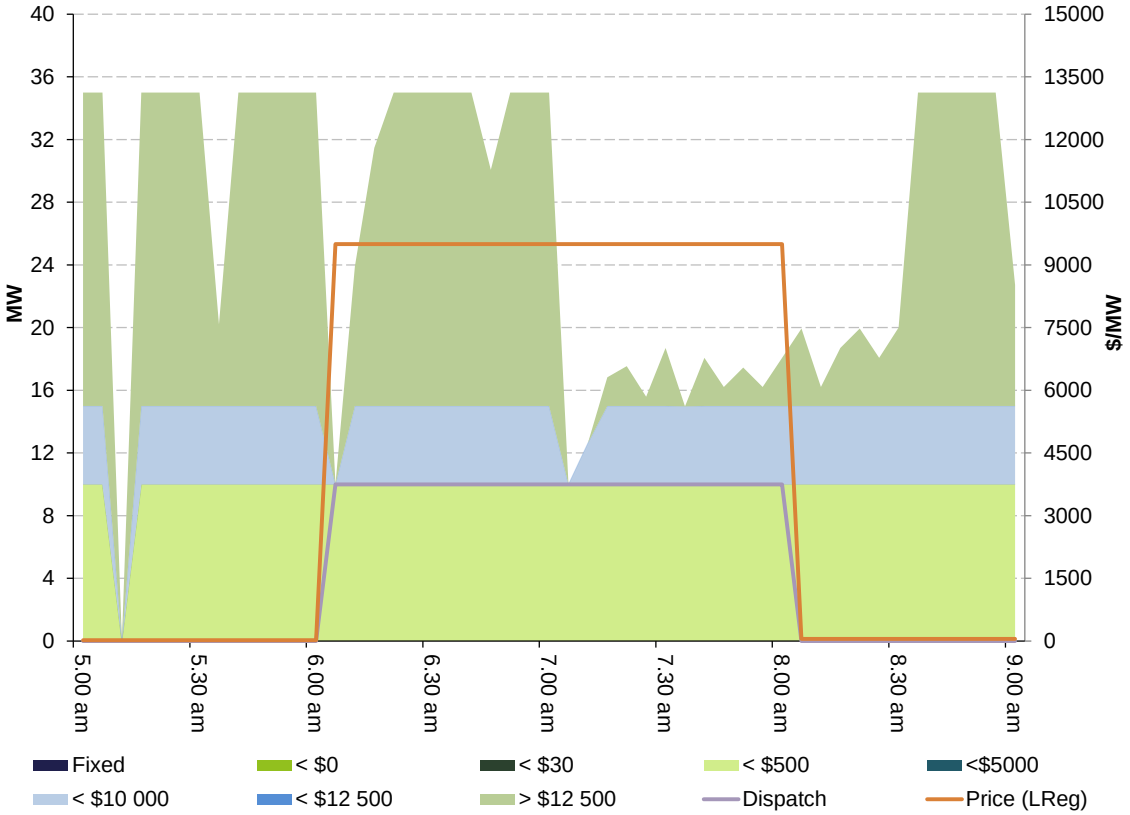


Figure D9a: Quarantine (Origin) lower regulation service closing bid prices, dispatch and dispatch price – maximum offers

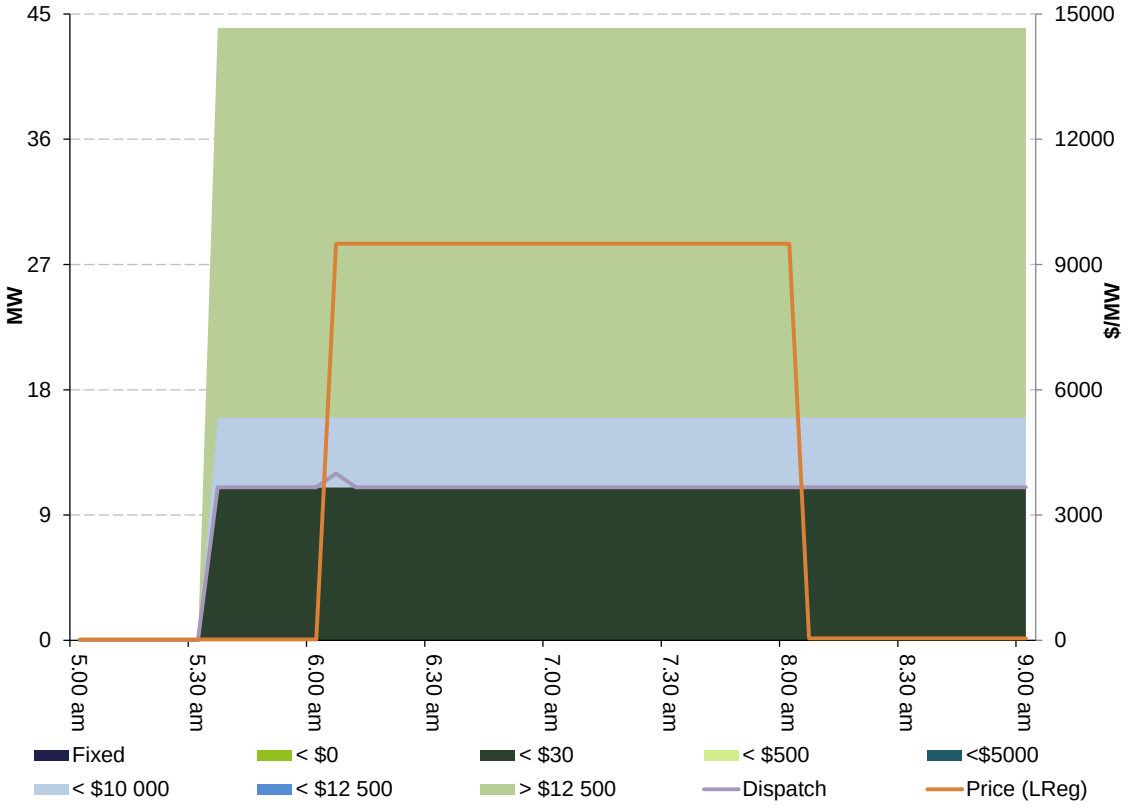
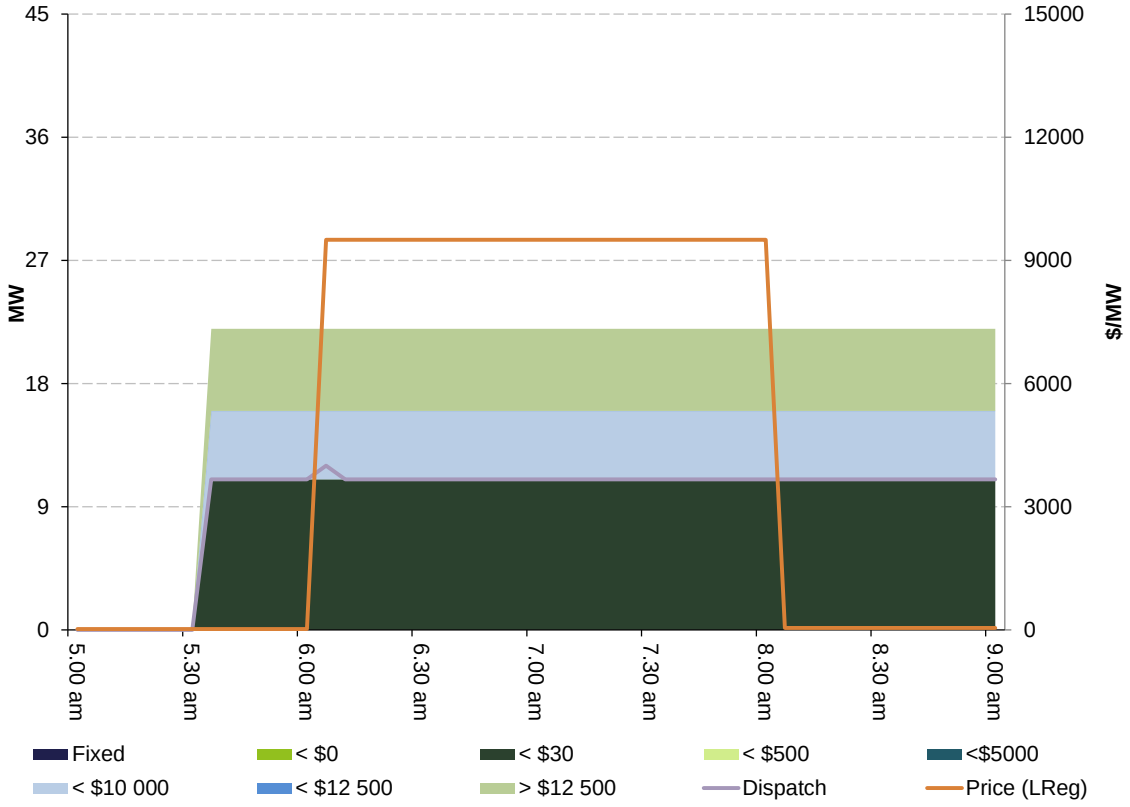


Figure D9b: Quarantine (Origin) lower regulation service closing bid prices, dispatch and dispatch price – effective offers



14 October Raise Regulation

Figure D10a: Torrens Island (AGL) raise regulation service closing bid prices, dispatch and dispatch price - maximum offers

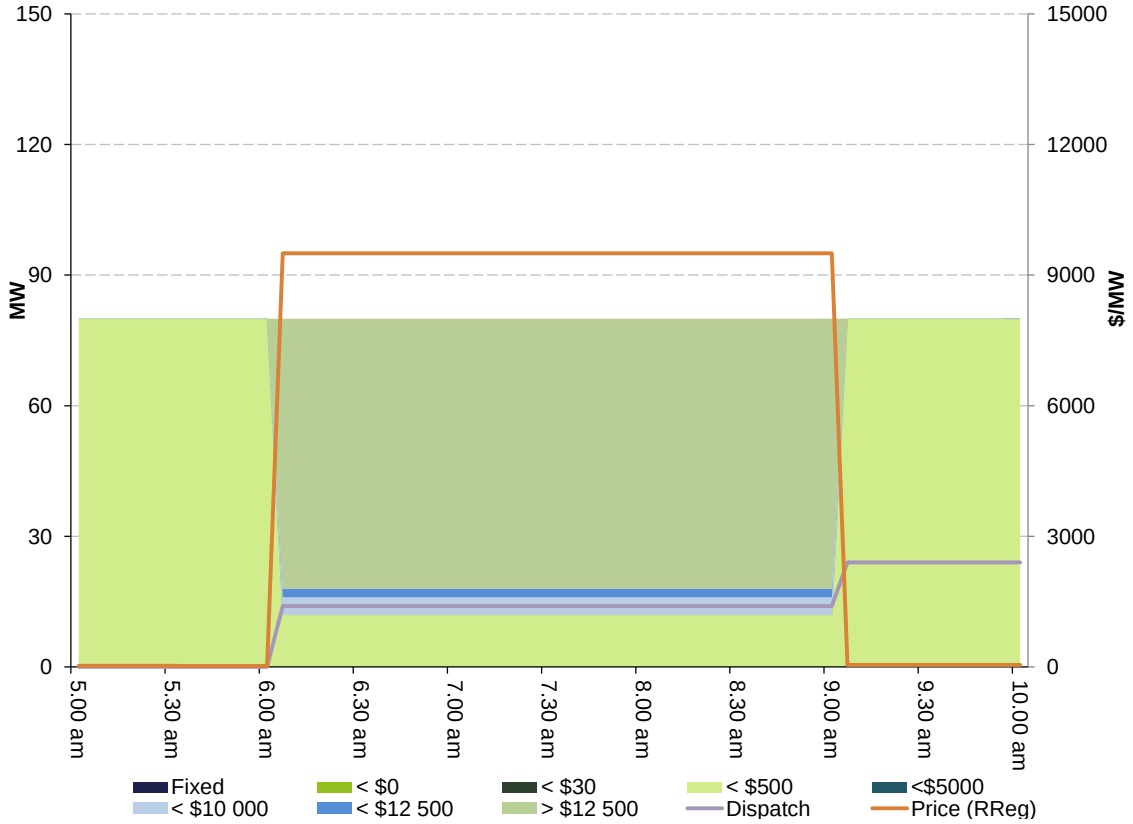


Figure D10b: Torrens Island (AGL) raise regulation service closing bid prices, dispatch and dispatch price - effective offers

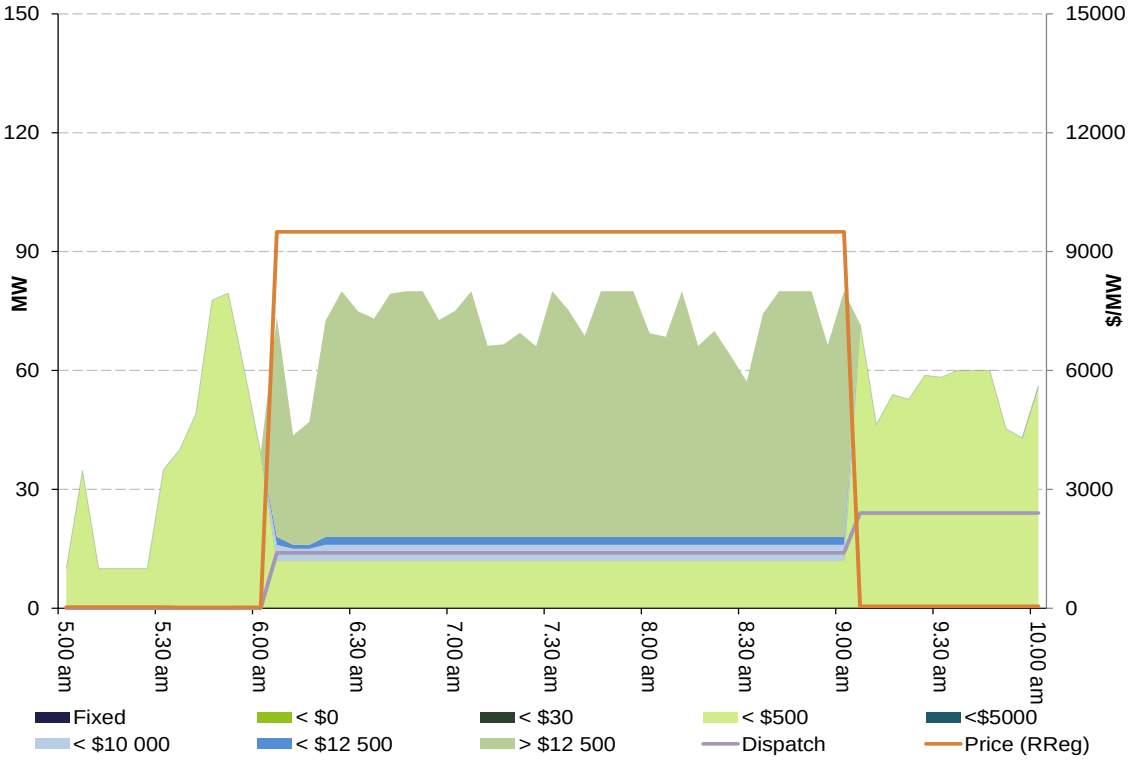


Figure D11a: Pelican Point (Engie) raise regulation service closing bid prices, dispatch and dispatch price – maximum offers

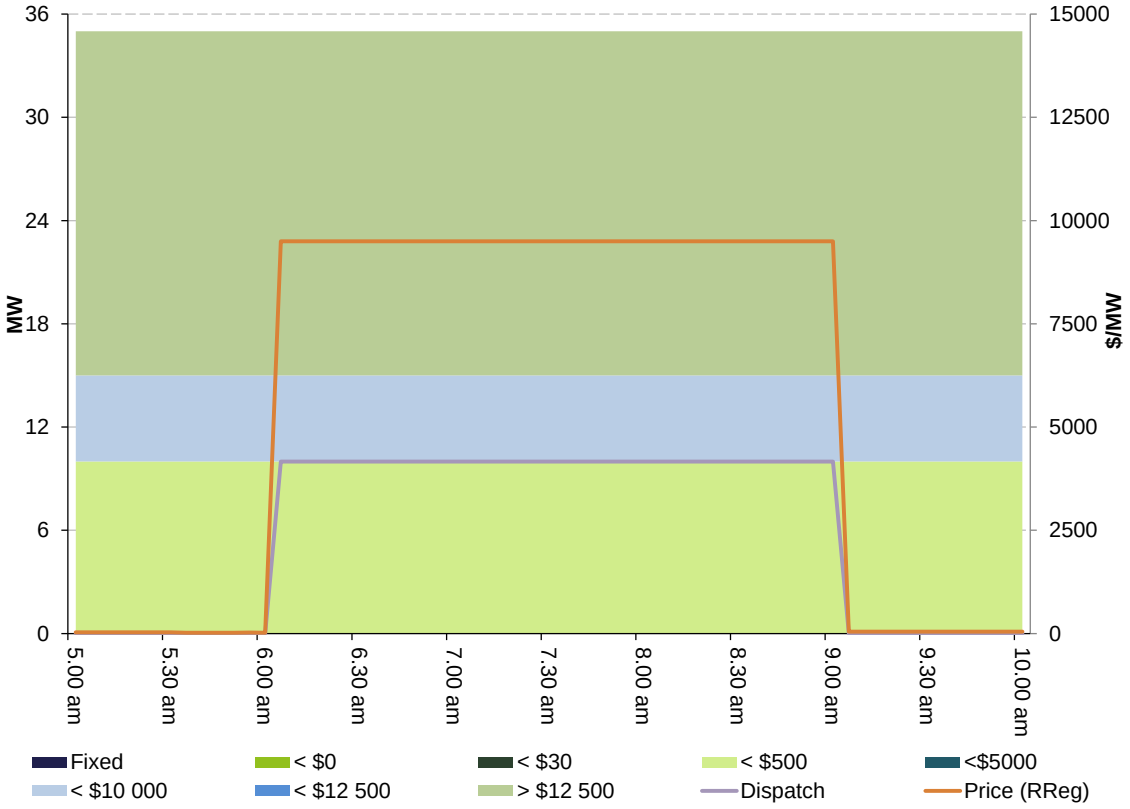


Figure D11b: Pelican Point (Engie) raise regulation service closing bid prices, dispatch and dispatch price – effective offers

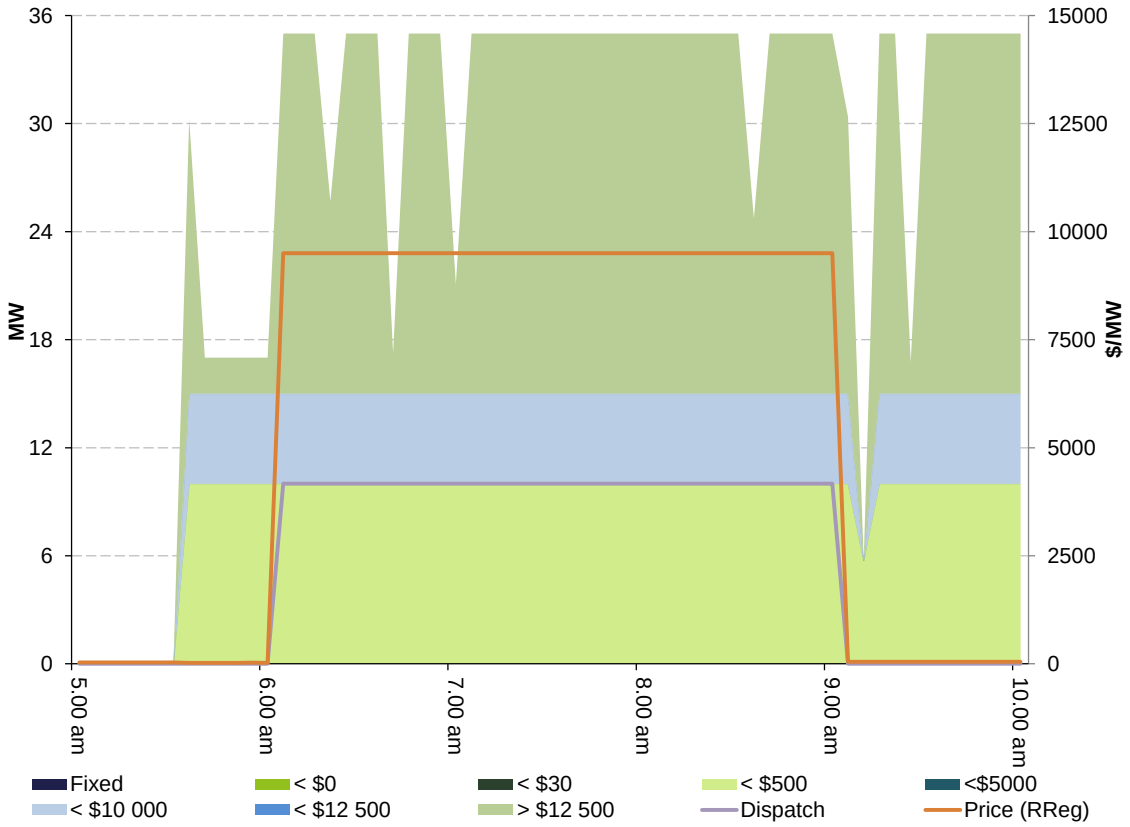


Figure D12a: Quarantine (Origin) raise regulation service closing bid prices, dispatch and dispatch price – maximum offers

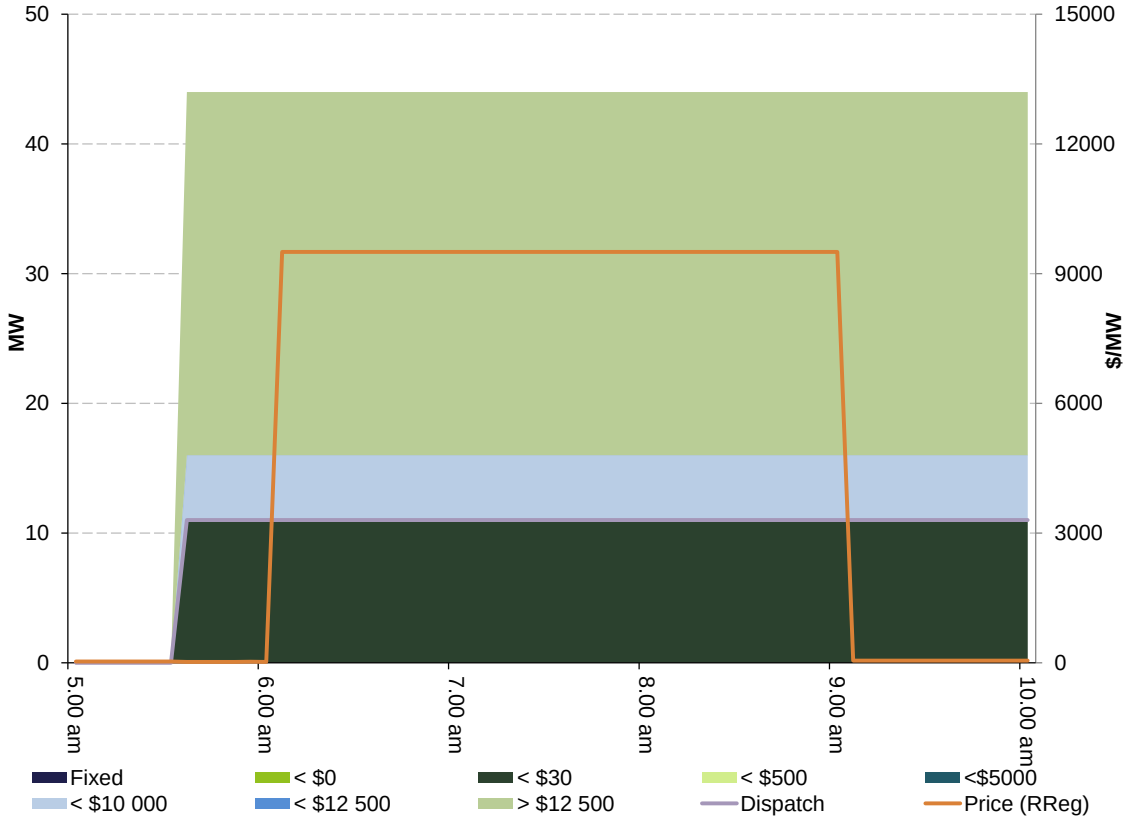
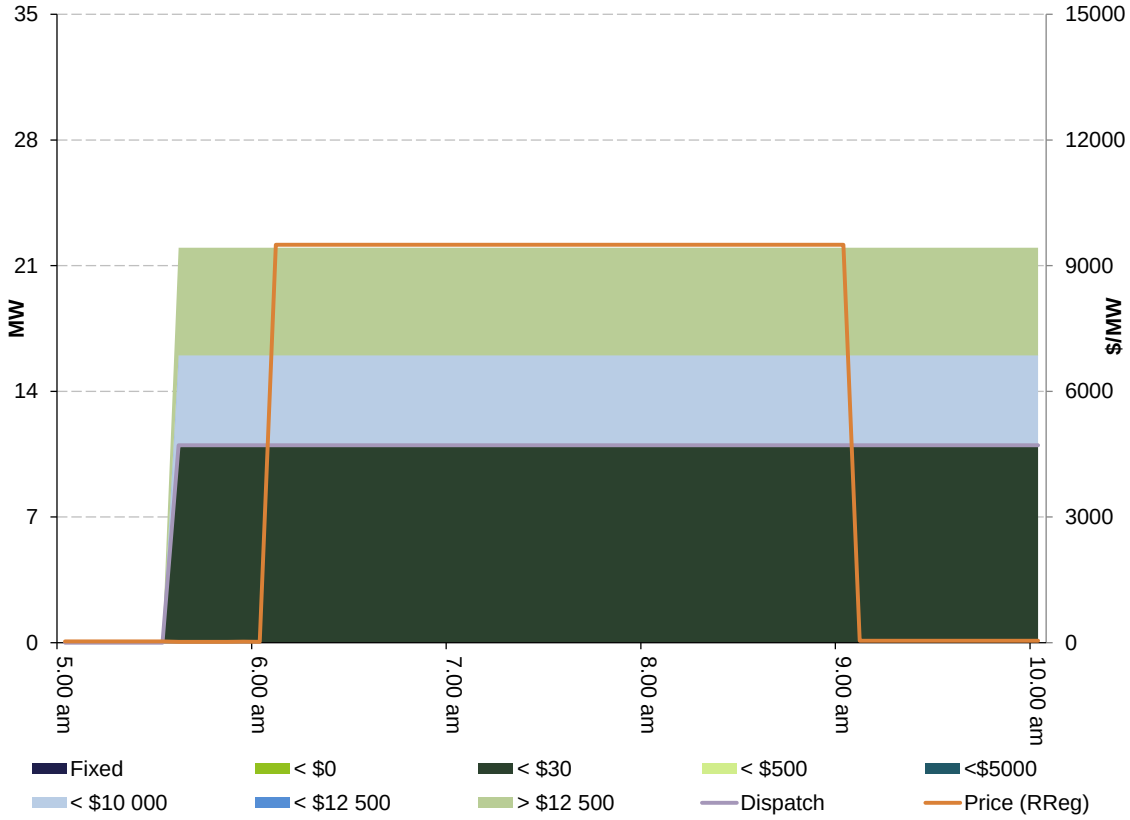


Figure D12b: Quarantine (Origin) raise regulation service closing bid prices, dispatch and dispatch price – effective offers



Appendix E: Market Notices

AEMO issued the following market notices relating to events on the day.

Market Notice	Type	Date of issue	Last Changed
59304	GENERAL NOTICE	27/09/2017 15:12:54	27/09/2017 15:12:54

Reason

AEMO ELECTRICITY MARKET NOTICE

This market notice is FOR INFORMATION ONLY.

The Heywood No.1 500 kV busbar in Victoria Region is planned out of service for the following periods:
13/10/2017 0600 hrs - 13/10/2017 1600 hrs.
14/10/2017 0600 hrs - 14/10/2017 1600 hrs.

A credible contingency event during this planned outage could cause synchronous separation of the South Australia (SA) region from the rest of the NEM. If separation occurs, load may be interrupted due to the operation of the Automatic Under Frequency Load Shedding (AUFLS) scheme in SA.

The credible separation contingency is managed as follows:

35 MW of raise and lower regulation FCAS will be sourced from SA.
When power transfer is from SA to Victoria (Vic), contingency lower FCAS will be sourced from SA.
When power transfer is from Vic to SA, due to the 47-52Hz island separation frequency band advised by the SA jurisdiction, contingency raise FCAS is not sourced in SA and the AUFLS scheme may respond to low frequency events.
Power transfer will be restricted on Victoria - South Australia interconnector (Heywood interconnector).

Forecast capacity reserves in the SA region are currently sufficient to meet electricity demand during the planned outage.

The following constraint sets have been invoked for this outage:

F-I_HYSE (includes F-S_LREG_0035 and F-S_RREG_0035)
S-X_BC_CP
V-HYTX_M12
V-HY_500BUS
I-VS_050

Refer AEMO Network Outage Schedule (NOS) for further details.

Harmohan Singh
AEMO Operations

Market Notice	Type	Date of issue	Last Changed
59476	GENERAL NOTICE	12/10/2017 16:03:39	12/10/2017 16:03:39

Reason

AEMO ELECTRICITY MARKET NOTICE

This market notice is FOR INFORMATION ONLY.

Refer to MN 59364

The Heywood No.1 500 kV busbar in Victoria Region is planned out of service for the following periods:
13/10/2017 0700 hrs - 13/10/2017 1700 hrs.
14/10/2017 0600 hrs - 14/10/2017 1600 hrs.

A credible contingency event during this planned outage could cause synchronous separation of the South Australia (SA) region from the rest of the NEM. If separation occurs, load may be interrupted due to the operation of the Automatic Under Frequency Load Shedding (AUFLS) scheme in SA.

The credible separation contingency is managed as follows:

35 MW of raise and lower regulation FCAS will be sourced from SA.
When power transfer is from SA to Victoria (Vic), contingency lower FCAS will be sourced from SA.
When power transfer is from Vic to SA, due to the 47-52Hz island separation frequency band advised by the SA jurisdiction, contingency raise FCAS is not sourced in SA and the AUFLS scheme may respond to low frequency events.
Power transfer will be restricted on Victoria - South Australia interconnector (Heywood interconnector).

Forecast capacity reserves in the SA region are currently sufficient to meet electricity demand during the planned outage.

The following constraint sets have been invoked for these outages:

F-I_HYSE (includes F-S_LREG_0035 and F-S_RREG_0035)
S-X_BC_CP
V-HYTX_M12
V-HY_500BUS
I-VS_050

Refer AEMO Network Outage Schedule (NOS) for further details.

Manager NEM Real Time Operations

Appendix F: Price setter

The following tables identify for each five-minute dispatch interval where regulation dispatch prices were above $5000/MW, the price and the generating units involved in setting the price for each of the lower and raise regulation services in South Australia. This information is published by AEMO.[4] Also shown are the offer prices involved in determining the dispatch price, together with the quantity of that service and the contribution to the total price. AEMO reports an increase as a negative marginal change in FCAS price setter. Generator offers which contributed zero to the price have been removed for clarity.

Lower regulation 13 October

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
07:05	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
07:10	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:15	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:20	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:25	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
07:30	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
07:35	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:40	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
07:45	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:50	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
07:55	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:00	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:05	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:10	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:15	$14 200.00	AGL (SA)	TORRB3	Lower reg	$14 200.00	-1.00	-$14 200.00
08:20	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
08:25	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:30	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
08:35	$10 030.63	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$160.00	-1.00	-$160.00
		AGL Energy	BW01	Energy	$87.00	0.50	$43.50
		AGL Energy	BW03	Energy	$87.00	0.50	$43.50

[4] Details on how the price is determined can be found at www.aemo.com.au

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
		AGL Energy	BW04	Energy	$87.00	0.50	$43.50
08:40	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
08:45	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
08:50	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
08:55	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
09:00	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
09:05	$10 269.93	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB4	Energy	$390.00	-1.00	-$390.00
		Delta Electricity	VP5	Energy	$87.00	0.28	$24.36
		AGL Energy	BW01	Energy	$87.00	0.37	$32.19
		AGL Energy	BW03	Energy	$87.00	0.37	$32.19
		AGL Energy	BW04	Energy	$87.00	0.37	$32.19
09:10	$10 270.19	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB4	Energy	$390.00	-1.00	-$390.00
		Origin Energy	ER01	Energy	$86.92	0.34	$29.55
		Origin Energy	ER02	Energy	$86.92	0.34	$29.55
		Origin Energy	ER03	Energy	$86.92	0.34	$29.55
		Origin Energy	ER04	Energy	$86.92	0.34	$29.55
09:15	$10 266.53	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB4	Energy	$390.00	-1.00	-$390.00
		Origin Energy	ER01	Energy	$86.92	0.36	$31.29
		Origin Energy	ER02	Energy	$86.92	0.36	$31.29
		Origin Energy	ER03	Energy	$86.92	0.36	$31.29
		Origin Energy	ER04	Energy	$86.92	0.36	$31.29
09:20	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
09:25	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
09:30	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
09:35	$10 035.86	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$160.00	-1.00	-$160.00
		Delta Electricity	VP5	Energy	$87.00	0.29	$25.23
		AGL Energy	BW01	Energy	$87.00	0.38	$33.06
		AGL Energy	BW03	Energy	$87.00	0.38	$33.06
		AGL Energy	BW04	Energy	$87.00	0.38	$33.06

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
09:40	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
09:45	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
09:50	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
09:55	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
10:00	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
10:05	$10 010.97	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$160.00	-1.00	-$160.00
		Snowy Hydro	MURRAY	Energy	$90.00	1.66	$149.40
10:10	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:15	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
10:20	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:25	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:30	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
10:35	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:40	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:45	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
10:50	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
10:55	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
11:00	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:05	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:10	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:15	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
11:20	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
11:25	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:30	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:35	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:40	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
11:45	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
11:50	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
11:55	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:00	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:05	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
12:10	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
12:15	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:20	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
12:25	$10 007.07	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$90.00	-1.00	-$90.00
		AGL Energy	BW01	Energy	$74.00	0.28	$20.72
		AGL Energy	BW02	Energy	$74.00	0.28	$20.72
		AGL Energy	BW03	Energy	$74.00	0.28	$20.72
		AGL Energy	BW04	Energy	$74.00	0.28	$20.72
12:30	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:35	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
12:40	$10 004.88	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$90.00	-1.00	-$90.00
		AGL Energy	BW01	Energy	$74.00	0.29	$21.46
		AGL Energy	BW02	Energy	$74.00	0.29	$21.46
		AGL Energy	BW03	Energy	$74.00	0.29	$21.46
		AGL Energy	BW04	Energy	$74.00	0.29	$21.46
12:45	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:50	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
12:55	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
13:00	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
13:05	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
13:10	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
13:15	$9999.99	AGL (SA)	TORRB4	Lower reg	$9999.99	-1.00	-$9999.99
13:20	$9999.99	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
13:25	$10000.55	AGL (SA)	TORRB3	Lower reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$90.00	-1.00	-$90.00
		AGL Energy	BW01	Energy	$87.00	0.26	$22.62
		AGL Energy	BW02	Energy	$87.00	0.26	$22.62
		AGL Energy	BW03	Energy	$87.00	0.26	$22.62
		AGL Energy	BW04	Energy	$87.00	0.26	$22.62

Lower regulation 14 October

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
06:05	$9500.00	Origin Energy	QPS5	Lower reg	$9500.00	-1.00	-$9500.00
06:10	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
06:15	$9500.00	Origin Energy	QPS5	Lower reg	$9500.00	-1.00	-$9500.00
06:20	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
06:25	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
06:30	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
06:35	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
06:40	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
06:45	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
06:50	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
06:55	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:00	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:05	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:10	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:15	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:20	$9500.00	Origin Energy	QPS5	Lower reg	$9500.00	-1.00	-$9500.00
07:25	$9500.00	Origin Energy	QPS5	Lower reg	$9500.00	-1.00	-$9500.00
07:30	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
07:35	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
07:40	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:45	$9499.99	AGL (SA)	TORRB4	Lower reg	$9499.99	-1.00	-$9499.99
07:50	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
07:55	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99
08:00	$9499.99	AGL (SA)	TORRB3	Lower reg	$9499.99	-1.00	-$9499.99

Raise regulation 13 October

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
07:05	$10 040.44	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
		Origin Energy	ER01	Energy	$86.92	-0.35	-$30.42
		Origin Energy	ER02	Energy	$86.92	-0.35	-$30.42

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
		Origin Energy	ER03	Energy	$86.92	-0.35	-$30.42
		Origin Energy	ER04	Energy	$86.92	-0.35	-$30.42
		EnergyAustralia	YWPS3	Raise 6 sec	$20.70	-1.41	-$29.19
		Origin Energy	ER01	Raise 6 sec	$19.99	0.35	$7.00
		Origin Energy	ER02	Raise 6 sec	$19.99	0.35	$7.00
		Origin Energy	ER03	Raise 6 sec	$19.99	0.35	$7.00
		Origin Energy	ER04	Raise 6 sec	$19.99	0.35	$7.00
		CS Energy	W/HOE#2	Raise 5 min	$14.95	-1.41	-$21.08
		Origin Energy	ER01	Raise 5 min	$9.99	0.35	$3.50
		Origin Energy	ER02	Raise 5 min	$9.99	0.35	$3.50
		Origin Energy	ER03	Raise 5 min	$9.99	0.35	$3.50
		Origin Energy	ER04	Raise 5 min	$9.99	0.35	$3.50
07:10	$10 058.76	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Snowy Hydro	MURRAY	Energy	$100.00	-1.49	-$149.00
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
07:15	$10 055.59	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Snowy Hydro	MURRAY	Energy	$100.00	-1.46	-$146.00
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
07:20	$10 068.64	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Snowy Hydro	MURRAY	Energy	$100.00	-1.59	-$159.00
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
07:25	$10049.75	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Snowy Hydro	MURRAY	Energy	$90.00	-1.55	-$139.50
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
07:30	$10 049.75	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Snowy Hydro	MURRAY	Energy	$90.00	-1.55	-$139.50
		AGL (SA)	TORRB3	Energy	$90.00	1.00	$90.00
07:35	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
		Origin Energy	ER03	Raise 5 min	$9.99	0.35	$3.50
		Origin Energy	ER04	Raise 5 min	$9.99	0.35	$3.50
07:40	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
07:45	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
07:50	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
07:55	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:00	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
08:05	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:10	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:15	$14 200.00	AGL (SA)	TORRB3	Raise reg	$14200.00	-1.00	-$14200.00
08:20	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:25	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:30	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:35	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:40	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
08:45	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
08:50	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
08:55	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:00	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
09:05	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:10	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:15	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
09:20	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
09:25	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:30	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
09:35	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
09:40	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:45	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:50	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
09:55	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:00	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
10:05	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:10	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
10:15	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:20	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:25	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
10:30	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
10:35	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
10:40	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:45	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
10:50	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
10:55	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
11:00	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
11:05	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:10	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:15	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:20	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
11:25	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:30	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:35	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
11:40	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
11:45	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:50	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
11:55	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
12:00	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
12:05	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
12:10	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
12:15	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
12:20	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99
12:25	$9999.99	AGL (SA)	TORRB4	Raise reg	$9999.99	-1.00	-$9999.99
12:30	$9999.99	AGL (SA)	TORRB3	Raise reg	$9999.99	-1.00	-$9999.99

Raise regulation 14 October

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
06:05	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:10	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:15	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:20	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:25	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:30	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99

DI	Dispatch Price ($/MW)	Participant	Unit	Service	Offer price ($/MW)	Marginal change	Contribution
06:35	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:40	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:45	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:50	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
06:55	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:00	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:05	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:10	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:15	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:20	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:25	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:30	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:35	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:40	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:45	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:50	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
07:55	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:00	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:05	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:10	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:15	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:20	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:25	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:30	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:35	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:40	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:45	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:50	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
08:55	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99
09:00	$9499.99	AGL (SA)	TORRB4	Raise reg	$9499.99	-1.00	-$9499.99