

Spot prices greater than \$5 000/MWh



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REGULATOR

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Introduction

The AER is required to publish a report covering the circumstances in which the spot price exceeded \$5000/MWh, pursuant to clause 3.13.7 (d) of the Rules. That report should:

- describe significant factors contributing to the spot price exceeding \$5000/MWh, including withdrawal of generation capacity and network availability;
- assess whether rebidding pursuant to clause 3.8.22 contributed to the spot price exceeding \$5000/MWh;
- identify the marginal scheduled generating units; and
- identify all units with offers for the trading interval equal to or greater than \$5000/MWh and compare these dispatch offers to relevant dispatch offers in previous trading intervals.

This report examines the factors that can contribute to the spot price exceeding \$5000/MWh including; changes in demand (compared to that forecast by NEMMCO); generator offers and rebidding (including changes to generation capacity); and changes to network availability.

NEMMCO produce a forecast of market conditions for each 30-minute trading interval of the trading day, including forecast price. These forecasts are based on information compiled by NEMMCO and submitted by participants. The first forecast, or predispach run, for a trading day is prepared at around 1 pm the previous day and is updated every half hour, taking into account: changes in demand; network capability; and participant bids and rebids. The accuracy and timeliness of this information is critical to allow participants to make informed commercial decisions based on the best information available at the time.

The report focuses on two forecasting horizons, namely 4 and 12 hours ahead of dispatch and endeavours to compare and explain actual outcomes with reference to these timeframes.

Summary

On each of Thursday 23 February and Friday 24 February, a planned transmission outage between Wagga and Yanco in southern New South Wales, in conjunction with a further planned outage at Robertstown in South Australia restricted imports into Victoria from Snowy. High temperatures on both days in Victoria led to a new record demand on Friday. As a result of the extreme demand and limited import capability, the half-hour spot price exceeded \$5000/MWh on four occasions, once on Thursday and three times on Friday. The impact of these outages on transfer capability into Victoria and demand were not accurately reflected in the forecasting systems. Figure 1 identifies those trading intervals where the price in Victoria exceeded \$5000/MWh.

Figure 1 - Spot prices above \$5000/MWh in Victoria

Date	Trading interval ending	Spot price (\$/MWh)
23 February 2006	3:30 pm	6997
24 February 2006	11:00 am	9134
24 February 2006	11:30 am	8834
24 February 2006	12:00 pm	6691

The scheduled generators involved in setting the spot prices during these trading intervals and how those prices were determined by the market systems are detailed in Appendix A.

Actual and forecast demand

The maximum temperature in Victoria on Thursday was 34 degrees. This represents an increase of five degrees compared to the forecast the previous evening. The maximum temperature in Victoria on Friday was 35 degrees, slightly less than the 36 degrees forecast the day before.

As a result of the high temperatures, the demand in Victoria reached 8100 MW on Thursday and 8714 MW on Friday, setting a new record for that region. In the trading intervals where the spot price was above \$5000/MWh, the actual demand was between 230 MW and 550 MW higher than that forecast by NEMMCO four hours ahead of dispatch. Figure 2 compares the actual demand in Victoria with that forecast by NEMMCO 4 and 12 hours ahead of dispatch. A comparison of actual and forecast spot price is also included.

Figure 2: Actual and forecast demand and spot price in Victoria

Thursday 3:30 pm	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7826	7269	7175
Spot price (\$/MWh)	6997.03	34.70	31.45

Friday 11 am	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7756	7209	7192
Spot price (\$/MWh)	9134.14	32.88	35.72

Friday 11.30 am	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7885	7609	7301
Price (\$/MWh)	8833.89	36.07	35.36

Friday 12 midday	Actual	4 hr forecast	12 hr forecast
Demand (MW)	7956	7723	7362
Price (\$/MWh)	6691.38	52.90	52.75

Generator offers and rebidding.

Thursday 23 February. From midnight on Wednesday, changes to the available capacity at International Power’s Hazelwood saw a reduction by around 360 MW of capacity available to the market. This included shutting down unit 5 from 220 MW for most of Thursday. The majority of this capacity was priced at less than \$20/MWh.

At 11.41 am, effective from 11.50 am, LYMMCO shifted 225 MW of capacity at Loy Yang A from prices of less than \$20/MWh to around \$4000/MWh. The reason for the rebid was “Material change in PD” (or predispach). A further rebid at 12.32 pm shifted this capacity \$4000/MWh to around \$8000/MWh. The capacity was returned to prices of less than \$20/MWh at 1.17 pm. The rebid reasons given were “Material drop in Vic RRP between 12:15 and 12:30” and “Yanco-Wagga line RTS at 13:15” respectively.

At 2.40 pm, 215 MW of capacity at Loy Yang A was again shifted from prices less than \$20/MWh to around \$8000/MWh. The rebid reason given was “Actual Vic RRP greater than F/Cast”.

Friday 24 February. Over two rebids around 5.20 am, LYMMCO brought forward the return of Loy Yang A1 to 6 am, increasing the available capacity by as much as 580 MW. The unit was originally scheduled to return to service around midday. All of this capacity was priced at less than \$20/MWh. The rebid reason given was “Unit run up”. At 8.08 am, 267 MW of capacity was shifted across Loy Yang A from prices of less than \$20/MWh to \$4000/MWh and \$8000/MWh. The rebid reason given was “Material change in PD”.

Figure 3 shows, for the trading intervals where the spot price was greater than \$5000/MWh, the total amount of capacity available in Victoria. The figure compares this with the forecasts 4 and 12 hours ahead of dispatch. The change in the amount of capacity offered at prices less than the forecast price calculated four hours ahead of dispatch is also included. This highlights the changes to the supply curve that contributed to changes in the price forecast.

Figure 3: Actual and forecast capacity and spot price

Thursday 3:30 pm	Actual	4 hr forecast	12 hr forecast
Capacity (MW)			
available	8195	8270	8550
priced at less than \$34.70	6571	6724	
Spot price (\$/MWh)	6997.03	34.70	
Friday 11 am			
Capacity (MW)			
available	8340	8447	8000
priced at less than \$32.88	6683	6693	
Spot price (\$/MWh)	9134.14	32.88	
Friday 11.30 am			
Capacity (MW)			
available	8405	8462	8330
priced at less than \$36.07	6542	6701	
Spot price (\$/MWh)	8833.89	36.07	
Friday 12 pm			
Capacity (MW)			
available	8423	8487	8580
priced at less than \$52.90	6855	6591	
Spot price (\$/MWh)	6691.38	52.90	

The closing bids for all participants in Victoria with capacity priced at or above \$5000/MWh during this period are provided in Appendix B.

Changes to network availability

Changes to the availability of the transmission network can have significant impacts on market outcomes. These changes may result from planned network outages or from the unplanned failure of equipment. Network outages are modelled in the market systems to reflect the expected capability of the network both in real time and ahead of time. At times, shortcomings in modelling accuracy can result in significant differences between the forecast capability of the network and the actual capability.

Planned network outages of a 132kV transmission line between Wagga and Yanco in southern New South Wales and a transformer at Robertstown in South Australia were scheduled for both Thursday and Friday. The combination of constraints required to manage these outages led to a significant restriction on flows from Snowy into Victoria, which was far greater than forecast.

Actual flows were limited to around 300 MW when the spot price was above \$5000/MWh. This compares to a nominal limit of around 1700 MW under normal conditions.

Despite the network outages being modelled in the forecasting process, the impact of these outages on network capability was not forecast accurately. The forecast produced four hours ahead of dispatch estimated the capability of the Snowy-Victoria interconnector to be between 600 MW and 900 MW higher than actual capability. The discrepancy continued up until the actual dispatch time. Figure 4 compares the actual Snowy to Victoria interconnector limit and flow with those forecast 4 and 12 hours ahead of dispatch for the trading intervals in question. Figure 5 shows the five minute flow and limits on the Snowy to Victoria interconnector for Thursday and Friday. The periods where the spot price was greater than \$5000/MWh are highlighted.

A more detailed explanation on the changes to the limits that occurred on Thursday and Friday can be found in Appendix C.

Figure 4: Snowy to Victoria interconnector actual and forecast flows and limits

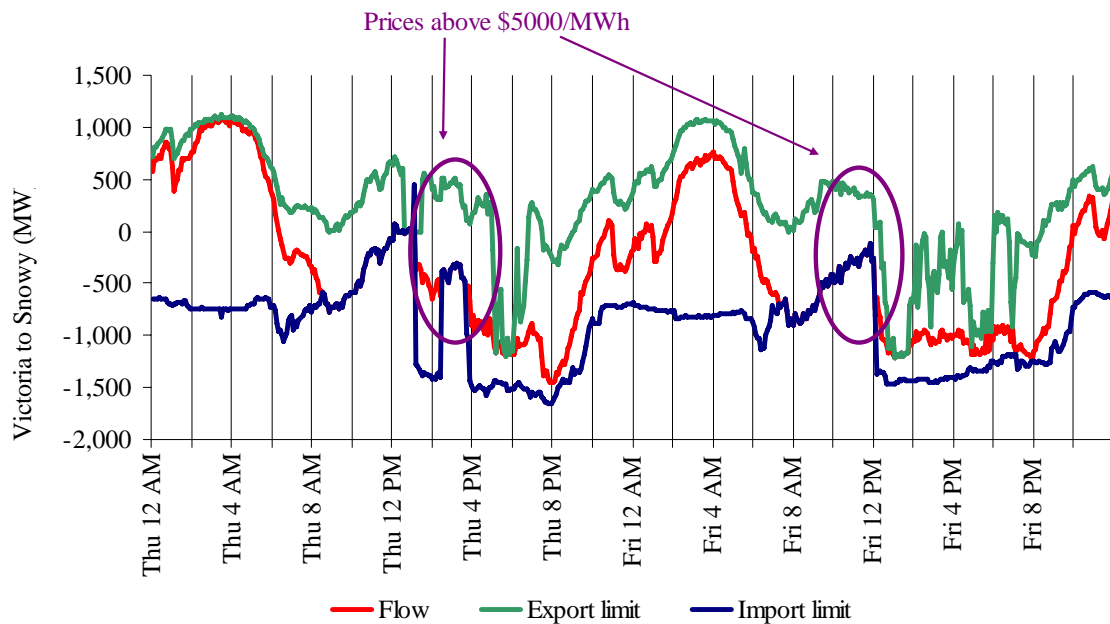
Thursday 3:30 pm	Actual	4 hr forecast	12 hr forecast
Limit into Victoria (MW)	346	1,325	1,333
Flows into Victoria (MW)	346	719	670

Friday 11 am	Actual	4 hr forecast	12 hr forecast
Limit into Victoria (MW)	309	919	1061
Flows into Victoria (MW)	309	910	1061

Friday 11.30 am	Actual	4 hr forecast	12 hr forecast
Limit into Victoria (MW)	282	1020	1060
Flows into Victoria (MW)	282	110	1060

Friday 12 pm	Actual	4 hr forecast	12 hr forecast
Limit into Victoria (MW)	202	1177	1104
Flows into Victoria (MW)	202	978	1057

Figure 5: Vic-Snowy flows including import and export limits



Assessment

High demand in Victoria, combined with the reduction in flows from Snowy into Victoria as a result of planned network outages in New South Wales and South Australia, led to four trading interval prices above \$5000/MWh on Thursday 23 and Friday 24 February. This information was not accurately forecast in the market systems. Whilst there was rebidding pursuant to clause 3.8.22 that did contribute to the price exceeding \$5000/MWh, its impacts were minor when compared to the network outage.

The following tables identify for each trading interval in which the spot price exceeded \$5000/MWh, every five minute dispatch interval price and the generating units, as published in the market systems, involved in setting the energy price. This information is published by NEMMCO¹. Also shown is the energy or ancillary service offer price involved in determining the dispatch price together with the quantity of that service and the contribution to the total energy price. Dispatch prices greater than \$10 000/MWh are capped. The 30 minute spot price is the time weighted average of the six dispatch interval prices.

Thursday 23 February – Victoria 3.30 pm

Time	Dispatch price (\$/MWh)	Participant	Unit	Service	Offer price	Margin. change	Contribution (\$/MWh)
3:05	10,407.82	TRUEnergy	TORRB2	Energy	\$9,600.05	0.36	3,469.69
			TORRB1	Energy	\$9,600.05	0.36	3,469.69
			TORRB4	Energy	\$9,600.05	0.36	3,469.69
			TORRB2	Lower reg	\$0.25	0.36	0.09
			TORRB1	Lower reg	\$0.25	0.36	0.09
			TORRB4	Lower reg	\$0.25	0.36	0.09
			TARONG#2	Lower reg	\$1.40	-1.08	-1.52
3:10	5,391.60	Int. Power.	PPCCGT	Energy	\$4,999.00	1.08	5,391.60
3:15	8,551.39	LYMMCO	LYA1	Energy	\$8,551.39	1.00	8,551.39
3:20	9,400.70	Ecogen	NPS	Energy	\$9,400.70	1.00	9,400.70
3:25	8,551.49	LYMMCO	LYA3	Energy	\$8,551.49	1.00	8,551.49
3:30	87.00	South.Hyd.	MCKAY1	Energy	\$87.00	1.00	87.00
Spot price	\$7,021.49/MWh						

Friday 24 February – Victoria 11 am

Time	Dispatch price (\$/MWh)	Participant	Unit	Service	Offer price	Margin. change	Contribution (\$/MWh)	
10:35	9,400.70	Ecogen	NPS	Energy	\$9,400.70	1.00	\$9,400.70	
10:40		Ecogen	NPS	Energy	\$9,400.70	1.00	\$9,400.70	
10:45	8,551.39	LYMMCO	LYA1	Energy	\$8,551.39	1.00	\$8,551.39	
10:50	8,550.68	LYMMCO	LYA4	Energy	\$8,550.49	1.00	\$8,550.49	
			LYA4	Raise 60 sec	\$0.40	-0.43	-\$0.17	
			LYA4	Raise 6 sec	\$0.50	-0.29	-\$0.14	
			Snowy Hyd	UPPTUMUT	Raise 6 sec	\$1.00	0.29	\$0.29
			CS Energy	SWAN_B_4	Raise 60 sec	\$0.50	0.43	\$0.21
10:55	9,500.70	Ecogen	JLA01	Energy	\$9,500.70	1.00	\$9,500.70	
11:00	9,400.70	Ecogen	NPS	Energy	\$9,400.70	1.00	\$9,400.70	
Spot price	\$9134.14/MWh							

¹ NEMMCO first published details on how the price is determined, for every dispatch interval, in June 2004. Documentation of this process can be found at <http://www.nemmco.com.au/dispatchandpricing/140-0036.htm>

Friday 24 February – Victoria 11.30 am

Time	Dispatch price (\$/MWh)	Participant	Unit	Service	Offer price	Margin. change	Contribution (\$/MWh)
11:05	8,550.49	LYMMCO	LYA4	Energy	\$8,550.49	1.00	8,550.49
11:10	8,550.49	LYMMCO	LYA4	Energy	\$8,550.49	1.00	8,550.49
11:15	9,400.70	Ecogen	NPS	Energy	\$9,400.70	1.00	9,400.70
11:20	8,550.49	LYMMCO	LYA4	Energy	\$8,550.49	1.00	8,550.49
11:25	9,400.70	Ecogen	NPS	Energy	\$9,400.70	1.00	9,400.70
11:30	8,550.49	LYMMCO	LYA4	Energy	\$8,550.49	1.00	8,550.49
Spot price	\$8833.89/MWh						

Friday 24 February – Victoria midday

Time	Dispatch price (\$/MWh)	Participant	Unit	Service	Offer price	Margin. change	Contribution (\$/MWh)
11:35	\$4,400.70	Ecogen	NPS	Energy	\$4,400.70	1.00	\$4,400.70
11:40	\$8,551.39	LYMMCO	LYA1	Energy	\$8,551.39	1.00	\$8,551.39
11:45	\$4,744.27	Int. Power	LYB2	Energy	\$4,744.27	1.00	\$4,744.27
11:50	\$8,550.49	LYMMCO	LYA4	Energy	\$8,550.49	1.00	\$8,550.49
11:55	\$9,500.73	Ecogen	JLA02	Energy	\$9,500.73	1.00	\$9,500.73
12:00	\$4,400.70	Ecogen	NPS	Energy	\$4,400.70	1.00	\$4,400.70
Spot price	\$6691.38/MWh						

The figures in this appendix identify the half hour closing bids for all participants in Victoria with capacity priced at or above \$5000/MWh during the trading intervals when the price exceeded \$5000/MWh.

Figure 1: AGL – Southern Hydro and Somerton closing bid prices, dispatch and region price.

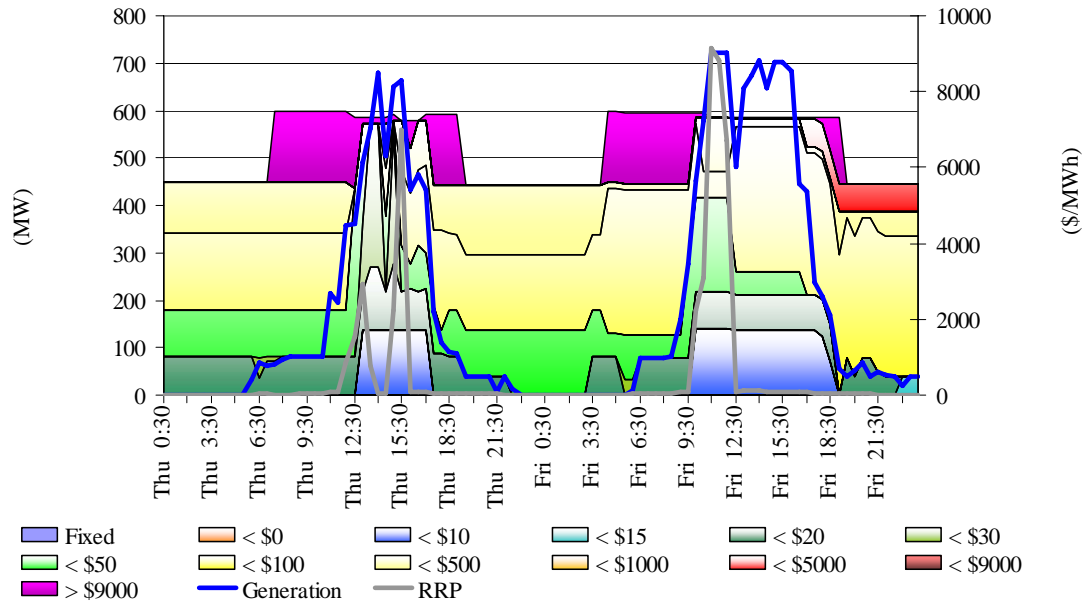


Figure 2: Alinta – Bairnsdale closing bid prices, dispatch and region price.

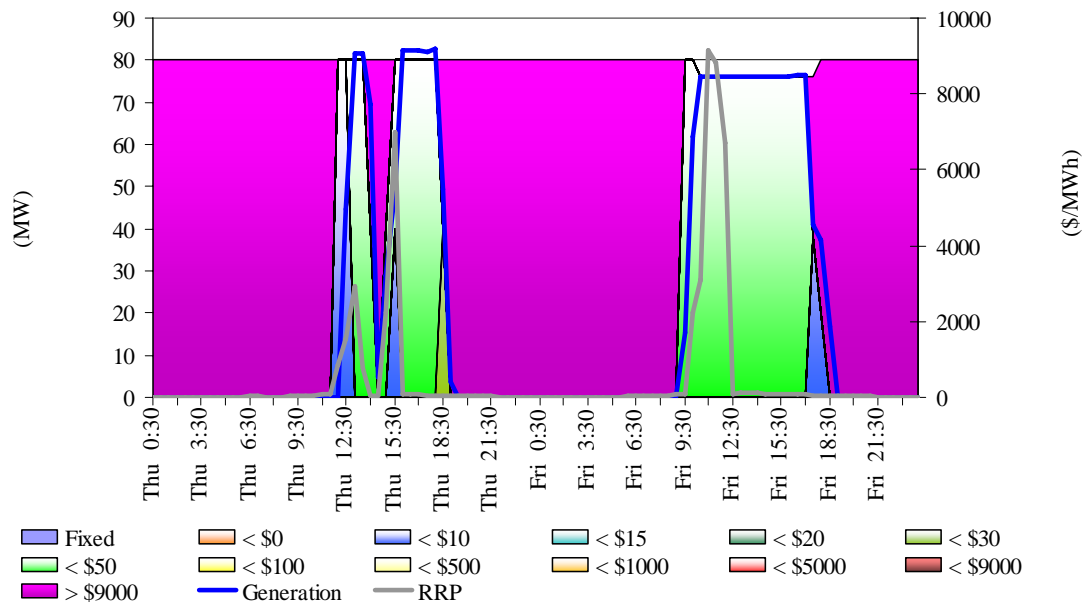


Figure 3: Ecogen closing bid prices, dispatch and region price.

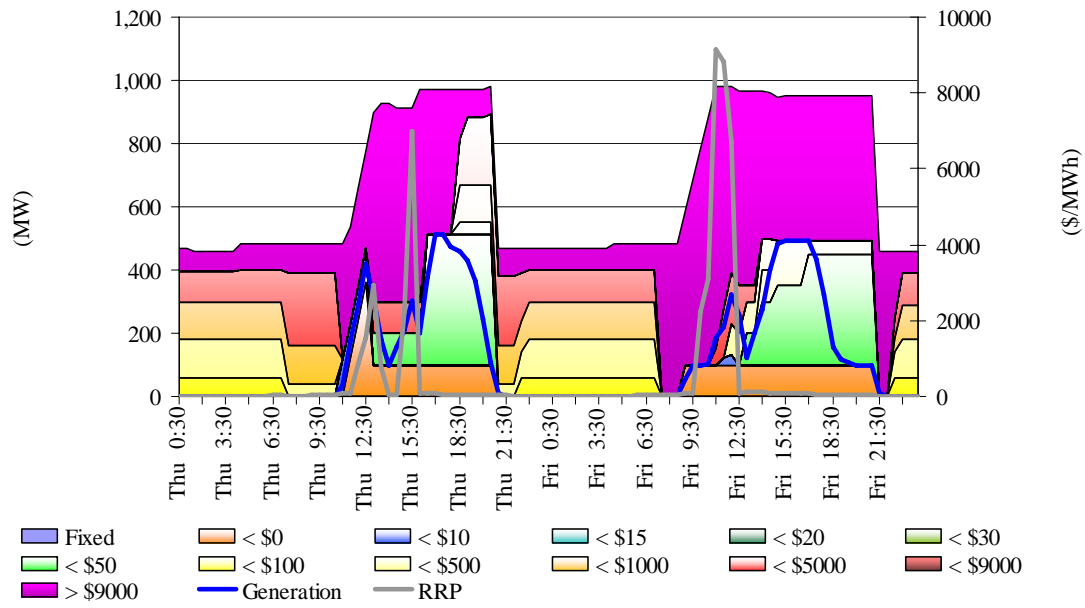


Figure 4: LYMMCO – Loy Yang A closing bid prices, dispatch and region price

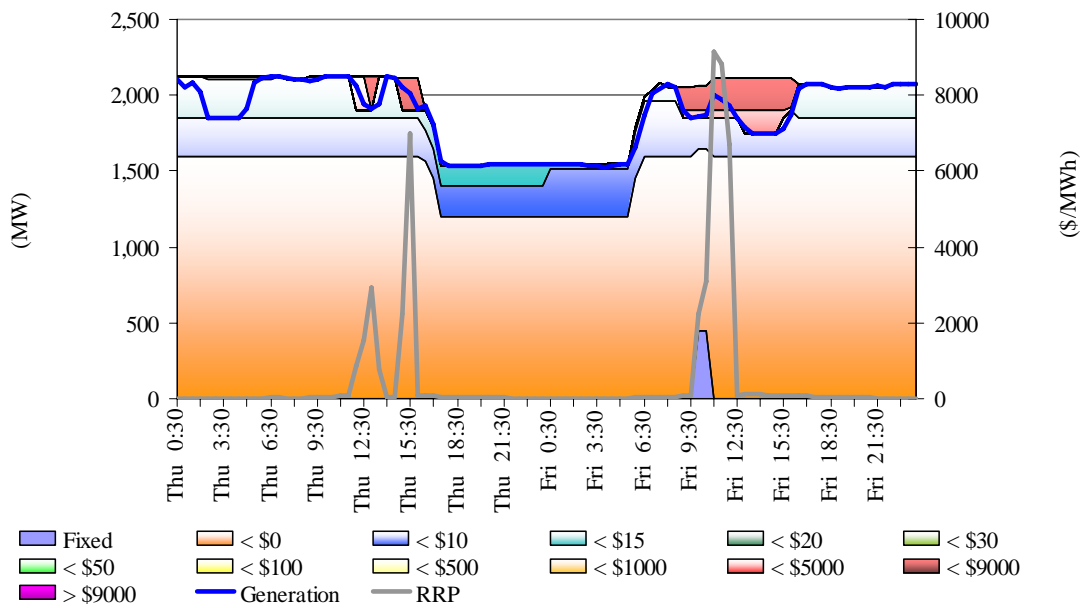
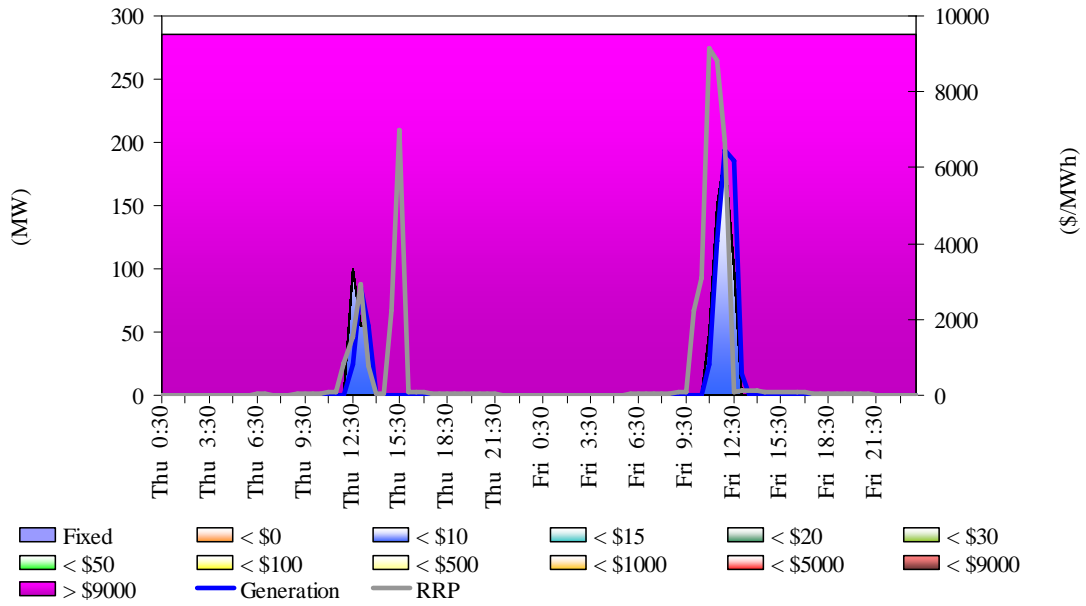


Figure 5: Snowy Hydro – Valley Power closing bid prices, dispatch and region price



Planned network outages of a 132kV transmission line between Wagga and Yanco in southern New South Wales and a transformer at Robertstown in South Australia were scheduled for both Thursday and Friday. The combination of constraints required to manage these outages led to a significant restriction on flows from Snowy into Victoria.

From around 8 am on Thursday morning, the limit on flows south across the Snowy to Victoria interconnector (the interconnector) was steadily reduced by the constraints designed to manage the two network outages. By midday, flows were forced north, counter to the prevailing market conditions. NEMMCO invoked further constraints to limit the accumulation of negative settlements across the interconnector. These constraints prevented flow north between 12.35 pm and 1.30 pm.

At 1.06 pm, effective immediately the constraints managing the outage of the Wagga to Yanco line in New South Wales were revoked from the market systems. Flows into Victoria from Snowy increased immediately from zero to 360 MW with a limit on flows of around 1300 MW.

The constraints managing the Robertstown transformer outage in South Australia remained in the market systems until 2.04 pm. Following their removal at 2.24 pm, the Wagga to Yanco constraints were again invoked, reducing the limit on flows from the Snowy to Victoria interconnector by 1000 MW in one dispatch interval. Actual flows were reduced by 200 MW to 400 MW. The 5-minute price in Victoria and South Australia rose to above \$5000/MWh, with a half hour price above \$5000/MWh in Victoria. At 3.44 pm the constraints were removed from the market systems effective immediately.

Two market notices were published at 2.54 pm. The first notified the market of counter price flows and the subsequent actions of NEMMCO to limit flows north to zero. The market notice was published an hour and a half after conditions had been resolved. The second market notice identified that the two transmission outages in South Australia and New South Wales had led to constraint violations between 12.45 pm and 1.10 pm, and that an agreed contingency plan had been enabled to maintain power system security. No details of this contingency plan were published.

The Robertstown transformer outage was first entered into the Network Outage Scheduler (NOS) by Electranet SA on Friday 3 February and progressed by NEMMCO to 'Likely to Proceed' (LTP) status on Monday 6 February. The Wagga to Yanco line outage was entered into the NOS on Monday, 30 January and progressed to LTP status the following day. Although the outages were planned, the constraints that actually limited flows on the day did not enter the market systems until two days before the outage and did not accurately reflect market outcomes in the predispatch forecasting system.