Market analysis

AUSTRALIAN ENERGY REGULATOR

19–25 FEBRUARY 2006

Prices for the week increased significantly in Victoria and South Australia averaging $200/MWh and $59/MWh respectively. A network outage in south western New South Wales on Thursday and Friday limited flows from Snowy into Victoria to zero at times. Notice of this outage was given two days earlier, with forecasts under-estimating the impact by more than 1000 MW. A new record demand of around 8700 MW occurred in Victoria on Friday.

Prices were consistent with the previous week in Queensland and New South Wales averaging $31/MWh and $25/MWh respectively. Prices in Tasmania averaged $32/MWh.

Turnover in the energy market for the mainland was $292 million. The total cost of ancillary services for the week was $234 000, or 0.1 per cent of the energy market. Turnover in Tasmania for the week was $5.6 million with the cost of ancillary services totaling $56 000 or 1 per cent of turnover.

Significant variations between actual prices and those forecast 4 and 12 hours ahead occurred in 67, or around 20 per cent of all trading intervals. Demand forecasts produced 4 and 12 hours ahead varied from actual by more than 5 per cent in approximately 20 per cent of all trading intervals across the market. These variations were most frequent in South Australia occurring in around 60 per cent of all trading intervals.

Energy prices

Figure 1 sets out national demand and spot prices in each region for each trading interval. Figure 2 compares the volume weighted average price with the averages for the previous week, the same quarter last year and for the financial year to date. Figure 3 compares the weekly price volatility index with the averages for the previous week and the same quarter last year.

Figure 1: national demand and spot prices

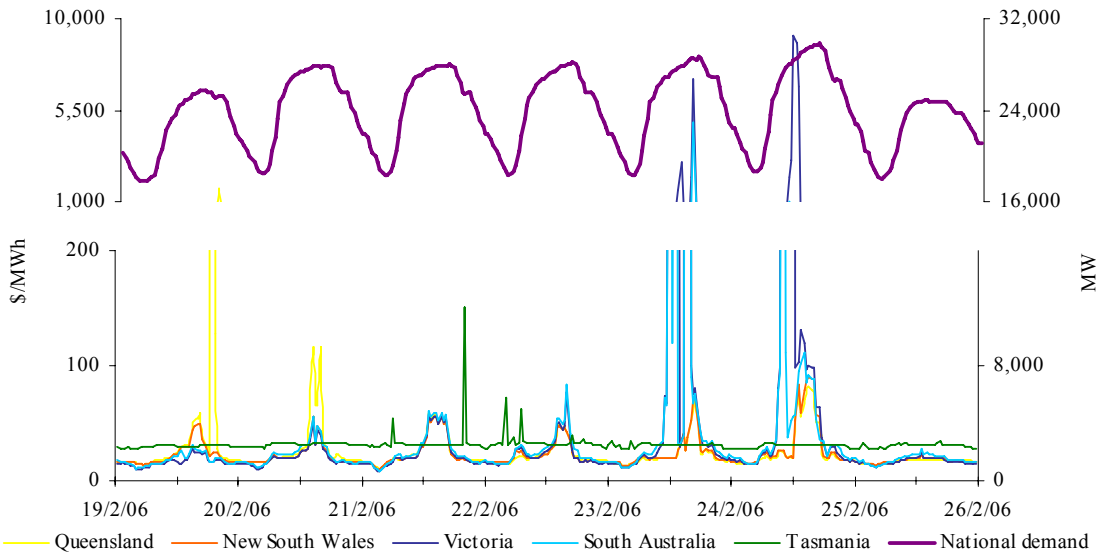


Figure 2: volume weighted average spot price for energy market ($/MWh)

	QLD	NSW	VIC	SA	TAS
Last week	31	25	200	59	32
Previous week	24	24	26	30	32
Same quarter last year	25	35	22	31	-
Financial year to date	36	53	35	48	73
% change from previous week	▲30%	▲1%	▲680%	▲95%	▲1%
% change from same quarter last year	▲25%	▼30%	▲807%	▲89%	-
% change from year to date	▼1%	▼7%	▲14%	▲14%	-

Figure 3: volatility index during peak periods

	QLD	NSW	VIC	SA	TAS
Last week	1.56	1.61	2.87	1.64	0.08
Previous week	0.98	1.01	1.24	1.02	0.08
Same quarter last year	0.73	0.74	0.78	0.70	-

Figures 4 to 8 show the weekly correlation between spot price and demand.

Figure 4: Queensland

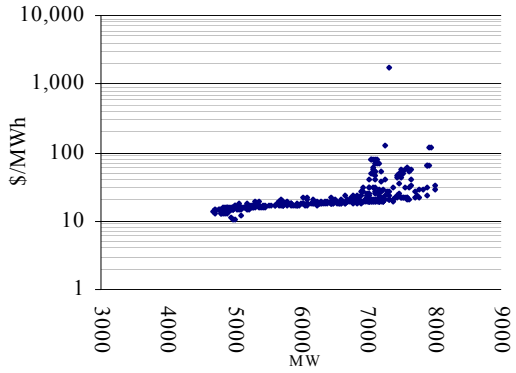


Figure 5: New South Wales

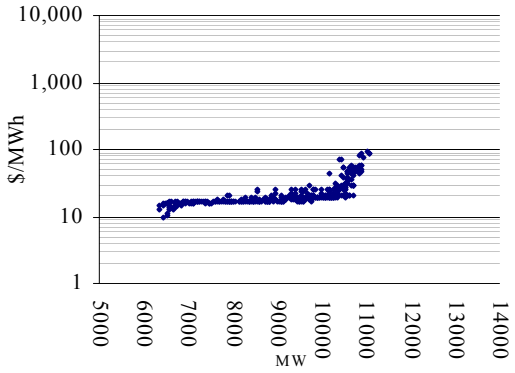


Figure 6: Victoria

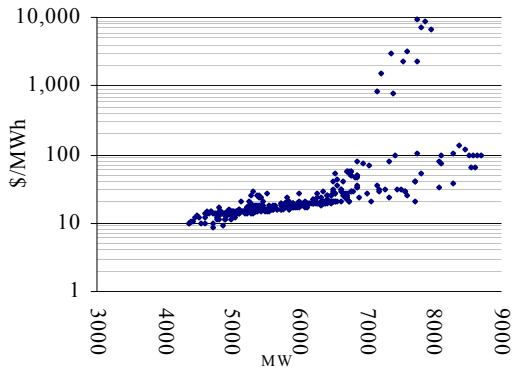


Figure 7: South Australia

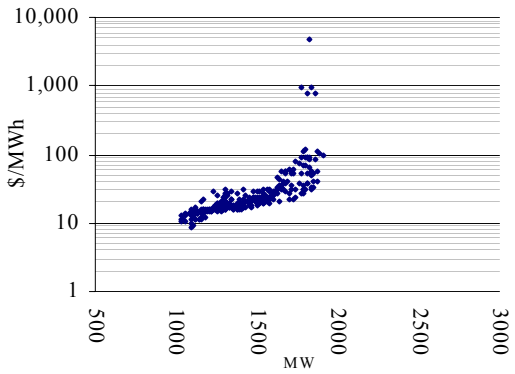
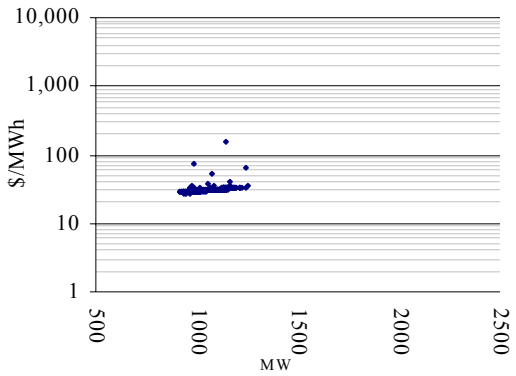


Figure 8: Tasmania



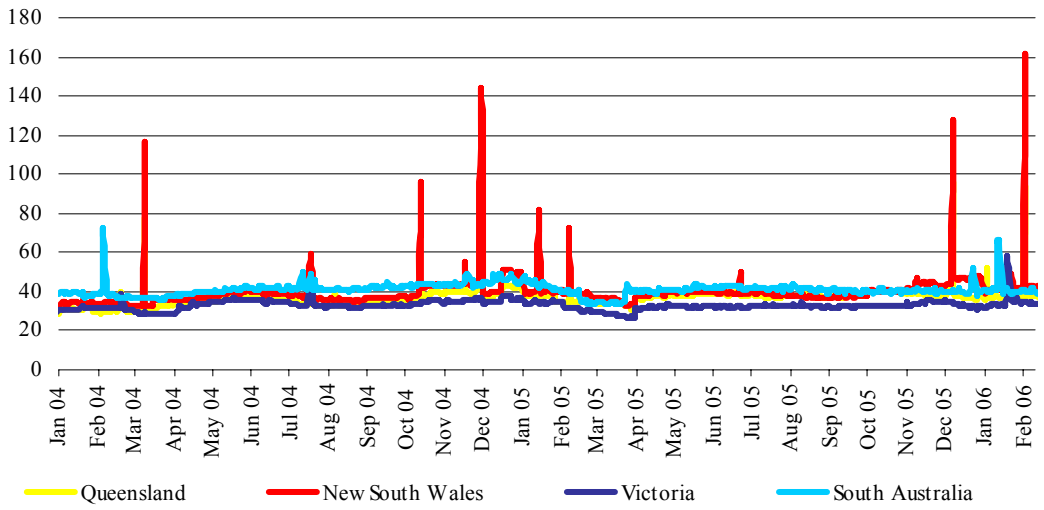
Maximum spot prices reached $90/MWh in New South Wales and $1693/MWh in Queensland on Sunday evening. The other mainland maximum spot prices for the week were $9134/MWh in Victoria at 11am Friday and $4937/MWh at 3.30pm Thursday in South Australia. In Tasmania, the highest price for the week, of $152/MWh, was recorded at 8.00pm on Tuesday.

Figure 9 sets out the d-cyphaTrade wholesale electricity price index (WEPI) for each region throughout the week excluding Tasmania. Figure 10 sets out the WEPI since 1 January 2004.

Figure 9: d-cyphaTrade WEPI for the week

	Monday	Tuesday	Wednesday	Thursday	Friday
Queensland	37.12	37.07	37.11	37.14	37.08
New South Wales	41.72	42.11	42.01	42.14	42.26
Victoria	33.96	34.07	34.12	38.64	41.97
South Australia	39.32	39.90	40.30	40.46	40.05

Figure 10: d-cyphaTrade WEPI



Reserve

There were no low reserve conditions forecast for the week. Directions were issued to Directlink on Monday, Tuesday, Wednesday, Thursday, Friday and Sunday to manage network issues associated with the Gold Coast area and northern New South Wales. Hydro Tasmania was directed on Wednesday to maintain power system security and reliability in the Tasmanian region.

Figures 11 to 14 show spot price, net imports and limits at the time of weekly maximum demand.

Figure 11: Queensland

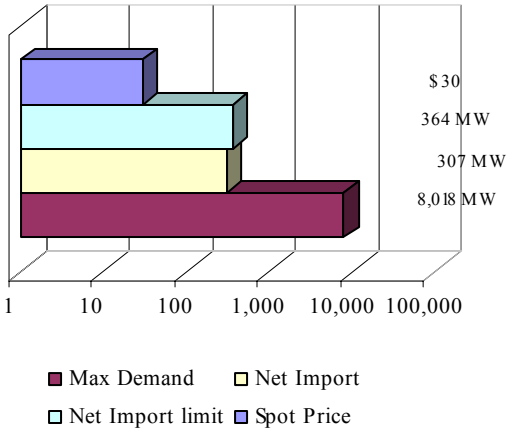


Figure 12: New South Wales

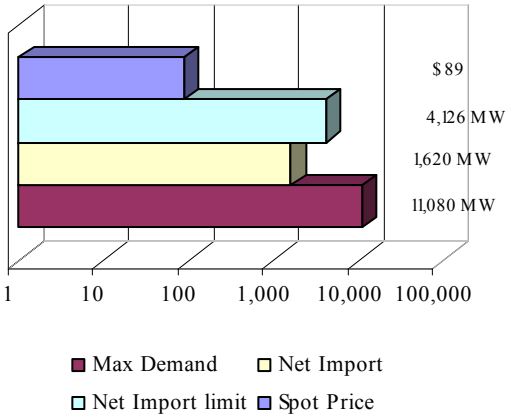


Figure 13: Victoria

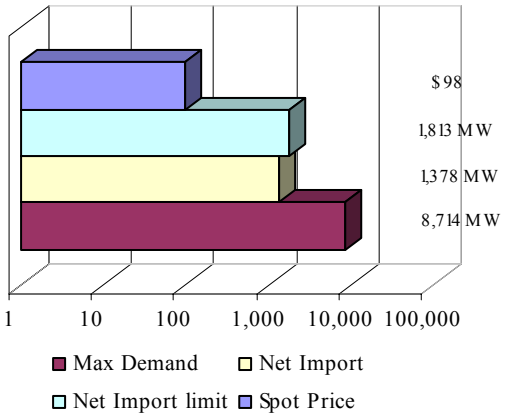
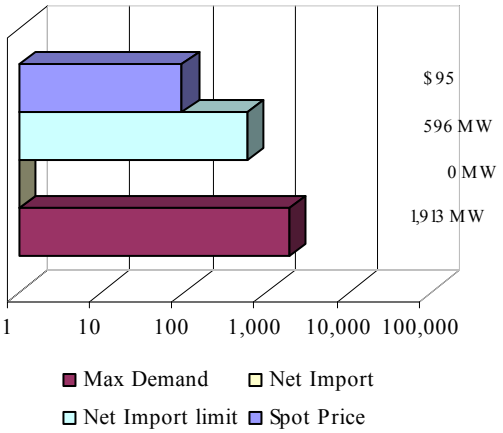


Figure 14: South Australia



In Tasmania, demand reached a maximum of 1251 MW at 7.30am on Wednesday morning. The spot price at that time was $35/MWh.

Price variations

There were 67 trading intervals where actual prices significantly varied from forecasts made 4 and 12 hours ahead of dispatch. Figures 15 to 19 show the difference in actual and forecast price versus the difference in actual and forecast demand. The figures highlight the correlation between price variation and demand forecast error. The information is presented in terms of the percentage difference from actual. Price differences beyond 100 per cent have been capped.

Figure 15: Queensland

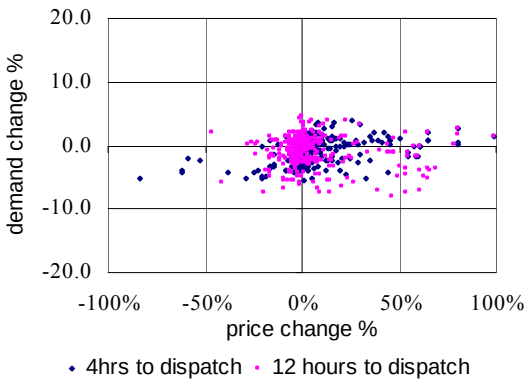


Figure 16: New South Wales

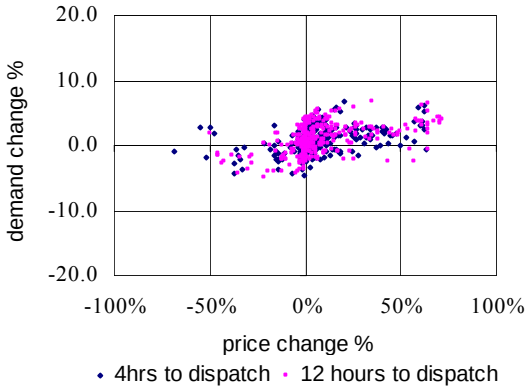


Figure 17: Victoria

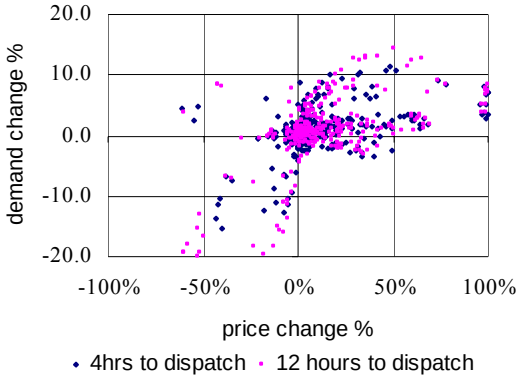


Figure 18: South Australia

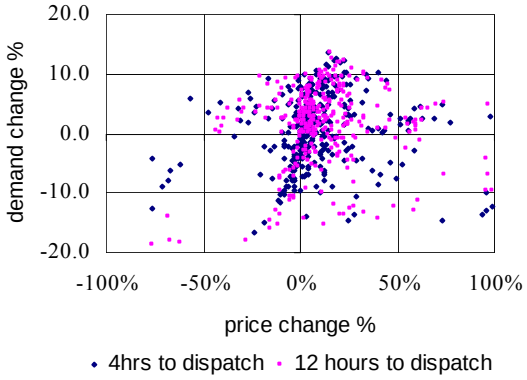


Figure 19: Tasmania

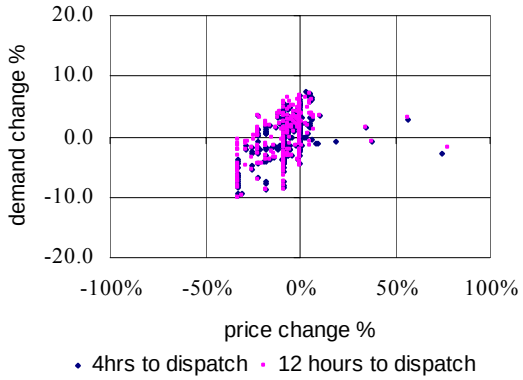
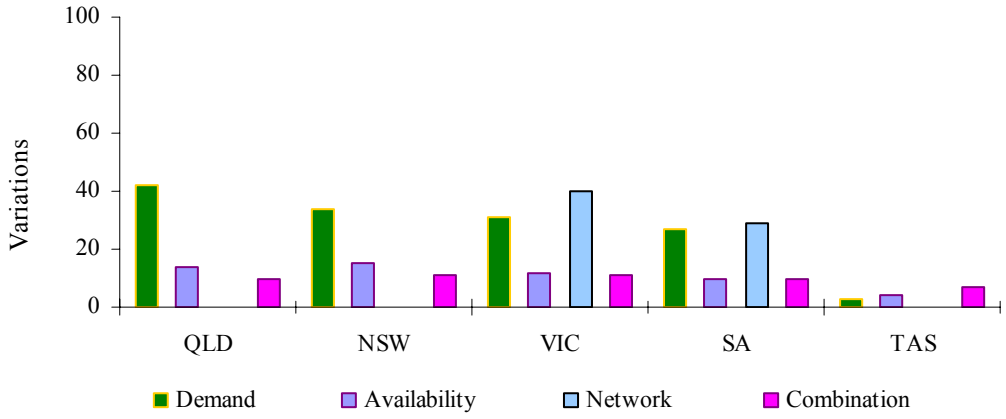


Figure 20 summarises the number and most probable reason for variations between forecast and actual prices.

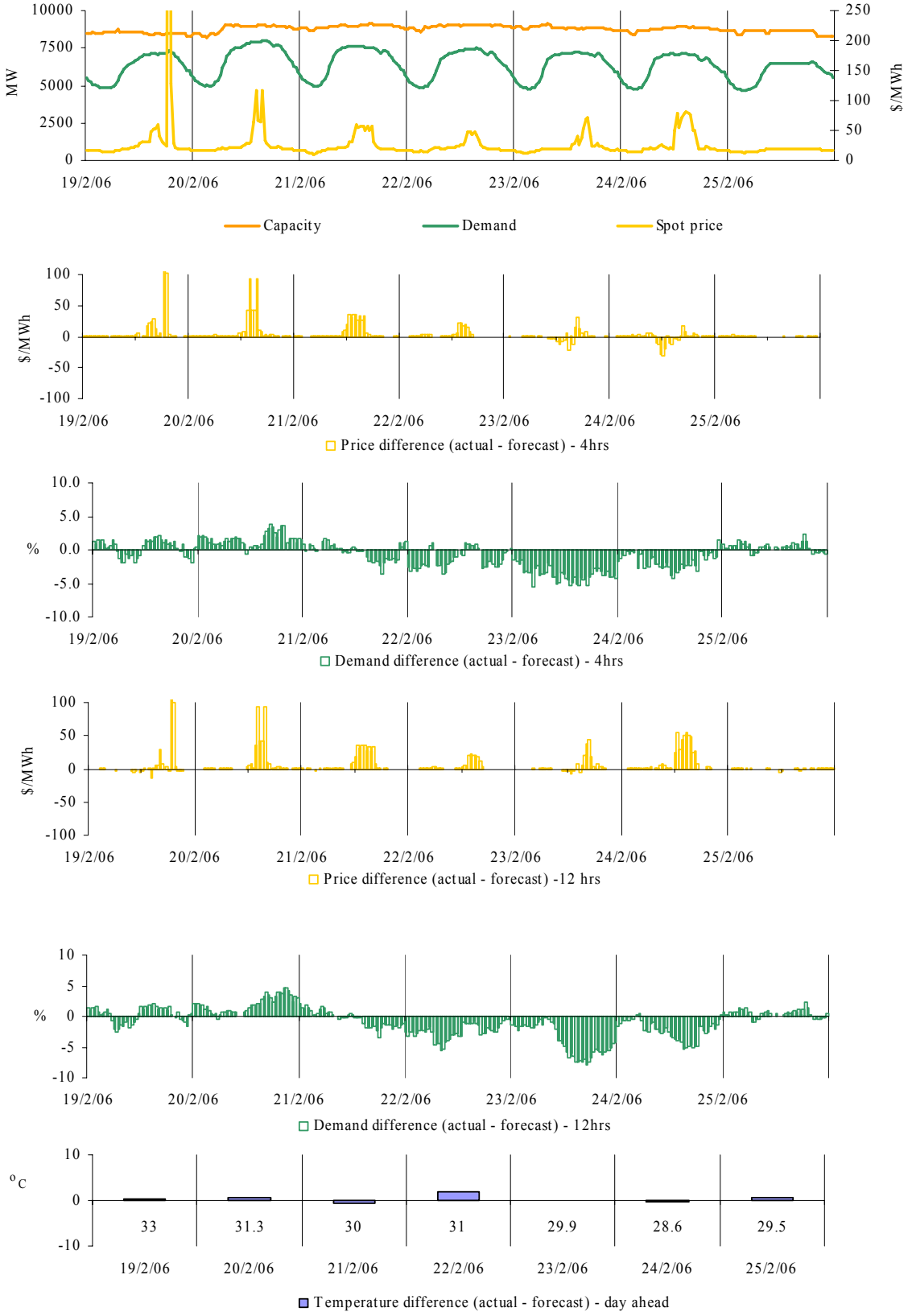
Figure 20: reasons for variations between forecast and actual prices



Price and demand

Figures 21 - 50 set out details of spot prices and demand on a regional basis. They include the actual spot price, actual demand outcomes and variation from forecasts made 4 and 12 hours ahead of dispatch on a daily basis. The differences between the maximum temperature and the temperature forecast at around 6.00 pm the day before are also included. Figures 51 - 55 set out for each region the extent of capacity offered into the market within a series of price thresholds. Actual price and generation dispatched in a region are overlaid.

Figures 21-26: Queensland actual spot price, demand and forecast differences



There were 4 occasions in Queensland where the spot price was greater than three times the weekly average price of $31/MWh. These occurred on Sunday evening and Monday afternoon.

Sunday, 19 February

7:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	1693.24	24.79	24.26
Demand (MW)	7313	7213	7202
Available capacity (MW)	8441	8402	8777
7:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	127.86	25.20	27.43
Demand (MW)	7274	7262	7257
Available capacity (MW)	8452	8410	8777

During the period demand was slightly higher than forecast.

Flows north from New South Wales were reduced from around 400 MW to 200 MW from 5pm, when NEMMCO reclassified the loss of multiple transmission lines around Bulli Creek as credible following advice of lightning in the vicinity.

Demand increased over the trading interval by 140 MW, this included a 5 minute increase of 76 MW at 6.55 pm. At the same time, fluctuations in the limit on flows north across the New South Wales to Queensland interconnector saw a 5-minute reduction of 50 MW from New South Wales. There was around 90 MW of capacity available within Queensland that was priced between $30/MWh and $9000/MWh. The 5-minute price increased to $10 000/MWh for this dispatch interval.

At 6.56 pm effective from 7.05 pm, Enertrade shifted a total of 180 MW of capacity at Gladstone from prices of less than $30/MWh to $80/MWh and $280/MWh. The rebid reason given was “material change in market conditions::change MW distribution”.

At 7.20pm effective 7.30pm, Stanwell increased the available capacity at Kareeya by 71MW. This capacity was all priced at zero. At the same time, the availability of Stanwell was increased by 15 MW. This capacity was priced at less than $20/MWh. The rebid reason given was “change market conditions”.

There was no other significant rebidding.

Monday, 20 February

2:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	115.78	22.84	22.84
Demand (MW)	7910	7872	7771
Available capacity (MW)	8974	9107	9223
4:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	116.38	22.84	22.84
Demand (MW)	7958	7739	7736
Available capacity (MW)	9025	9059	9223

Conditions at the time saw demand as much as 200 MW higher than forecast four hours ahead with available capacity lower than forecast.

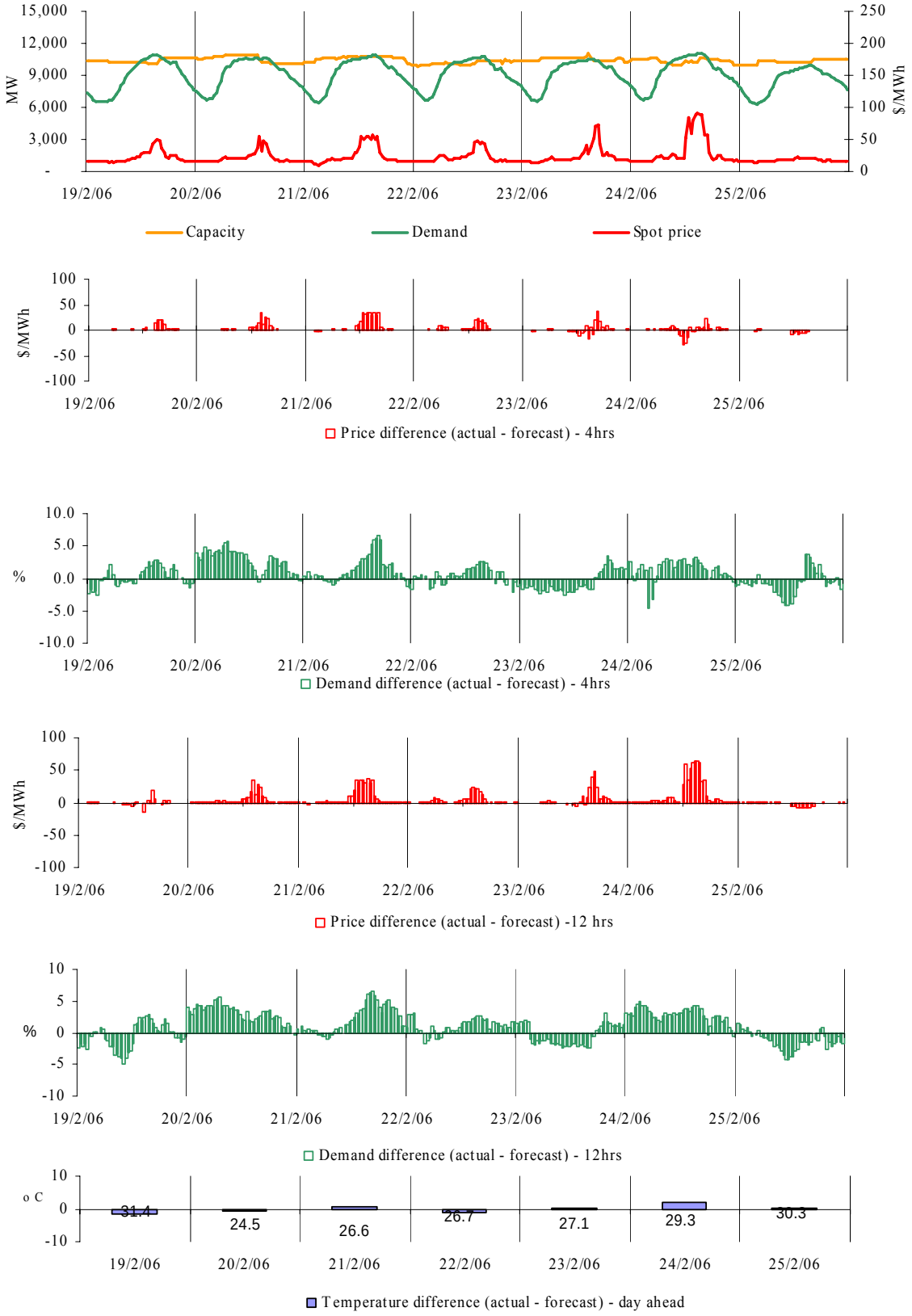
At 9.31 am, Callide Power Trader reduced the available capacity at Callide C by 75 MW. All of this capacity was priced at less than $20/MWh. A second rebid at 11.36 am increased the availability by 15 MW. The rebid reason given on each occasion was "high emissions".

Over the course of the morning, CS Energy reduced its available capacity by 72 MW. Most of this occurred at 10.57 am when 45 MW was removed at Swanbank B3, 20 MW of this capacity was priced at less than $20/MWh. The rebid reason given was "Swan B3 emissions HL 1 pass O/S".

At 11.47 am Enertrade reduced the available capacity at Gladstone unit 5 by 125 MW, the majority of this capacity was priced at less than $30/MWh. The rebid reason given was "reasons are different". Further rebids made around 2pm, saw 235 MW of capacity at Gladstone shifted from prices of less than $30/MWh to above $260/MWh. The rebid reasons given were "material change in market conditions::change MW distribution" and "extend/revise outage::change available/MW distribution".

There was no other significant rebidding.

Figures 27-32 New South Wales actual spot price, demand and forecast differences



There were 6 occasions in New South Wales where the spot price was greater than three times the weekly average price of $25/MWh. These occurred on Friday afternoon.

Friday, 24 February

1:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	82.99	96.70	23.91
Demand (MW)	10859	10522	10474
Available capacity (MW)	10230	9892	10790
2:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	78.55	81.54	25.83
Demand (MW)	10935	10702	10531
Available capacity (MW)	10287	9922	11190
2:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	87.56	90.88	25.82
Demand (MW)	10903	10696	10551
Available capacity (MW)	10287	9922	11190
3:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	90.22	84.20	25.81
Demand (MW)	11028	10705	10589
Available capacity (MW)	10287	9922	11190
3:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	88.98	83.65	25.94
Demand (MW)	11080	10721	10618
Available capacity (MW)	10579	9932	11190
4:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	87.95	84.45	26.35
Demand (MW)	11077	10777	10596
Available capacity (MW)	10577	9932	11190

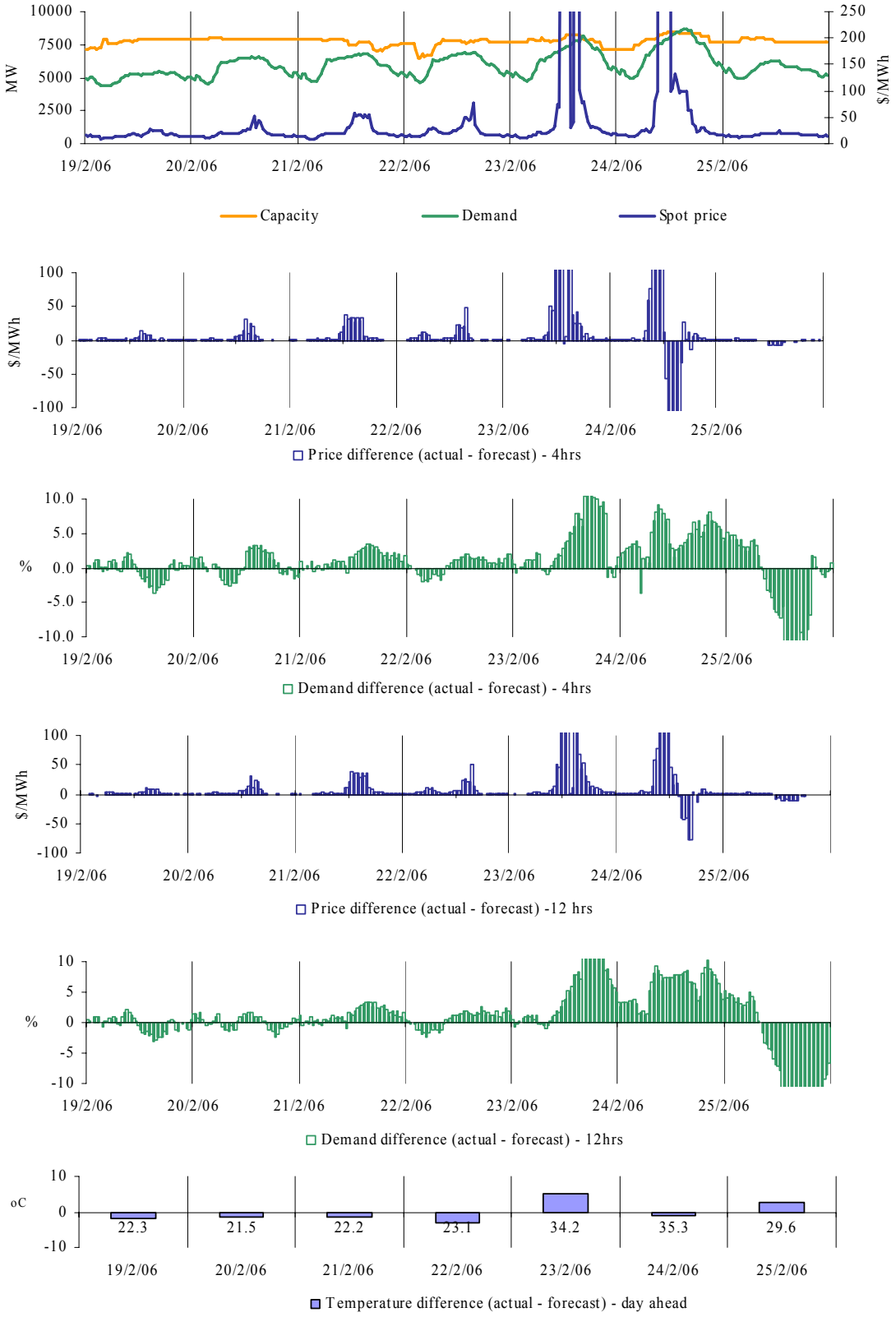
Conditions at the time saw demand more than 300 MW higher than forecast four hours ahead, with price close to forecast on the same basis. At around 6am, the availability of Macquarie Generation's Liddell was reduced by 585 MW for "Coal management". Liddell unit 4 was shut down from around 8.30am, bringing the total reduction to around 900 MW - the reason given was "Steam main leak". Most of this capacity was priced at less than $30/MWh. Around 400 MW of this capacity was returned later in the morning.

At 8.54 am, Delta Electricity shifted 150 MW of capacity at Vales Point from prices above $9500/MWh to below $15/MWh. At 1.52 pm, a further 50 MW of capacity was shifted from above $9500/MWh to below $20/MWh. The rebid reason given on both occasions was "spot price change::band shift". At 2.46pm, the availability of Vales Point unit 6 was increased by 300 MW, 50 MW of which was priced at less than $20/MWh. The rebid reason given was "Precip outage finished ealier::capacity limit change".

Rebids from 1.27 pm shifted 650 MW of capacity at Macquarie Generation's Bayswater and Liddell from prices less than $30/MWh to around $280/MWh. The rebid reason given was "Manage Snowy Vic constraint". At 1.57 pm, 160 MW of capacity at Bayswater was shifted to prices less than $15/MWh from $250/MWh. The rebid reason given was "Change in 5 minute predispatch".

There was no other significant rebidding.

Figures 33-38: Victoria actual spot price, demand and forecast differences



There were 11 occasions in Victoria where the spot price was greater than three times the weekly average price of $200/MWh. These occurred on Thursday and Friday. A report into the events of both days, when the spot price exceeded $5000/MWh, will be published separately in accordance with clause 3.13.7 of the Rules.

Thursday, 23 February

12:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	845.04	24.02	22.95
Demand (MW)	7158	6900	6897
Available capacity (MW)	7944	8209	8354
12:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	1528.95	28.26	23.58
Demand (MW)	7213	6928	6937
Available capacity (MW)	8066	8139	8474
1:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	2919.93	32.08	27.41
Demand (MW)	7375	6998	6991
Available capacity (MW)	8198	8264	8594
1:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	761.10	33.64	27.65
Demand (MW)	7405	7034	7027
Available capacity (MW)	8228	8294	8624
3:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	2233.23	48.59	31.61
Demand (MW)	7759	7142	7148
Available capacity (MW)	8198	8255	8550
3:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	6997.03	34.70	31.45
Demand (MW)	7826	7269	7175
Available capacity (MW)	8195	8270	8550

Conditions at the time saw demand up to almost 600 MW higher than forecast four hours ahead. Available capacity was around 400 MW less than forecast 12 hours ahead. Temperatures on the day reached 34 degrees, five degrees higher than forecast the previous day. Despite high prices occurring for much of the afternoon, at no time were high prices forecast. Predispatch forecasts, immediately prior to dispatch, were at times reporting limits south as high as 1300 MW, whilst the actual limit in dispatch was as low as zero.

Transmission outages in New South Wales and South Australia were the cause of the restrictions on power flows into Victoria from Snowy. Flows across the Victoria to Snowy interconnector into Victoria were reduced over the course of the morning, and by midday were beginning to flow into Snowy, counter price. NEMMCO invoked constraints to limit the accumulation of negative settlements, preventing flows north between 12.35 pm and 1.30 pm.

At 1.06pm, effective immediately constraints to manage the outage of the Wagga to Yanco line in New South Wales were revoked by NEMMCO. Flows into Victoria from Snowy increased immediately to 360 MW with the limit increasing from zero to around 1300 MW.

Prices were aligned across the market between 1.15 pm and 2.30 pm. The constraints to manage the outage of the Robertstown transformer in South Australia were revoked at 2.04 pm effective immediately. At 2.24 pm effective from 2.35 pm, the Wagga to Yanco line constraint was invoked again, reducing flows across the Victoria to Snowy interconnector into Victoria by 200 MW with the limit reducing by around 1000 MW, Victoria and South Australia 5-minute prices returned above $5000/MWh. At 3.44 pm the constraints were revoked effective immediately.

Between midnight and 8 am, the availability of International Power's Hazelwood was reduced by around 360 MW. Most of this capacity was priced at less than $20/MWh.

At 10.42 am, Ecogen shifted 118 MW of capacity at Jeeralang A from prices of above $280/MWh to $1/MWh. The rebid reason given was "Actual Vs PD forecast errors (market cond)".

At 11.41am effective 11.50 am, LYMMCO shifted 225 MW of capacity from prices of less than $20/MWh to around $4000/MWh. The rebid reason given was "Material change in PD". This capacity was shifted again at 12.32 pm effective immediately from $4000/MWh to around $8000/MWh before being returned to less than $20/MWh at 1.17pm. The rebid reasons given were "Material drop in Vic RRP B/T 12:15 and 12:30" and "Yanco-Wagga line RTS at 13:15" respectively. At 2.40 pm, 215 MW of capacity was again shifted to prices around $8000/MWh from less than $20/MWh. The rebid reason given was "Actual Vic RRP greater than F/Cast".

Around midday, Alinta shifted 80 MW of capacity at Bairnsdale from prices above $9000/MWh to zero. The rebid reason given was "Market conditions – Price/demand expectation".

There was no other significant rebidding.

Friday, 24 February

10:00 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	2240.93	20.60	21.91
Demand (MW)	7539	6950	6956
Available capacity (MW)	8202	8254	7760
10:30 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	3085.89	21.07	33.10
Demand (MW)	7604	7093	7080
Available capacity (MW)	8292	8342	7880
11:00 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	9134.14	32.88	35.72
Demand (MW)	7756	7209	7192
Available capacity (MW)	8340	8447	8000
11:30 am	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	8833.89	36.07	35.36
Demand (MW)	7885	7609	7301
Available capacity (MW)	8405	8462	8330
12:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	6691.38	52.90	52.75
Demand (MW)	7956	7723	7362
Available capacity (MW)	8423	8487	8580

Conditions at the time saw demand around 500 MW higher than forecast four and twelve hours ahead. Available capacity was as much as 400 MW higher than forecast 12 hours ahead. Temperatures on the day reached 35 degrees. Demand reached record levels later in the day, peaking above 8700 MW[1] at 4 pm

A transmission line outage in New South Wales between Wagga and Yanco was limiting flows south across the Victoria to Snowy interconnector to between 500 MW and 200 MW. Forecasts, immediately prior to dispatch however, were at times reporting limits as high as 1400 MW. The constraints modeling the outage were revoked from the market systems at 12.04 pm effective immediately. Following this, the limit across the interconnector increased by more than 1000 MW with flows increasing to more than 700 MW.

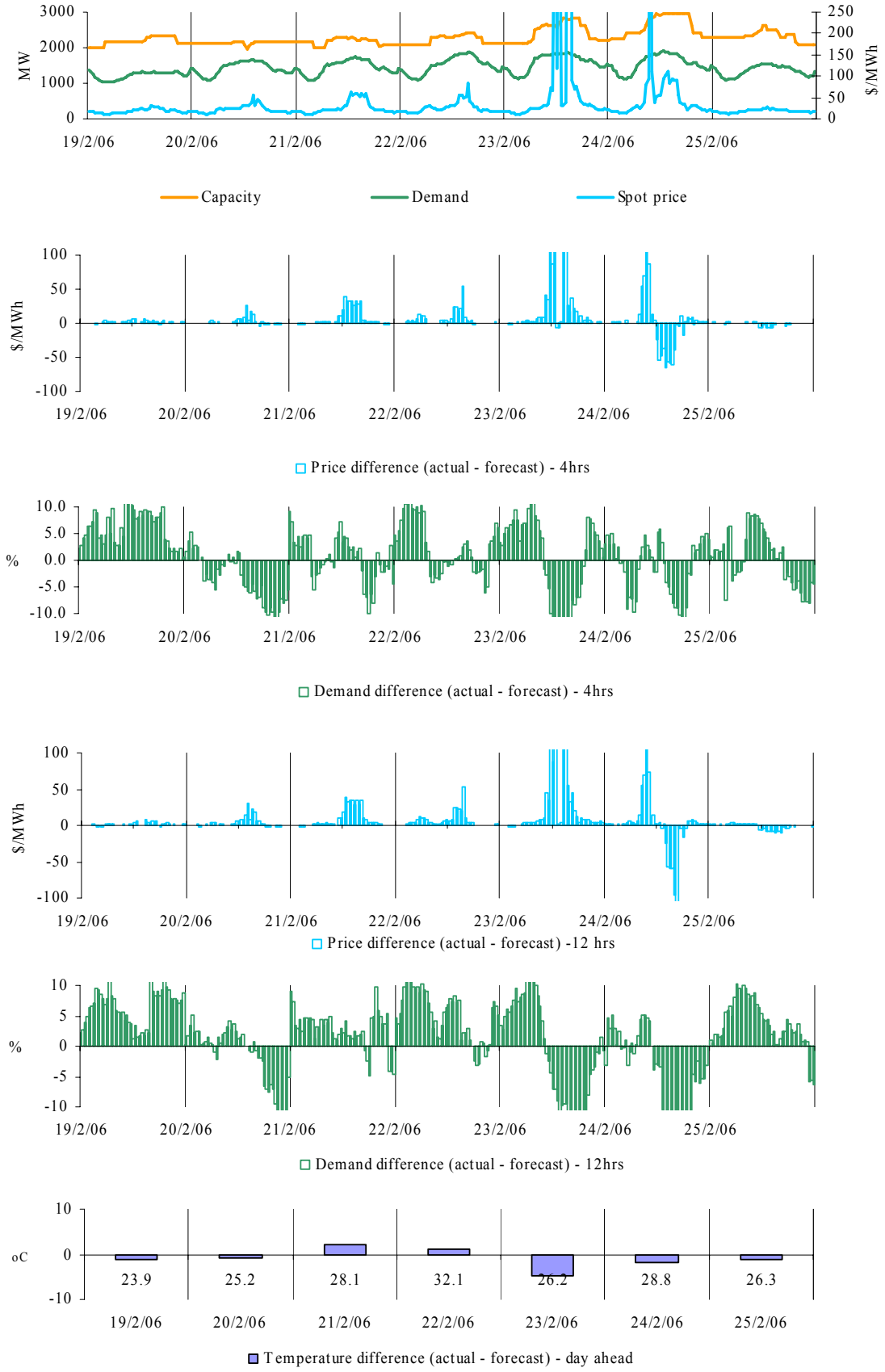
Over two rebids around 5.20am, LYMMCO brought forward the return of Loy Yang A1 to 6 am, increasing the available capacity by as much as 580 MW. All of this capacity was priced at less than $20/MWh. The rebid reason given was "Unit run up". At 8.08 am, 267 MW was shifted across Loy Yang A from prices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

There was no other significant rebidding.

[1] This demand is taken from the market systems and is referred to as "initial supply". Initial supply is a measurement of the demand at the start of a dispatch interval and is defined as the:

- sum of the scheduled generation measurements in the region; plus
- net measured interconnector flow into the region.

Figures 39-44: South Australia actual spot price, demand and forecast differences



There were 5 occasions in South Australia where the spot price was greater than three times the weekly average price of $60/MWh. These occurred on Thursday and Friday.

Thursday, 23 February

12:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	780.98	31.00	29.60
Demand (MW)	1814	1996	1893
Available capacity (MW)	2624	2653	2653
1:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	923.01	36.06	31.00
Demand (MW)	1832	2069	1961
Available capacity (MW)	2707	2653	2653
3:00 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	763.06	51.01	35.18
Demand (MW)	1865	2118	2043
Available capacity (MW)	2805	2638	2653
3:30 pm	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	4936.50	37.04	34.65
Demand (MW)	1823	2046	1997
Available capacity (MW)	2786	2851	2653

Conditions at the time saw demand and available capacity closely aligned to levels forecast 12 hours prior to dispatch. Demand forecasts 4 hours ahead were up to 250 MW higher than actual. There was little generation priced between $250/MWh and $4700/MWh during this period, with prices aligned with those in Victoria.

At around 11 am Origin Energy shifted almost 60 MW of capacity at Ladbroke and Quarantine from $2000/MWh and $9000/MWh to zero. The rebid reason given was “est(n) change in pds”.

Between 11.30 am and midday Cummins Engine Company shifted 40 MW of capacity at Angaston from around $5000/MWh to around $10/MW. The rebid reason given was “test run::decrease energy band” and “optimise as and energy::decrease energy band”.

At 11 am International Power increased the availability at Pelican Point by 220 MW. The rebid reason given was “response to change in predispatch 10:49”. 175 MW of this capacity was priced at less than zero

At 12.30 pm, 86 MW of capacity at Mintaro was made unavailable. The reason given was “avoiding economic dispatch”. This capacity was again made available at 2.00 pm.

There was no other significant rebidding.

Friday, 24 February

10:00 am	Actual	4 hr forecast	12 hr forecast
Price ($/MWh)	957.02	23.84	25.38
Demand (MW)	1777	1725	1693
Available capacity (MW)	2836	2639	2639

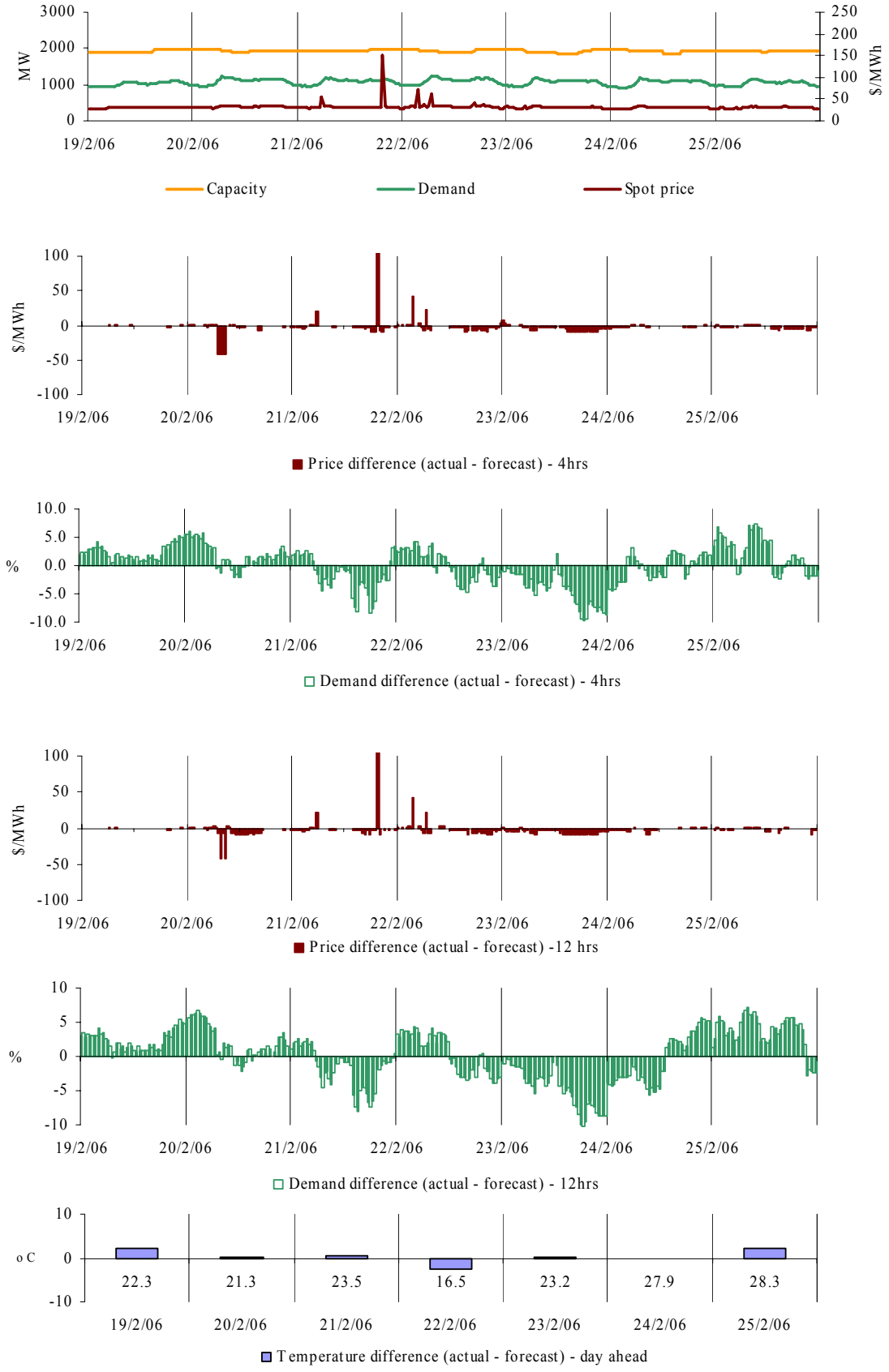
Conditions at the time saw demand close to. Available capacity was around 200 MW higher than forecast. Price was reflecting the conditions in Victoria.

At 7.25 am International Power increased the availability of Pelican Point by 210MW. The reason given was "response to predispatch 07:22". 170 MW of this capacity was bid in at less than zero.

At 8.39 am Origin Energy shifted almost 40 MW of capacity at Ladbroke and 23 MW at Quarantine from prices of $200/MWh and $9000/MWh to zero, the rebid reason given was "est(n) change in pds".

There was no other significant rebidding.

Figures 45-50: Tasmania actual spot price, demand and forecast differences



There was one occasion was the spot price in Tasmania greater than three times the weekly average price of $32/MWh. This occurred on Tuesday evening.

Tuesday, 21 February

8:00 pm	Actual	4 hr forecast	12 hr forecast
Price ($/MWh)	151.51	37.60	33.50
Demand (MW)	1148	1180	1169
Available capacity (MW)	1975	1975	1975

Conditions at the time saw demand and availability close to forecast. At 7.35 pm network constraints within Tasmania constrained down 190 MW of generation at Gordon, Meadowbank and Tungatina stations. These constraints impacted for two 5-minute dispatch intervals. Generation priced at $700/MWh was dispatched to replace that capacity which was constrained off. Prices returned to around $40/MWh from 7.45 pm.

Figure 51: Queensland closing bid prices, dispatched generation and spot price

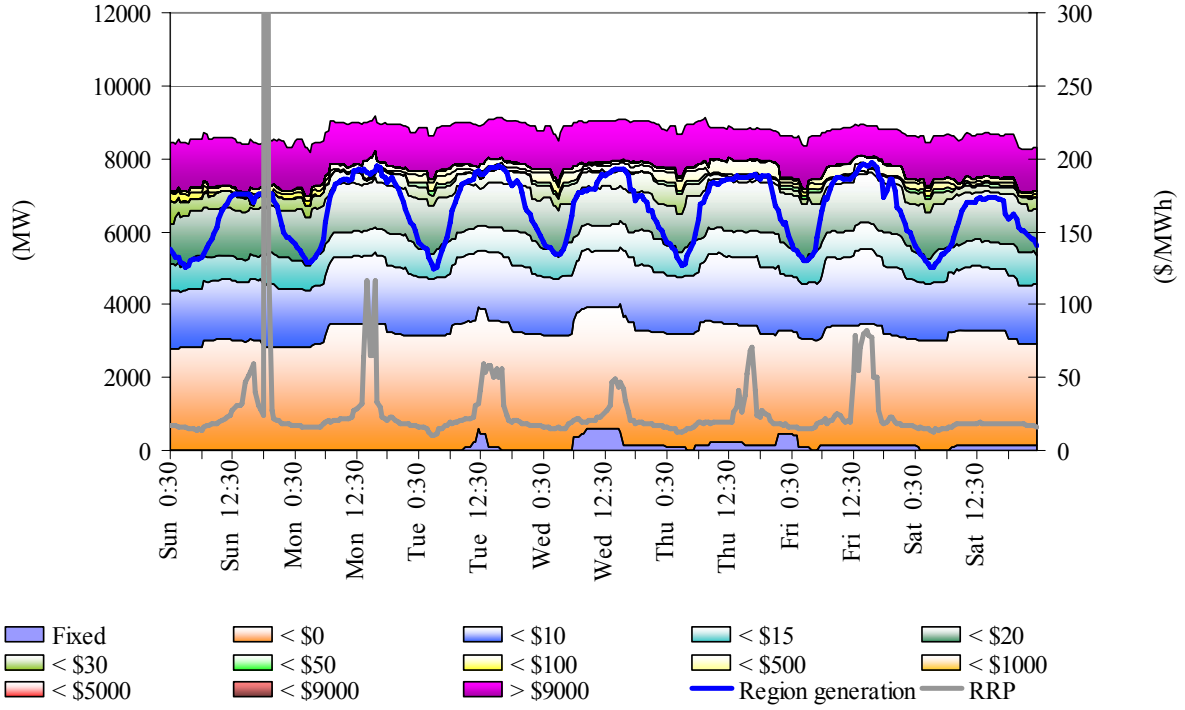


Figure 52: New South Wales closing bid prices, dispatched generation and spot price

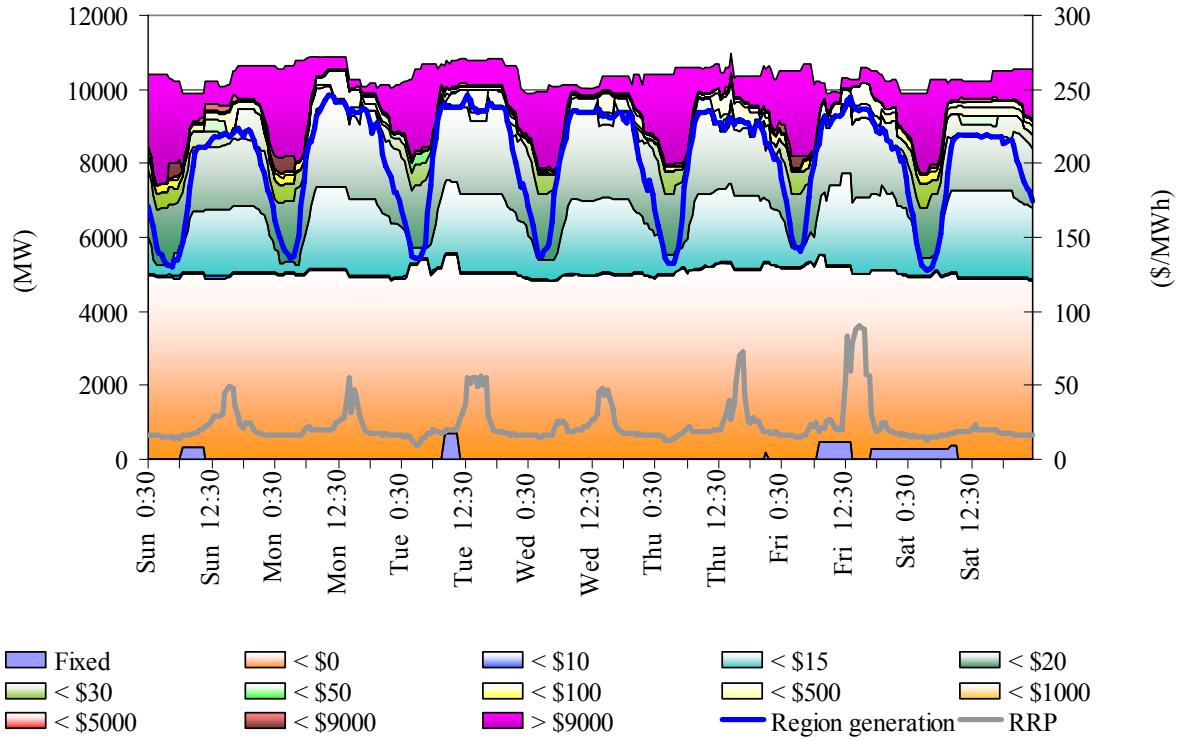


Figure 53: Victoria closing bid prices, dispatched generation and spot price

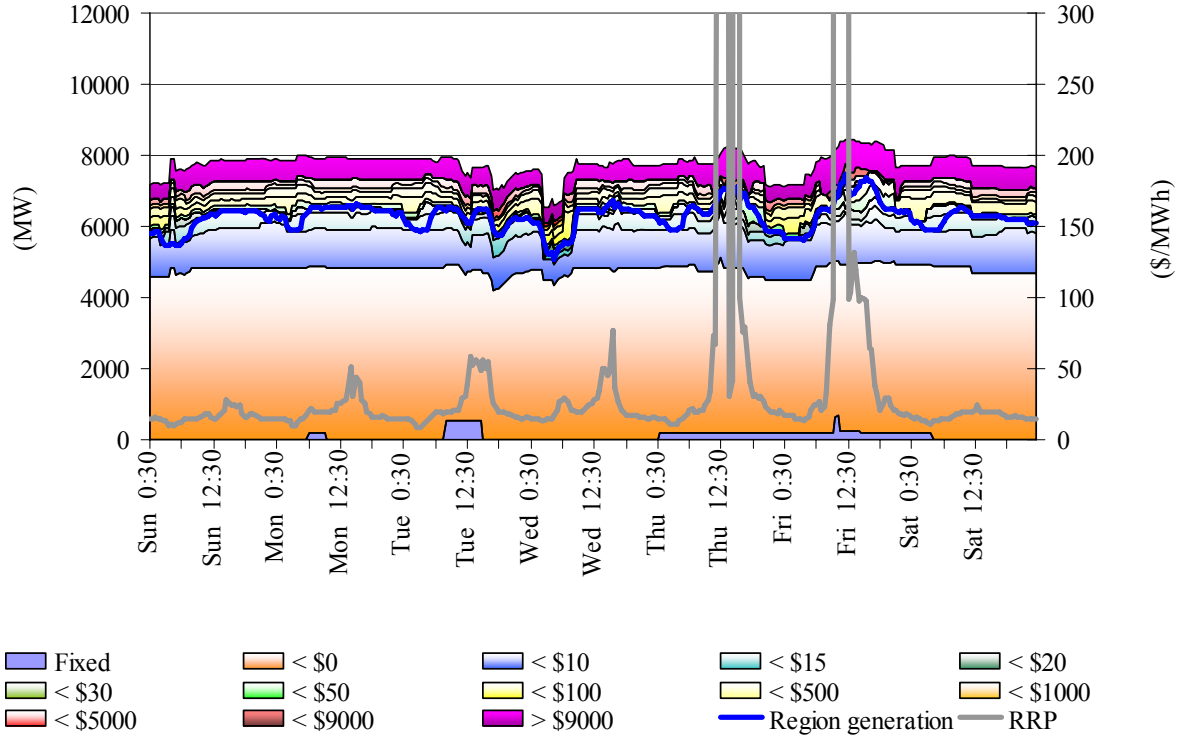


Figure 54: South Australia closing bid prices, dispatched generation and spot price

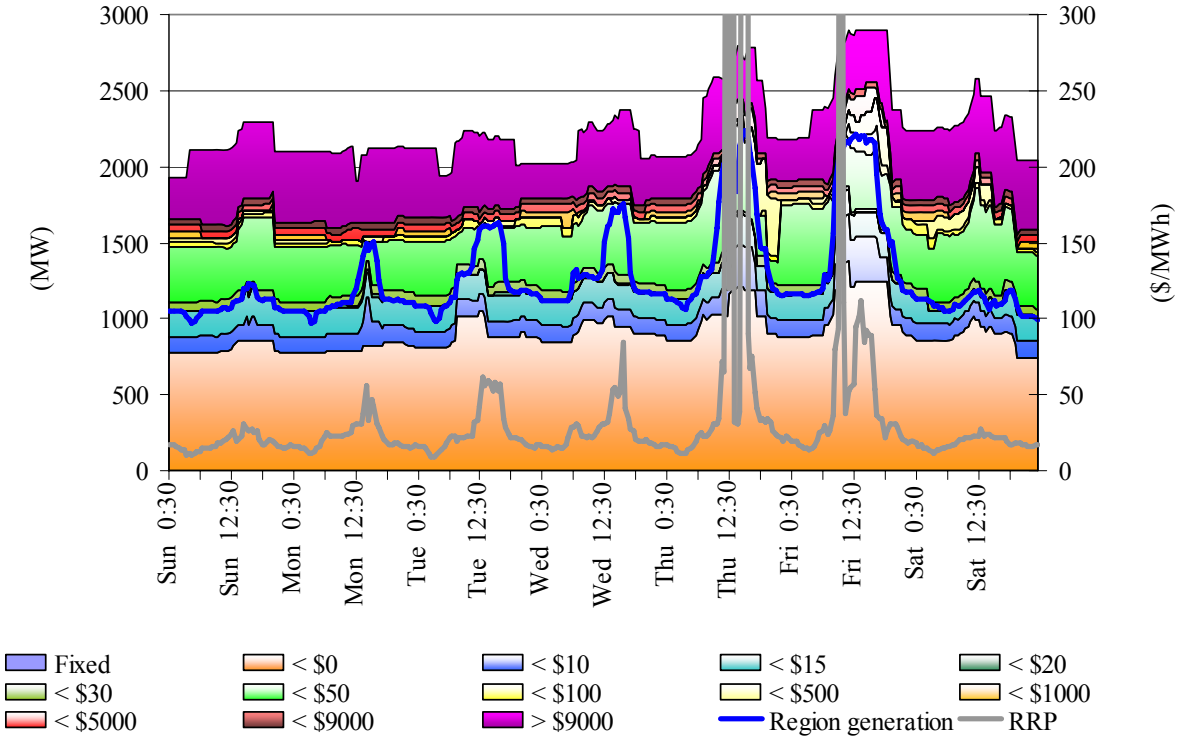
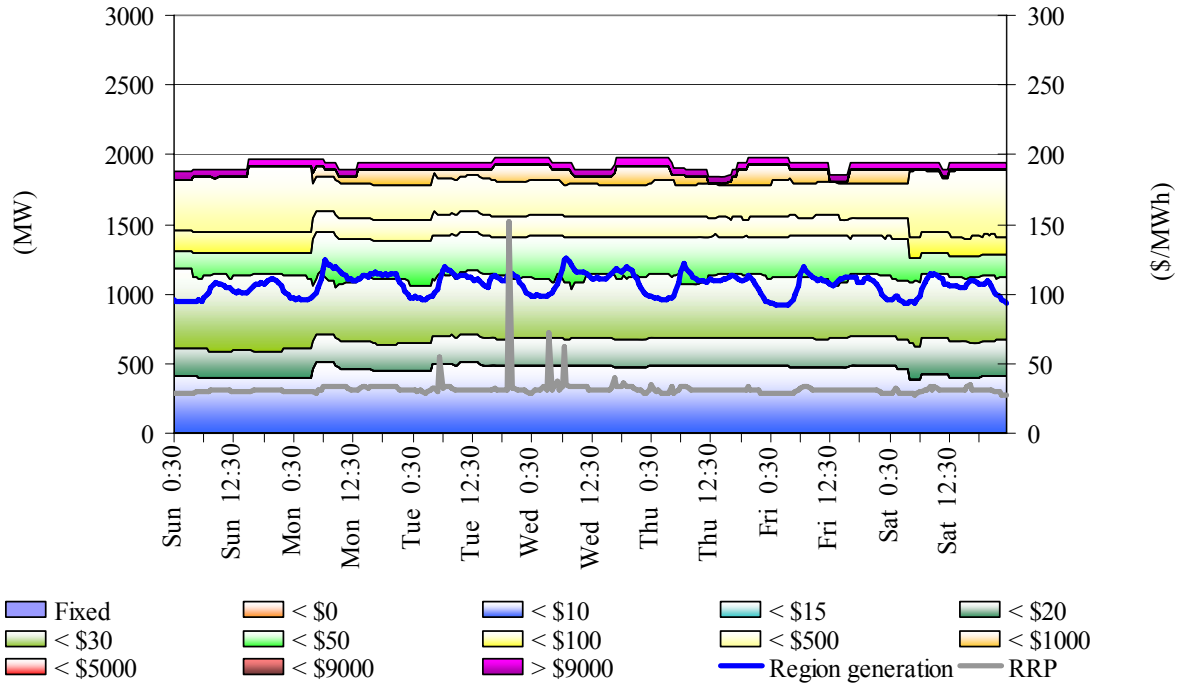


Figure 55: Tasmania closing bid prices, dispatched generation and spot price



Ancillary service market

The total cost of ancillary services on the mainland for the week was $234 000 or 0.1 per cent of the total turnover in the energy market. Figure 56 summarises the volume weighted average prices and costs for the eight frequency control ancillary services across the interconnected regions.

Figure 56: frequency control ancillary service prices and costs

	Raise 6 sec	Raise 60 sec	Raise 5 min	Raise reg	Lower 6 sec	Lower 60 sec	Lower 5 min	Lower reg
Last week	0.82	0.56	1.49	0.73	0.19	0.22	0.84	1.50
Previous week	0.74	0.47	1.20	0.50	0.17	0.21	0.90	1.44
Last quarter	1.76	0.73	1.15	1.54	0.39	2.28	5.00	1.93
Market Cost ($1000s)	39	26	98	16	1	1	19	33
% of energy market	0.01%	0.01%	0.03%	0.01%	0.00%	0.00%	0.01%	0.01%

The total cost of ancillary services in Tasmania for the week was around $56 000 or 1 per cent of the total turnover in the energy market in Tasmania. Figure 57 summarises for Tasmania the prices and costs for the eight frequency control ancillary services.

Figure 57: frequency control ancillary service prices and costs for Tasmania

	Raise 6 sec	Raise 60 sec	Raise 5 min	Raise reg	Lower 6 sec	Lower 60 sec	Lower 5 min	Lower reg
Last week	2.54	0.25	0.25	0.26	0.32	0.25	0.25	0.25
Previous week	1.28	0.25	0.25	0.25	0.35	0.25	0.25	0.25
Last quarter	7.89	1.05	1.05	1.58	4.43	1.06	1.06	1.97
Market Cost ($1000s)	25	3	3	2	5	8	6	2
% of energy market	0.45	0.05	0.05	0.04	0.10	0.14	0.11	0.04

Figure 58 shows the daily breakdown of cost for each frequency control ancillary service.

Figure 58: daily frequency control ancillary service costs

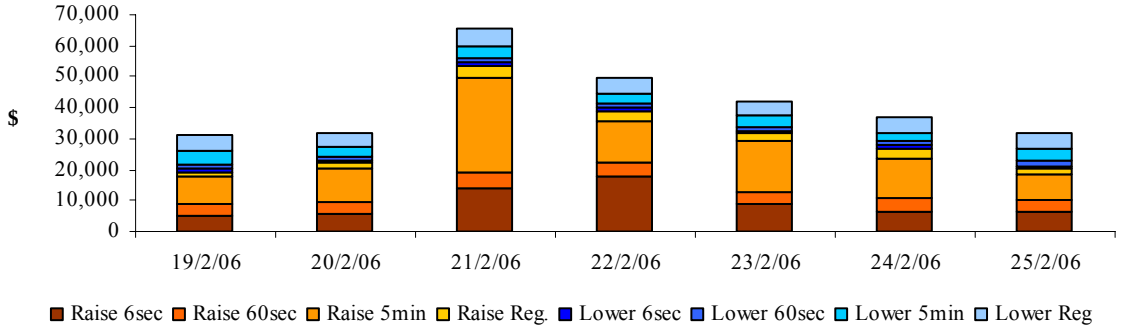
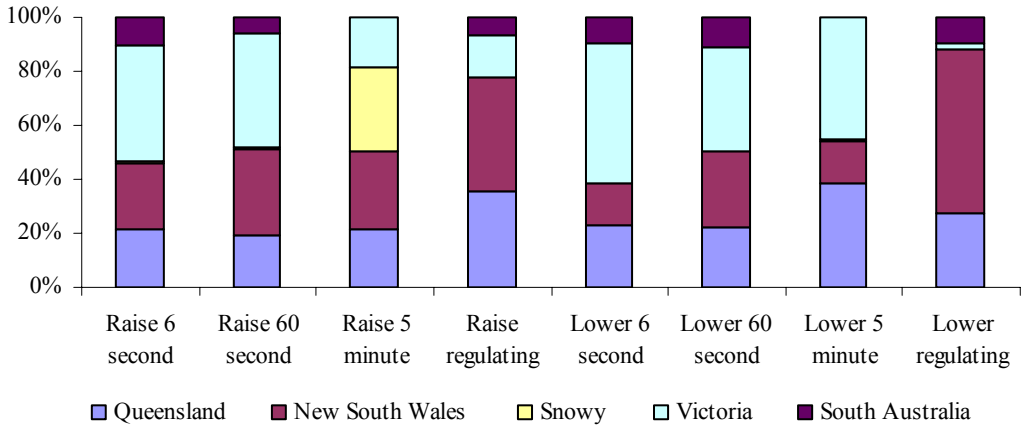


Figure 59 shows the contribution, on a percentage basis, that frequency control ancillary service providers are utilised (in each mainland region) to satisfy the total requirement for each service.

Figure 59: regional participation in ancillary services on the mainland



Figures 60 and 61 show 30-minute prices for each frequency control ancillary service throughout the week.

Figure 60: prices for raise services

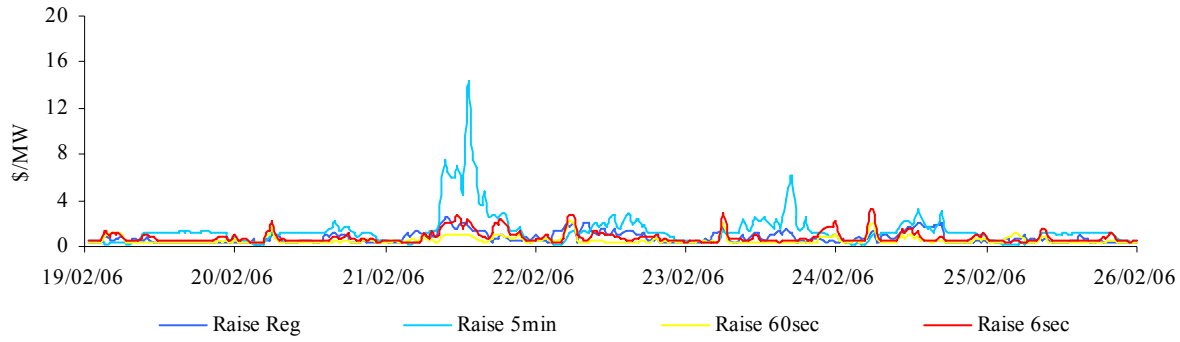


Figure 60A: prices for raise services - Tasmania

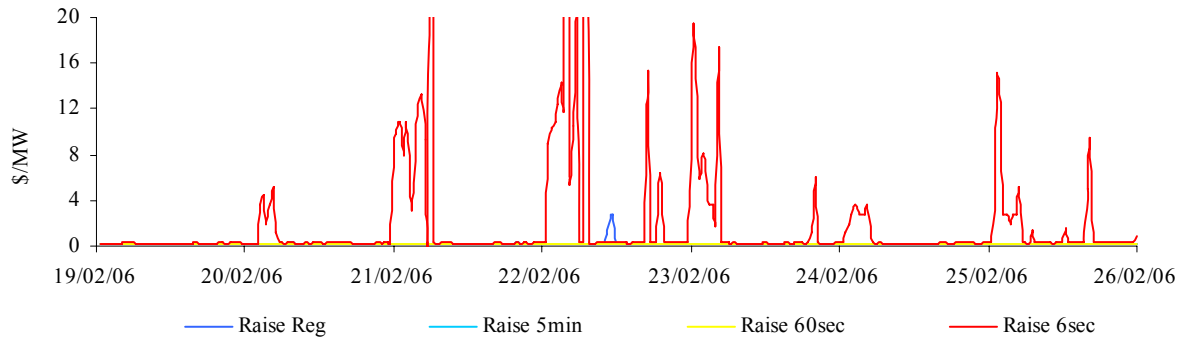


Figure 61: prices for lower services

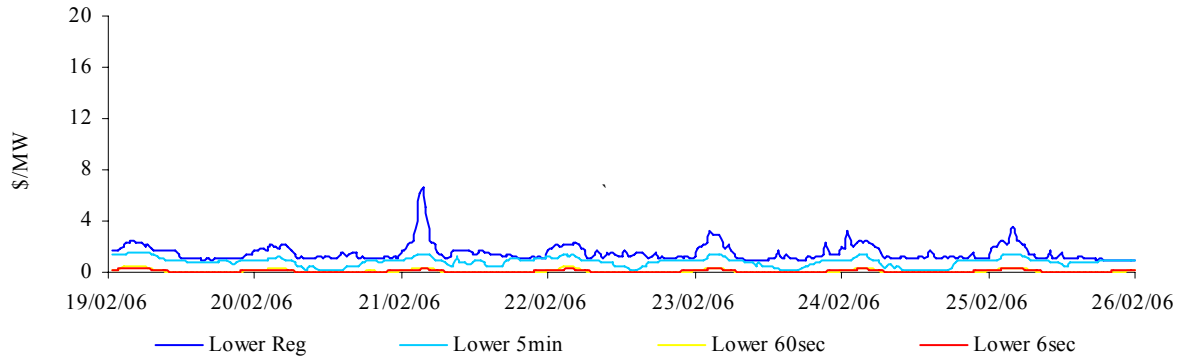
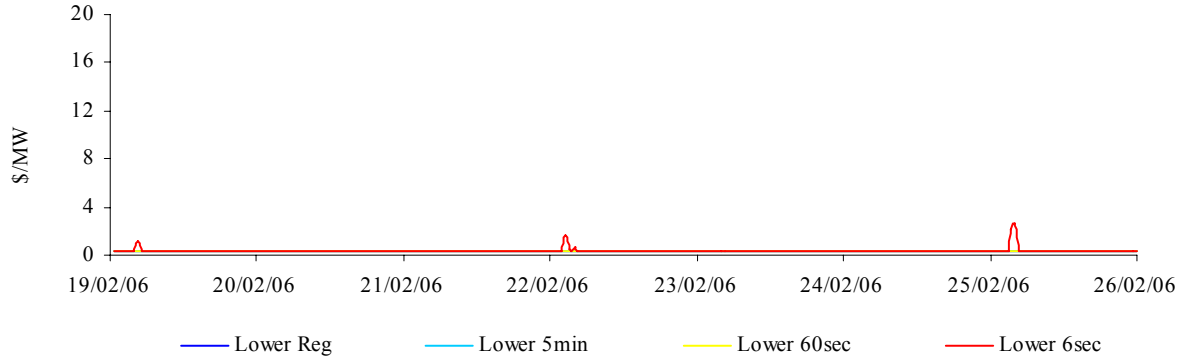


Figure 61A: prices for lower services - Tasmania



Figures 62 and 63 present for both raise and lower frequency control services the requirement, established by NEMMCO, for each service to satisfy the frequency standard.

Figure 62: raise requirements

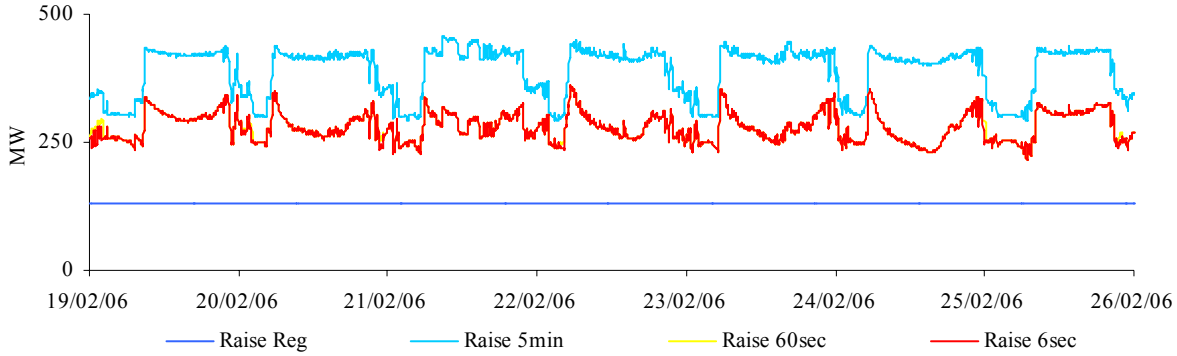


Figure 62A: raise requirements - Tasmania

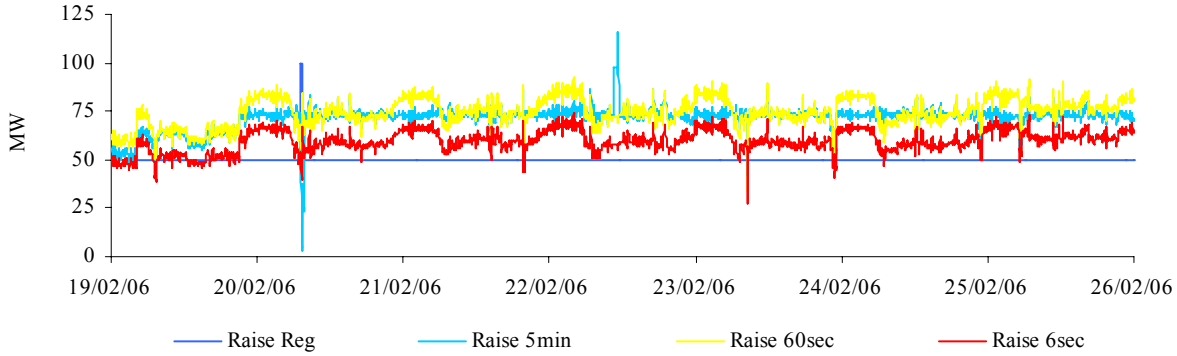


Figure 63: lower requirements

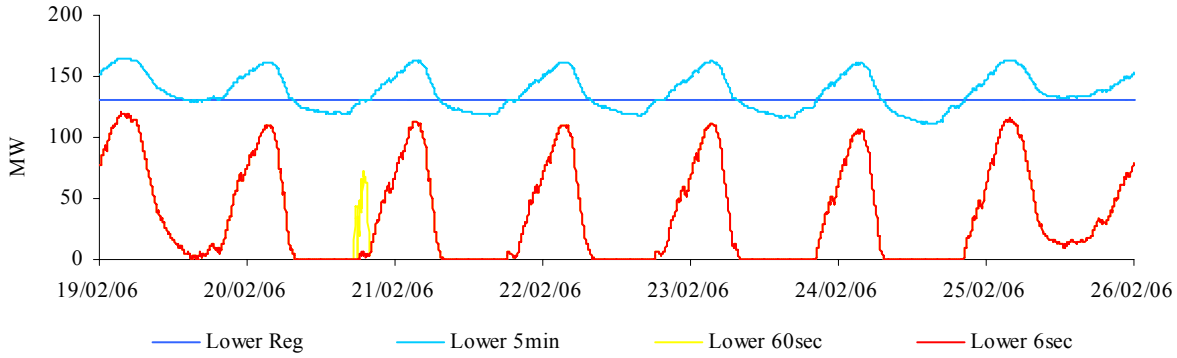
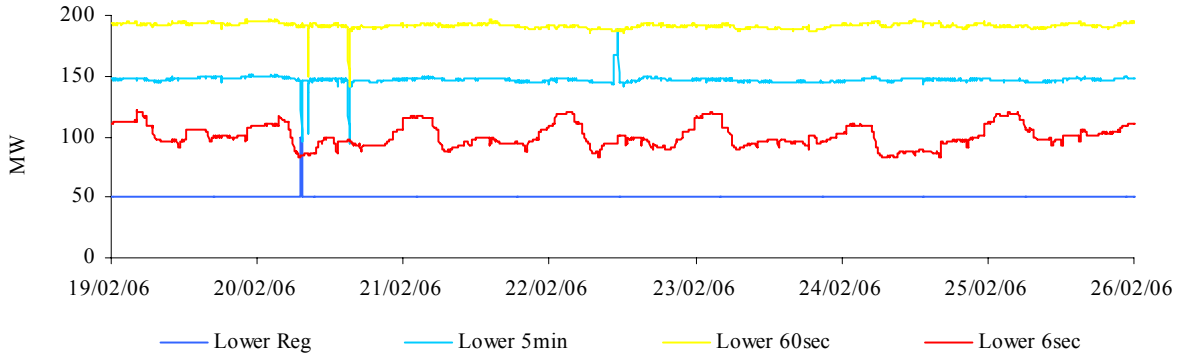


Figure 63A: lower requirements - Tasmania



Australian Energy Regulator
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