WEEKLY ELECTRICITY MARKET ANALYSIS

AUSTRALIAN ENERGY REGULATOR

1 July – 7 July 2012

Spot market prices

On 1 July the carbon price as set out in the Federal Government's Clean Energy Future package came into effect. The carbon price has been introduced at a cost of $23 per tonne of carbon dioxide equivalent emitted. Liable entities are required to purchase and surrender carbon permits to offset their emissions. In the NEM, certain generators are liable for the emissions produced as a result of generating electricity, which serves to increase their operating costs.

The cost increases were expected to flow through to generator offers and the spot price. However, since the commencement of the carbon price, spot prices in the market have been higher than anticipated. This has been driven to an extent by some generators increasing their offer prices by more than would be expected following the introduction of the carbon price.

Extreme pricing in Victoria, South Australia and Tasmania, driven by network events on Monday, also contributed to a sharper increase in average prices in those regions.

Coal supply issues at the Loy Yang mine that constrained energy output from base load generation in Victoria at times, combined with the continuing outage of three units at Yallourn as a result of flooding in June, further exacerbated the effects of generators increasing their offer prices.

The most significant increase in average prices was in South Australia. The planned shutdown of Northern Power Station unit 1 together with minimal wind generation (not more than 150 MW during peak periods for the majority of the week) reduced the availability of lower priced generation capacity that usually exists in the region. A further factor in South Australia was that AGL increased its offer prices at Torrens Island (the largest station in that region) by considerably more than expected. This is despite gas fuelled power stations having a lower carbon cost than coal fuelled power stations.

Cold temperatures saw daily peak demand across the NEM edge above 30 000 MW for the first three days of the week in contrast to the month of June where, generally, daily peak demand was tracking around 1000-2000 MW below this level.

Daily average prices fell toward the end of the week as a result of lower levels of demand combined with changes to offer profiles.

Futures market prices significantly increased on Monday in all regions, but fell away slightly on Tuesday in all regions apart from South Australia. This occurred following the overall price movement, and the price spikes on Monday in Victoria and South Australia.

The average prices for the 2011/12 financial year were the lowest ever in all regions.

The market price cap increased on 1 July from $12 500/MWh to $12 900/MWh.

Figure 1: Volume weighted average spot price by region ($/MWh)

	Qld	NSW	VIC	SA	Tas
Average price for 1 July – 7 July 2012	68	75	108	116	74
11/12 financial year	30	31	28	32	33

Further information is provided in Appendix A when the spot price exceeds three times the weekly average and is above $250/MWh or less than -$100/MWh. Longer term market trends are attached in Appendix B[1].

Financial markets

Figures 2 to 9 show futures contract[2] prices traded on the Australian Securities Exchange (ASX) as at close of trade on Monday 9 July 2012. Figure 2 shows the base futures contract prices for the next three calendar years, and the average over these three years. Also shown are percentage changes[3] from the previous week.

Figure 2: Base calendar year futures contract prices ($/MWh)

	QLD		NSW		VIC		SA	
Calendar Year 2013	58*	2%	62*	1%	58*	-2%	60	0%
Calendar Year 2014	52	-1%	56	-1%	53	-1%	55	2%
Calendar Year 2015	57	0%	52	-2%	53	0%	69	0%
Three year average	56	0%	57	0%	55	-1%	62	1%

Source: d-cyphaTrade www.d-cyphatrade.com.au
* denotes trades in the product.

Figure 3 shows the $300 cap contract price for Q1 2013 and calendar year 2013 and the percentage change[4] from the previous week.

Figure 3: $300 cap contract prices ($/MWh)

	QLD		NSW		VIC		SA	
Q1 2013 (% change)	14	-4%	15	-3%	14*	-12%	22	0%
2013 (% change)	6	-2%	7	-2%	6	-8%	9	0%

Source: d-cyphaTrade www.d-cyphatrade.com.au
* denotes trades in the product.

Figure 4 shows the weekly trading volumes for base, peak and cap contracts. The date represents the end of the trading week.

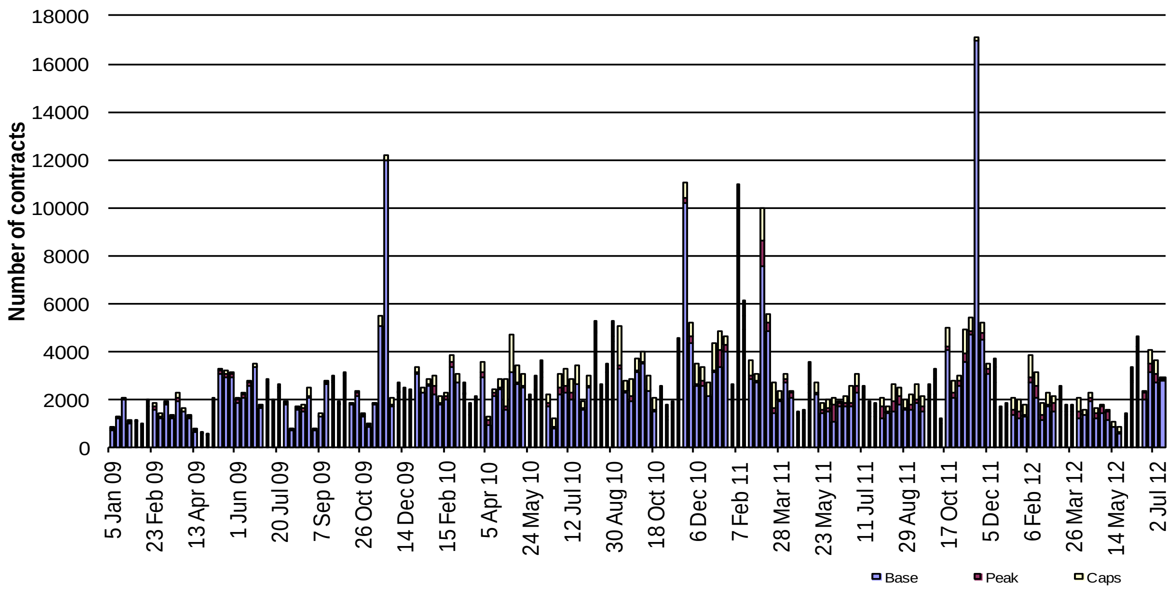
[1] Monitoring the performance of the wholesale market is a key part of the AER's role and an overview of the market's performance in the long term is provided on the AER website. Long-term statistics can be found there on, amongst other things, demand, spot prices, contract prices and frequency control ancillary services prices. To access this information go to www.aer.gov.au -> Australian energy industry -> Performance of the energy sector

[2] Futures contracts traded on the ASX are listed by d-cyphaTrade (www.d-cyphatrade.com.au). A futures contract is typically for one MW of electrical energy per hour based on a fixed load profile. A base load profile is defined as the base load period from midnight to midnight Monday to Sunday over the duration of the contract quarter. A peak load profile is defined as the peak-period from 7 am to 10 pm Monday to Friday (excluding Public holidays) over the duration of the contract quarter.

[3] Calculated on prices prior to rounding.

[4] Calculated on prices prior to rounding.

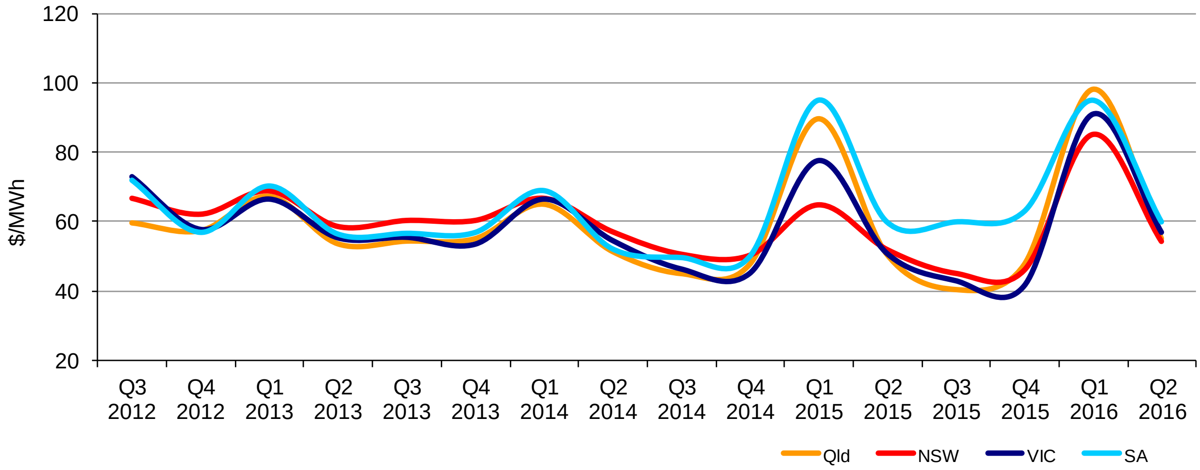
Figure 4: Number of exchange traded contracts per week



Source: d-cyphaTrade www.d-cyphatrade.com.au

Figure 5 shows the prices for base contracts for each quarter for the next four financial years.

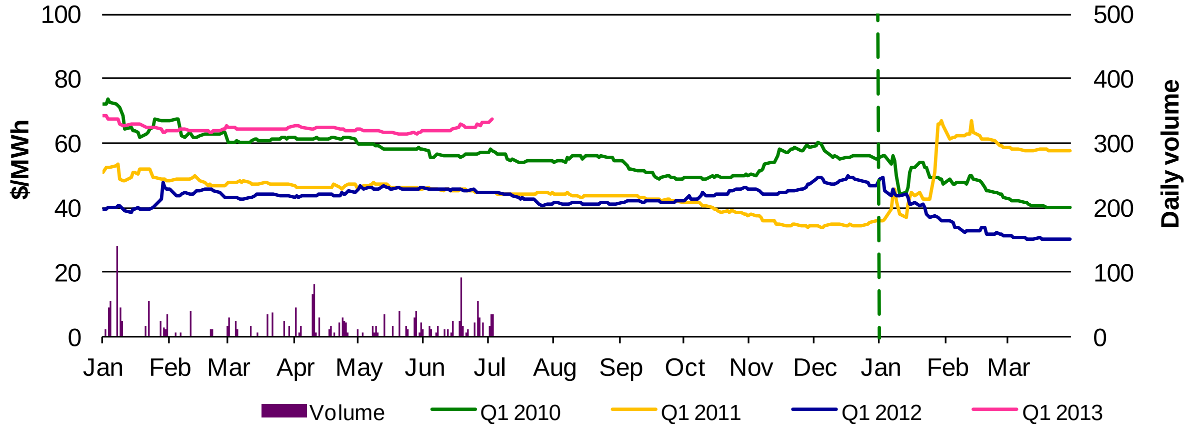
Figure 5: Quarterly base future prices Q3 2012 – Q2 2016



Source: d-cyphaTrade www.d-cyphatrade.com.au

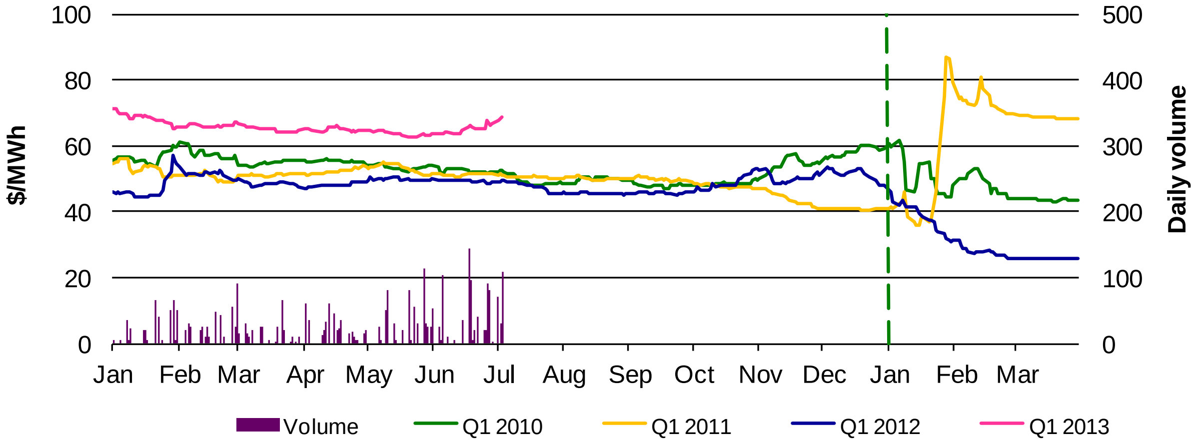
Figures 6-9 compare for each region the closing daily base contract prices for the first quarter of 2010, 2011, 2012 and 2013. Also shown is the daily volume of Q1 2013 base contracts traded. The vertical dashed line signifies the start of the Q1 period for which the contracts are being purchased.

Figure 6: Queensland Q1 2010, 2011, 2012 and 2013



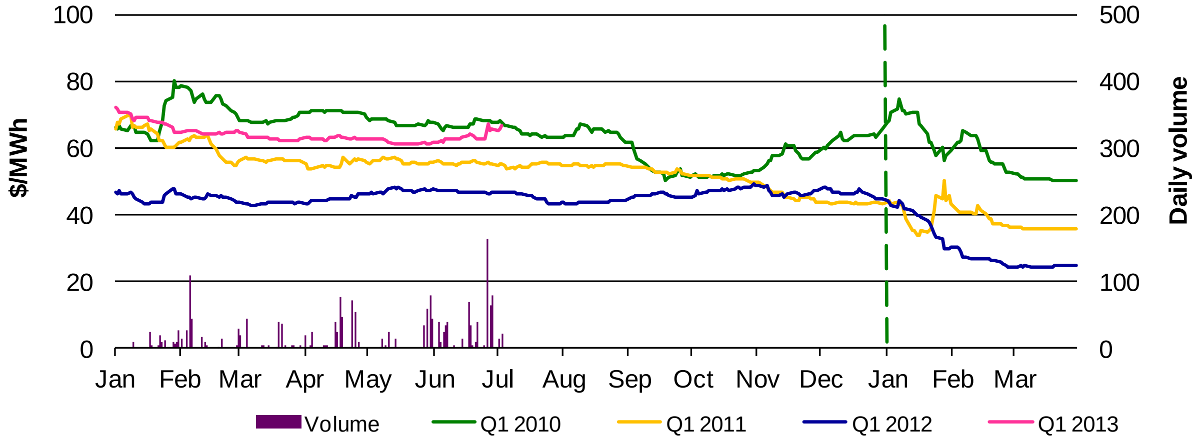
Source: d-cyphaTrade www.d-cyphatrade.com.au

Figure 7: New South Wales Q1 2010, 2011, 2012 and 2013



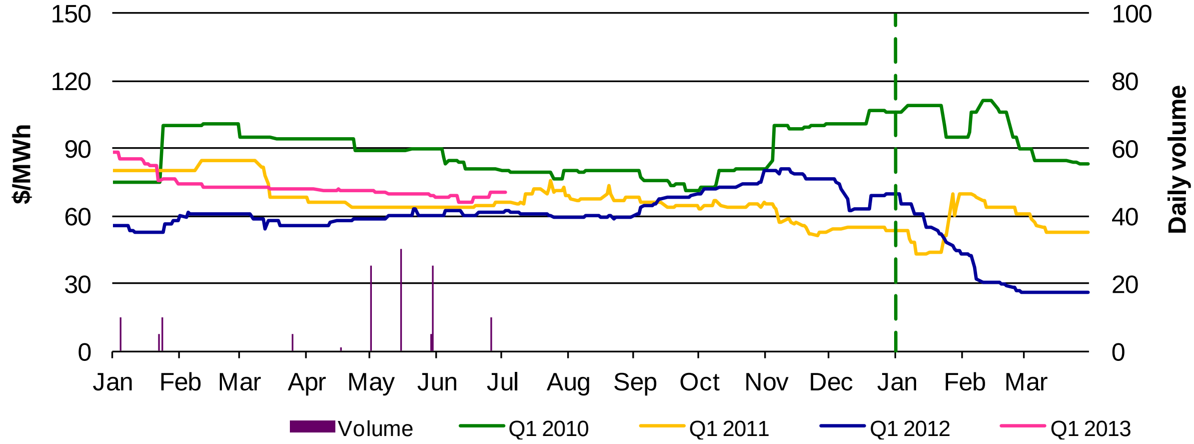
Source: d-cyphaTrade www.d-cyphatrade.com.au

Figure 8: Victoria 2010, 2011, 2012 and 2013



Source: d-cyphaTrade www.d-cyphatrade.com.au

Figure 9: South Australia Q1 2010, 2011, 2012 and 2013



Source: d-cyphaTrade www.d-cyphatrade.com.au

*The daily volume scale for South Australia is smaller than for other regions to reflect the lower liquidity in the market in South Australia.

Spot market forecasting variations

The AER is required under the National Electricity Rules to determine whether there is a significant variation between the forecast spot price published by the Australian Energy Market Operator (AEMO) and the actual spot price and, if there is a variation, state why the AER considers the significant price variation occurred. It is not unusual for there to be significant variations as demand forecasts vary and as participants react to changing market conditions. There were 101 trading intervals throughout the week where actual prices varied significantly from forecasts[5]. This compares to the weekly average in 2011 of 78 counts and the average in 2010 of 57. Reasons for these variances are summarised in Figure 10[6].

Figure 10: Reasons for variations between forecast and actual prices

	Availability	Demand	Network	Combination
% of total above forecast	15	17	2	4
% of total below forecast	15	36	1	10

Demand and bidding patterns

The AER reviews demand, network limitations and generator bidding as part of its market monitoring to better understand the drivers behind price variations. Figure 11 shows the weekly change in total available capacity at various price levels during peak periods[7]. For example, in Queensland 2831 MW less capacity was offered at prices under $20/MWh this week compared to the previous week. Also included is the change in average demand during peak periods, for comparison.

As expected there were significant changes of offers into higher prices coinciding with the start of the carbon price.

Figure 11: Changes in available generation and average demand compared to the previous week during peak periods

MW	<$20/MWh	Between $20 and $50/MWh	Total availability	Change in average demand
QLD	-2831	2094	149	-193
NSW	-115	-3633	54	91
VIC	-498	-689	-202	63
SA	-109	-314	-156	54
TAS	-439	-148	35	8
TOTAL	-3992	-2690	-120	23

[5] A trading interval is counted as having a variation if the actual price differs significantly from the forecast price either four or 12 hours ahead.

[6] The table summarises (as a percentage) the number of times when the actual price differs significantly from the forecast price four or 12 hours ahead and the major reason for that variation. The reasons are classified as availability (which means that there is a change in the total quantity or price offered for generation), demand forecast inaccuracy, changes to network capability or as a combination of factors (when there is not one dominant reason). An instance where both four and 12 hour ahead forecasts differ significantly from the actual price will be counted as two variations.

[7] A peak period is defined as between 7 am and 10 pm on weekdays.

Ancillary services market

The total cost of frequency control ancillary services (FCAS) on the mainland for the week was $406 000 or less than one per cent of energy turnover on the mainland. In addition there was a requirement for local FCAS in South Australia as a result of a network outage affecting the interconnectors on 3 July at a cost of around $330 000.

The total cost of FCAS in Tasmania for the week was $109 000 or less than one per cent of energy turnover in Tasmania.

On 3 July, from 9.25 am, there was an outage of the Heywood to Moorabool No. 1 500kV line, which led to a requirement for local FCAS in South Australia. This outage, combined with generation output from Mortlake power station (that was not forecast), resulted in increased exports from South Australia to Victoria on the Heywood interconnector.

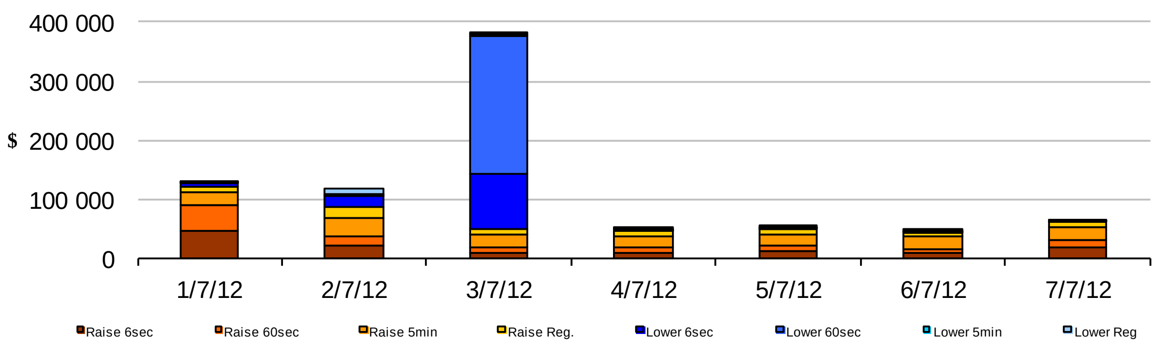
At 4.04 pm, effective from 4.10 pm, Origin Energy rebid 281 MW of capacity at Mortlake unit one from prices above $108/MWh to prices between $49/MWh and $65/MWh, which committed the unit into service. The reason given was “1555A Ch in fcast- inc Vic dem 5mpd 6738>30mpd 6668 @1630 SL”. The dispatch target at Mortlake unit one increased from zero at 4.10 pm to 25 MW at 4.15 pm and to 91 MW by 4.30 pm, although Mortlake was generating at around 60 MW above its target.

This increased generation at Mortlake saw a significant step change in flows across the Heywood interconnector, from importing 220 MW into South Australia at 4.15 pm to exporting around 181 MW to Victoria at 4.30 pm. This change in flow, combined with the network outage led to an increased requirement for local lower ancillary services in South Australia. The lower 60 second service requirement increased from around 33 MW at 4.25 pm to 133 MW at 4.30 pm. The lower 6 second service requirement increased from around 27 MW to around 84 MW for the same period. The lower 60 second service price was $10 281/MW at 4.30 pm, increasing to $12 013/MW at 4.35 pm when Mortlake was generating at around 120 MW above its target. The lower 6 second service price reached $3000/MW at 4.30 pm, increasing to $12 500/MW at 4.35 pm.

A further rebid from Origin Energy at 4.30 pm shut down Mortlake unit one with the reason given: “1625P Chnage in avail - unit dispatch < min load - V_HYML1_1 SL”. This rebid became effective at 4.40 pm and at the same time, the Heywood to Moorabool line returned to service and as a result, there was no longer a requirement for local lower FCAS in South Australia.

Figure 12 shows the daily breakdown of cost for each FCAS for the NEM.

Figure 12: Daily frequency control ancillary service cost



Australian Energy Regulator
July 2012

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Queensland:

There was one occasion where the spot price in Queensland was below -$100/MWh.

Monday, 2 July

12:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	-$110.26	55.34	52.72
Demand (MW)	5782	5809	5854
Available capacity (MW)	10 686	10 701	10 726

This event coincided with the low price event in New South Wales and the high price event in Victoria, South Australia and Tasmania. The event is explained in the Victoria section.

Victoria:

There were two occasions where the spot price in Victoria was greater than three times the Victoria weekly average price of $125/MWh and above $250/MWh.

Monday, 2 July

12:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	3798.42	81.86	69.83
Demand (MW)	6908	6687	6832
Available capacity (MW)	8429	8827	9048
1:00 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	4364.10	70.48	69.83
Demand (MW)	6693	6682	6799
Available capacity (MW)	8297	8828	9062

Over two rebids at 11.37 pm and 12.10 pm Hydro Tasmania shifted a total of around 885 MW of capacity from prices below $90/MWh to prices around $250/MWh. The reasons given were “1135A Vic price higher than forecast” and “1205P Increased transmission risk +sl”.

Hydro Tasmania’s rebidding to higher prices was in an attempt to reduce generation dispatch and therefore reduce northward flows to avoid the loss of Basslink as had occurred on the previous evening.

However, the five minute price in Victoria at 12.15 pm was greater than Hydro Tasmania’s offered price and therefore the rebid did not have the desired effect of reducing exports across Basslink.

A further rebid was submitted at 12.14 pm, effective at 12.20 pm, shifted all of the capacity previously offered at prices around $250/MWh to prices above $11 400/MWh. The reason given was “1210E Correcting error in previous bid”. This rebid again failed to back off Basslink substantially (only 43 MW) as Tasmanian generation became marginal in Victoria. Basslink tripped at 12.17 pm (from close to maximum exports of around 580 MW).

This saw the 12.20 pm price in Tasmania and Victoria reach $12 400/MWh and $8600/MWh respectively and the price cap in South Australia. A constraint on the Vic-NSW interconnector had separated Queensland and New South Wales market outcomes from the remaining regions.

At 12.25 pm, once the Basslink trip was reflected in AEMO systems, the five minute price in Tasmania fell to $66/MWh as the reduced exports saw generation in the region significantly reduced. To account for the loss of Basslink, there was a step change in imports into Victoria from South Australia on the Heywood interconnector of around 120 MW and on the Vic-NSW interconnector of around 290 MW. At the same time, there were exports from Victoria to South Australia on the Murraylink interconnector of around 100 MW. Constraint equations on the Vic-NSW and Murraylink interconnectors violated and the five minute price reached the price cap in Victoria and around $9500/MWh in South Australia at 12.25 pm.

At 11.38 am, effective from 11.45 am, Snowy Hydro rebid 1200 MW of capacity at Murray power station in Victoria, the majority of which was priced between $30/MWh and $100/MWh, to the price floor. The rebid also reduced the ramp down rate of the unit from 50 MW/minute to 3 MW/minute, the minimum allowable. The reason given was “11:36 A VIC: 5mpd price $191.89 hgr thn 30mpd 11:50@11:02”. Over three further rebids, between 12.02 pm and 12.16 pm, Snowy Hydro rebid its remaining 338 MW of capacity at Murray from prices above $350/MWh to the price floor. The reasons given were “12:05 A NSW: act price $54.00 hgr thn 5mpd 12:05@11:56”, “12:15 A vic: act price $108.13 hgr thn 5mpd 12:15@12:06” and “12:16:A unfcast 8600 price in vic”.

When constraints between Murray and Melbourne bind, only limited generation from Murray can flow south. The remaining generation flows north into New South Wales. On occasions during the high price periods, this led to counter price flows with around $170 000 of negative settlement residues accruing on the Victoria to New South Wales interconnector.

The five minute price in New South Wales reached $272/MWh at 12.25 pm. At 12.22 pm, effective at 12.30 pm, Snowy Hydro rebid 1000 MW of capacity at Upper Tumut and Tumut 3, the majority of which was priced between $300/MWh and $500/MWh, to prices close to the price floor. The reason given was “12:22:A Unfcast voll in Vic 270 in NSW”. This increase in availability of low priced generation resulted in the five minute price falling to the price floor in New South Wales and to -$957/MWh in Queensland.

At 12.26 pm, effective at 12.35 pm, Snowy Hydro reversed the earlier rebid. The reason given was “12:26:A NSW price -1000”. This saw the five minute price increase to below $20/MWh in New South Wales and Queensland.

On the day several contemporaneous dredger problems resulted in significant coal supply issues at the Loy Yang mine that necessitated coal off-loading, constraining energy output at both Loy Yang A and Loy Yang B.

At 11.34 am, effective from 12.05 pm, International Power reduced the availability of Loy Yang B by 430 MW (from 1170 MW) priced between around $30/MWh and $50/MWh. The reason given was “1134P change in avail - coal offloading profile sl”.

At 12.28 pm, effective at 12.35 pm, AGL rebid 560 MW of capacity at Loy Yang A units three and four from prices around $280/MWh to close to the price cap. The reason given was “12:17P Unexpected plant limitations:coal off_loading”.

At 12.40 pm the five minute price reached the price cap in Victoria and $12 145/MWh in South Australia.

At 12.37 pm, effective from 12.45 pm, AGL Hydro rebid a total of 583 MW of capacity at Dartmouth, Eildon units one and two and McKay unit one, all priced above $95/MWh to close to the price floor. The reason given was "1230A Chg in forecast::price increase vs pd Vic $12899". This led to increased output, with Dartmouth increasing from 1 MW to 163 MW at 12.45 pm. As these generators are located close to Murray this also contributed to the counter price flows into New South Wales.

Between 12.20 pm and 12.50 pm demand in Victoria fell by around 300 MW (in an apparent demand side response to the high prices), this contributed to the five minute price falling to around $106/MWh by 12.50 pm.

South Australia:

There were two occasions where the spot price in South Australia was greater than three times the South Australia weekly average price of $133/MWh and above $250/MWh.

Monday, 2 July

12:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	3937.56	87.05	76.79
Demand (MW)	1803	1725	1766
Available capacity (MW)	2468	2586	2526
1:00 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	4140.15	75.38	76.47
Demand (MW)	1766	1713	1758
Available capacity (MW)	2358	2583	2530

This event coincided with the high price events in Victoria and Tasmania. The event is explained in the Victoria section.

Tasmania:

There was one occasion where the spot price in Tasmania was greater than three times the Tasmania weekly average price of $78/MWh and above $250/MWh.

Monday, 2 July

12:30 PM	**Actual**	**4 hr forecast**	**12 hr forecast**
Price ($/MWh)	2188.31	74.24	58.01
Demand (MW)	1206	1246	1243
Available capacity (MW)	2506	2510	2510

This event coincided with the high price events in Victoria and South Australia. The event is explained in the Victoria section.

Detailed NEM Price and Demand Trends

for Weekly Market Analysis
1 July - 7 July 2012

AUSTRALIAN ENERGY REGULATOR

Table 1: Financial year to date spot market volume weighted average price

Financial year	QLD	NSW	VIC	SA	TAS
2012-13 ($/MWh) YTD	68	75	108	116	74
2011-12 ($/MWh) YTD	22	26	25	27	28
Change*	207%	187%	331%	332%	165%
2011-12 ($/MWh)	30	31	28	32	33

Table 2: NEM turnover

Financial year	NEM Turnover** ($, billion)	Energy (TWh)
2012-13 (YTD)	$0.343	4
2011-12	$5.987	199
2010-11	$7.445	204

Table 3: Recent monthly and quarterly spot market volume weighted average price and turnover

Volume weighted average ($/MWh)	QLD	NSW	VIC	SA	TAS	Turnover ($, billion)
Mar-12	28	26	24	26	36	0.396
Apr-12	30	34	33	30	36	0.457
May-12	26	29	27	30	33	0.434
June-12	35	37	38	31	35	0.619
July-12 (MTD)	68	75	108	116	74	0.343
Q3 2012 (QTD)	68	75	108	116	74	0.343
Q3 2011 (QTD)	22	26	25	27	28	0.100
Change*	207%	187%	331%	332%	165%	244.32%

Table 4: ASX energy futures contract prices at end of 10 July 2012

	QLD		NSW		VIC		SA	
Q1 2013	Base	Peak	Base	Peak	Base	Peak	Base	Peak
Price on 02 Jul ($/MWh)	66	87	68	88	67	87	70	108
Price on 09 Jul ($/MWh)	67	88	69	88	67	87	70	108
Open interest on 09 Jul	848	88	1170	235	1124	78	94	0
Traded in the last week (MW)	135	0	293	0	181	0	0	0
Traded since 1 Jan 12 (MW)	1861	162	3108	213	2003	134	126	0
Settled price for Q1 12($/MWh)	30	37	26	28	25	29	26	30

Table 5: Changes to availability of low priced generation capacity offered to the market

Comparison:	QLD	NSW	VIC	SA	TAS	NEM
May 12 with May 11						
MW Priced <$20/MWh	26	-1367	593	-94	34	-809
MW Priced $20 to $50/MWh	38	217	98	177	182	712
June 12 with June 11						
MW Priced <$20/MWh	-685	-2047	-480	66	13	-3133
MW Priced $20 to $50/MWh	238	1100	269	40	168	1814
July 12 with July 11 (MTD)						
MW Priced <$20/MWh	-3500	-1783	-1565	-18	-417	-7283
MW Priced $20 to $50/MWh	2,061	-1771	184	-325	204	352

*Note: These percentage changes are calculated on VWA prices prior to rounding
** Estimated value