



Electricity Pricing Event Reports

APRIL 2016

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** A summary was prepared as the maximum daily spot price was between \$500/MWh and \$2,000/MWh*



Tuesday 05 April 2016 – Negative Energy price SA

Market Outcomes: South Australia spot price was between $-\$182.88/\text{MWh}$ and $-\$203.61/\text{MWh}$ for trading intervals (TI) ending 0300 hrs, 0330 hrs and 0400 hrs.

Victorian spot price was negative for all affected TIs, but did not reach the price threshold for reporting purposes. South Australia FCAS prices and energy and FCAS prices in other regions were not affected.

Detailed Analysis: 5-Minute dispatch price in South Australia decreased to at or below $-\$977.98/\text{MWh}$ for dispatch intervals (DI) ending 0250 hrs, 0310 hrs and 0345 hrs. These negative prices can be mainly attributed to the South Morang F2 500/330kV transformer flow change, resulting in increased interconnector flows from Victoria to South Australia and decreased interconnector flows from Victoria to New South Wales, during low demand periods.

For all affected TIs, South Australia had low operational demand, between 1134 MW and 1207 MW. For the negative priced DIs, demand decreased by up to 79 MW when up to 69 MW of non-scheduled generation came online. For DIs ending 0310 hrs and 0345 hrs, wind generation in South Australia increased by 63 MW and 182 MW, respectively.

For the negative priced DIs, flow across the South Morang F2 500/330kV transformer decreased by up to 131.78 MVA. The decreased loading on the transformer caused the right-hand side of the thermal constraint equation $V \gg V_{\text{NIL_2A_R}}$ to decrease. This constraint equation prevents the overload of South Morang F2 500/330 kV transformer under system normal conditions. To prevent this constraint equation from violating, the target flow towards New South Wales on the VIC-NSW interconnector was decreased by up to 213 MW, the target flow towards South Australia on the Heywood interconnector was increased by up to 126 MW and the target flow towards Victoria on the Murraylink interconnector was decreased by up to 29 MW.

Planned outage of the Canowie – Robertson 275 kV line was scheduled between 0748 hrs on 2 April 2016 and 1838 on 5 April 2016. Planned outage of the Davenport – Canowie 275kV line was scheduled between 0742 hrs on 29 March 2016 and 1907 hrs on 5 April 2016. The constraint sets S-CNHL_HAL and S-X_DVCN+CNRB+RBCB were invoked for the duration of the concurrent outages.

During the negative priced DIs, the thermal outage constraint equations $S \gg X_{\text{DVCN+CNRB+CB_10}}$ and $S \gg X_{\text{DVCN+CNRB+CB_16}}$ from the S-X_DVCN+CNRB+RBCB constraint set limited the flow on the Murraylink interconnector from South Australia to Victoria. The $S \gg X_{\text{DVCN+CNRB+CB_10}}$ constraint equation prevents the overload of the Robertstown 275/132kV transformer for loss of Robertstown – Para 275kV line, during the outage of the Davenport–Canowie – Robertstown 275kV line. The $S \gg X_{\text{DVCN+CNRB+CB_16}}$ constraint equation prevents the overload of the Waterloo East–Morgan Whyalla Pump 4 – Robertstown 132kV line for loss of the Mokota – Robertstown 275kV line during outage of the Davenport – Canowie–Robertstown 275kV line.

With excess cheaper priced generation available from Victoria during the low demand period, the South Australia price decreased to below $-\$997.98/\text{MWh}$ for all affected DIs.

The 5-minute price in South Australia increased to at or above $-\$45/\text{MWh}$ for the DIs subsequent to the low priced DIs when demand increased by up to 121 MW and net interconnector flows towards South Australia reduced.



Negative spot prices were forecast in the latest pre-dispatch schedule, however the forecasted values were of a smaller magnitude than the dispatch price, due to dips in demand and changes in interconnector flows within the affected dispatch interval.

Tuesday 05 April 2016 – Negative Energy price SA, VIC

Market Outcomes: Spot price was -\$174.70/MWh in South Australia and -\$163.21/MWh in Victoria for trading interval (TI) ending 1600 hrs.

FCAS prices in all regions and Energy prices for the other NEM regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch price decreased to -\$991.80/MWh in South Australia and -\$928.26/MWh in Victoria for dispatch interval (DI) ending 1540 hrs. These negative prices can be attributed to rebidding of generation capacity in NSW during a planned outage period, which forced excess cheaper priced generation into Victoria and South Australia during a low demand period.

For DI ending 1540 hrs, demand was low in South Australia and Victoria at 1480 MW and 5750 MW, respectively. For the same DI, in Victoria demand decreased by 54 MW.

Planned outage of the Marulan–Yass no.4 330kV line was scheduled between 0703 hrs and 1622 hrs on 5 April 2016. The constraint set N-MNYS_4_15M was invoked for this period. During the negative priced DI, the transient stability outage constraint equation N::V_MNYS_2 from the constraint set N-MNYS_4_15M was binding. This constraint equation manages the stability limit across Snowy to New South Wales for the loss of either Marulan–Yass no. 4 or no. 5 330kV line or Gullen Range–Bannaby no. 61 330kV line, during outage of the parallel Marulan–Yass 330kV line. ,

Between DIs ending 1515 hrs and 1530 hrs (i.e. in the TI prior to the affected TI) Origin and Snowy Hydro rebid 2,140 MW of generation capacity from bands priced at or above \$26.29/MWh to bands priced at the Market Floor Price (MFP) of -\$1000/MWh. The reasons given for these rebids were '1502A CONSTRAINT MANAGEMENT - V>>V_BTRT_2A_R SL' and '15:05 A NSW: +1000 SENS \$13,390.42 HGR THN 30MPD 16:00@14:36', respectively.

Between DIs ending 1535 hrs and 1540 hrs, Origin and Snowy Hydro rebid 490 MW of generation capacity from bands priced at or above \$299.80/MWh to bands priced at the MFP. Some of the capacity that was rebid to lower priced bands were from generating units that were constrained by the constraint equation N::V_MNYS_2. In order to maximise the dispatch from the cheap generation units, while preventing this constraint equation from violating, the flow on the VIC-NSW interconnector was increased towards Victoria. Resultantly, the target flow on the VIC-NSW interconnector reversed from 57 MW towards New South Wales for DI ending 1535 hrs to 334 MW towards Victoria for DI ending 1540 hrs.

During the negative priced DI, the target flow on the Murraylink interconnector was limited to 220 MW towards South Australia by the upper transfer limit constraint equation VSML_220. The target flow on the Heywood interconnector was 224 MW towards South Australia.

With excess cheaper priced generation available in Victoria and South Australia, prices in these regions collapsed to at or below -\$928.26/MWh for DI ending 1540 hrs.



The 5-minute price in South Australia and Victoria increased to -\$45.00/MWh and -\$40.95/MWh, respectively for DI ending 1545 hrs, when 340 MW of generation capacity were rebid, in Victoria, from bands priced at the MFP to bands priced at or above \$0/MWh. Both regions returned to positive prices at DI ending 1555 hrs.

The negative spot price for South Australia was not forecast in the pre-dispatch schedules, as it was a result of short notice rebidding in NSW during a planned outage.

Saturday 09 April 2016 – High FCAS price Mainland

Market Outcomes: The Mainland (Queensland, New South Wales, Victoria and South Australia) Fast Raise Frequency Control Ancillary Service (FCAS) price reached \$134.78/MWh and \$78.46/MWh for trading intervals (TI) ending 1800 hrs and 1830 hrs.

FCAS prices in Tasmania were not affected by this event. Energy prices for the NEM were also elevated but did not reach the price threshold for reporting purposes.

Detailed Analysis: The Fast Raise FCAS prices in all Mainland regions were above \$100/MWh for 7 dispatch intervals (DI) between DIs ending 1735 hrs and 1810 hrs. The high FCAS prices can be attributed to low availability of cheap capacity and steep supply curve of Fast Raise Service.

A number of units providing cheap FCAS in the Mainland were dispatched close to their maximum capacity in the energy market, which effectively reduced their Fast Raise FCAS availability. In addition, Fast Raise FCAS support from Tasmania was unavailable due to the outage of Basslink interconnector from 20 December 2015.

Due to lower availability of cheap capacity and a steep supply curve in the Fast Raise FCAS market, a marginal increase of Fast Raise FCAS requirement for a Mainland generation event was met by changing the energy dispatch of units that offered cheap capacity in the Fast Raise FCAS market. For the high priced DIs, 5-minute energy prices were elevated between \$140.20/MWh and \$299.60/MWh across the Mainland regions. The Fast Raise FCAS price was the outcome of FCAS and energy market co-optimisation.

The mainland FCAS prices for Fast Raise Services reduced to \$40.50/MWh for DI ending 1815 hrs when the availability of Fast Raise FCAS capacity was increased.

High 30-minute FCAS prices for mainland were forecast in the pre-dispatch schedules.

Monday 11 April 2016 to Sunday 17 April 2016 – High Energy price TAS*

Market Outcomes: Tasmania spot prices were above \$500/MWh for 57 trading intervals (TIs) between TIs ending 0930 hrs on 11 April 2016 and ending 2030 hrs on 17 April 2016.

FCAS prices in all regions and Energy prices for the other NEM regions were not affected by this event.

Detailed Analysis: 5-Minute dispatch prices in Tasmania were between \$500.20/MWh and \$600.10/MWh for 336 Dispatch Intervals (DIs) during the high priced TIs. These high prices can be



attributed to a steep supply curve, low wind generation during high demand periods while Basslink was out of service.

- Tasmanian capacity was offered at either less than \$151/MWh or above \$500/MWh during these high priced DIs, resulting in a steep supply curve.
- For the high priced TIs between TIs ending 0930 hrs on 12 April 2016 and 2030 hrs on 17 April 2016, wind generation was low ranging between 1.92 MW and 96.25 MW.

The 5-minute price reduced in the DIs subsequent to the high priced intervals, when demand reduced or generation capacity was rebid from higher price bands to lower price bands.

The high 30-minute spot prices for Tasmania were forecast in the pre-dispatch schedules.

** A summary was prepared as the maximum daily spot price was between \$500/MWh and \$2,000/MWh*

Monday 18 April 2016 to Sunday 24 April 2016 – High Energy price TAS*

Market Outcomes: Tasmania spot price was above \$500/MWh for 71 trading intervals (TIs) between TIs ending 0430 hrs on 18 April 2016 and ending 1300 hrs on 24 April 2016.

FCAS prices in all regions and Energy prices for the other NEM regions were not affected by this event.

Detailed Analysis: 5-Minute dispatch prices in Tasmania were between \$520.29/MWh and \$597.87/MWh for 422 Dispatch Intervals (DIs) during the high priced TIs. These high prices mainly attributed to a steep supply curve and low wind generation during high demand periods while Basslink was out of service.

- Tasmanian capacity was offered at either less than \$151/MWh or above \$594/MWh during these high priced DIs, resulting in a steep supply curve.
- For the high priced TIs, wind generation was low, ranging between 0 MW and 146 MW.

The 5-minute price reduced in the DIs subsequent to the high priced intervals, when demand reduced or generation capacity was rebid from higher price bands to lower price bands.

The high 30-minute spot prices for Tasmania were forecast in the pre-dispatch schedules.

** A summary was prepared as the maximum daily spot price was between \$500/MWh and \$2,000/MWh*

Monday 25 April 2016 to Saturday 30 April 2016 – High Energy price TAS*

Market Outcomes: Tasmania spot price was above \$500/MWh for 43 trading intervals (TIs) between TIs ending 0700 hrs on 25 April 2016 and ending 0400 hrs on 30 April 2016.



FCAS prices in all regions and Energy prices for the other NEM regions were not affected by this event.

Detailed Analysis: 5-Minute dispatch prices in Tasmania were between \$594.07/MWh and \$600.09/MWh for 258 dispatch intervals (DIs) during the high priced TIs. These high prices mainly attributed to a steep supply curve during high demand periods, while Basslink was out of service.

- Tasmanian capacity was offered at either less than \$151/MWh or above \$594/MWh during these high priced DIs, resulting in a steep supply curve.

The 5-minute price reduced in the DIs subsequent to the high priced intervals, when demand reduced or generation capacity was rebid from higher price bands to lower price bands.

The high 30-minute spot prices for Tasmania were forecast in the pre-dispatch schedules.

** A summary was prepared as the maximum daily spot price was between \$500/MWh and \$2,000/MWh*

Thursday 28 April 2016 – Negative Energy price SA

Market Outcomes: South Australia had a negative spot price of -\$126.12/MWh for trading interval (TI) ending 1430 hrs.

FCAS prices in all regions and Energy prices for the other NEM regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch price decreased to the Market Floor Price (MFP) of -\$1000/MWh in South Australia for dispatch interval (DI) ending 1415 hrs. The negative price can be attributed to excess cheaper priced generation in South Australia due to increased interconnector flow from Victoria to South Australia across the Heywood interconnector.

Between DIs ending 1410 hrs and 1415 hrs, demand in South Australia decreased by 26 MW to 1429 MW and wind generation increased by 65 MW to 356 MW.

During the same period, flow across the South Morang F2 500/330kV transformer increased from 916 MVA to 1163 MVA. The increased loading on the transformer caused the thermal constraint equation $V_{NIL_2A_R} > V_{NIL_2A_R}$ to bind. This constraint equation prevents the overload of South Morang F2 500/330 kV transformer under system normal conditions. The binding constraint equation resulted in the target flow towards South Australia on the Heywood Interconnector to increase from 86 MW to 492 MW between DIs ending 1410 hrs and 1415 hrs.

With excess cheaper priced generation available from Victoria during the low demand period, the South Australia price decreased to the MFP for DI ending 1415 hrs.

The 5-minute price increased to \$35.70/MWh for DI ending 1420 hrs when the flow across the South Morang F2 500/330kV transformer reduced by 342 MVA. Demand in South Australia increased by 49 MW and 74 MW of generation capacity was rebid from the MFP to the Market Price Cap (MPC) of \$13,800/MW.

The negative spot price was not forecast in the latest pre-dispatch schedule, as it was a result of increased flow on the South Morang F2 500/330kV transformer within the affected TI.