Electricity Pricing Event Reports

JANUARY 2016

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

Saturday 09 January 2016 – High Energy price SA*

Market Outcomes: South Australia spot price reached $586.79/MWh for trading interval (TI) ending 1630 hrs.

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

Detailed Analysis: 5-Minute dispatch price in South Australia reached $3,231.21/MWh for dispatch interval (DI) ending 1620 hrs. The high price can be attributed to moderate wind generation and generator tripping when interconnector flow was limited.

- The temperature in Adelaide reached a maximum of 34.8°C.
- The demand reached 1,770 MW for TI ending 1630 hrs.
- Wind generation was moderate at 252.68 MW during the high price TI.
- At 1609 hrs, AGL Torrens Island A unit 4 tripped from 96 MW.
- Cheaper priced generation was available during the high price interval but limited due to FCAS profile (Northern PS unit 2), or required more than one DI to synchronise (Hallet GT) or were constrained off by the S>>NIL_SETB_KHTB1 constraint equation (Ladbroke PS and Lake Bonney WF).
- During the high price interval, target flow on the Heywood interconnector was limited to 386 MW towards South Australia by the system normal constraint equation, V^S_HYCP. This constraint equation avoids the voltage collapse in Heywood area for the loss of the Heywood – Mortlake 500kV line. The target flow also violated the limit of 376 MW set by the system normal constraint equation, S>>NIL_SETB_KHTB1. This constraint equation manages the post-contingent loading on the Keith - Tailem Bend no. 1 132 kV line for the loss of the South East – Tailem Bend 275 kV transmission lines.
- During the high price interval, target flow on the Murraylink interconnector was limited to 165 MW towards South Australia by the voltage stability constraint equation, V^SML_NSWRB_2. This constraint equation avoids voltage collapse in Victoria for loss of the Darlington Point -Buronga (X5) 220 kV line.

South Australia dispatch price reduced to $50.29/MWh for the subsequent interval following the high price when:

- Demand reduced, which includes around 116 MW of non-scheduled generation coming online.
- A total of 502 MW of generation capacity was rebid from higher priced bands to the market floor price (MFP) of -$1,000/MWh.

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

Monday 11 January 2016 – High FCAS price Mainland

Market Outcomes: The sum of all mainland (Queensland, New South Wales, Victoria and South Australia) Frequency Control Ancillary Service (FCAS) price was between $74.60/MWh and $187.61/MWh for trading intervals (TI) ending 1400 hrs, 1500 hrs, 1530 hrs and 1600 hrs.

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

Further information is provided below.

Detailed Analysis: The FCAS prices for raise services in all regions of the mainland was above $150/MWh for 9 dispatch intervals (DI) between DIs ending 1335 hrs and 1600 hrs. The high FCAS prices can be attributed to limited cheaper priced raise regulation services during a period of increasing demand and non-compliance with generator targets.

Mainland regions experienced a hot temperature day of above 35 degrees in Sydney, Melbourne and Adelaide. As the NEM demand increased in the afternoon, the accumulated time error in the mainland increased from -1.0 sec at 1226 hrs to -4.26 sec at 1342 hrs. The exacerbation of the time error can be attributed to non-compliance with National Electricity Market Dispatch Engine (NEMDE) targets by a number of generators.

To manage the time error, the amount of raise regulation services enabled in the mainland increased from 137 MW for DI ending 1230 hrs to 250 MW (maximum) for DI ending 1345 hrs. The additional raise regulation had to be sourced from more expensive units by reducing their generation in the energy market.

Between the high price DIs ending 1335 hrs and 1600 hrs, a number of generators were limited by their FCAS profiles. CS Energy, Delta Electricity and AGL also rebid a total of 224 MW of raise regulation from lower priced bands to bands priced at or above $200/MWh. FCAS support from Tasmania was unavailable due to the outage of Basslink interconnector from 20 December 2015.

The mainland FCAS prices for raise services reduced to $20.80/MWh for DI ending 1545 hrs when the time error in the mainland had recovered and raise service requirements reduced.

The high 30-minute FCAS prices for mainland were not forecast in the pre-dispatch schedules, as the FCAS requirements in Pre-dispatch were much lesser than Dispatch.

Tuesday 12 January 2016 – High Energy and FCAS price TAS

Market Outcomes: Spot price in Tasmania reached $1,132.12/MWh and the sum of all FCAS prices reached $3,362.05/MWh for trading interval (TI) ending 0700 hrs.

FCAS prices and energy prices in other NEM regions were not affected.

Further information is provided below.

Detailed Analysis: The Tasmania energy price reached $6,311.52/MWh for DI ending 0650 hrs. Tasmania demand increased by approximately 41 MW from dispatch intervals (DIs) ending 0645 hrs to 0650 hrs due to Rio Tinto returning to service. With Basslink interconnector out of service since 20 December 2015, the increase in demand had to be sourced from local generators. For the high priced TI, the wind generation in Tasmania was low at 7 MW.

For DI ending 0650 hrs, cheaper priced generation was available but limited due to ramp rates (Cethana PS, Devils Gate PS, Fisher PS, John Butters PS, Lemonthyme/Wilmot PS, Mackintosh PS, Reece PS unit 1 and Tribute PS) and FCAS profile (Reece PS unit 2 and Poatina PS unit 3, 4, 5 and 6). Ramp rates for most units were limited to 1 MW per minute as the Automatic Generation Control (AGC) for these units were temporarily suspended for one DI due to a frequency event.

The 5-minute energy price in Tasmania reduced to $90.30/MWh for DI ending 0655 hrs when Nyrstar tripped and the demand decreased by 45 MW. The price reduction is also due to increased ramp rates for Gordon, Mackintosh PS and Reece PS unit 1 when AGC was no longer suspended.

Raise Regulation and Fast Raise service prices reached $13,800/MWh and $6,314.58/MWh respectively for DI ending 0650 hrs. With Basslink interconnector out of service, Tasmania FCAS requirement had to be source from local generators. The FCAS requirement for both services increased for DI ending 0650 hrs resulting in the enablement of all available Raise Regulation and Fast Raise services in Tasmania. Constraint equation F_T+NIL_MG_R6 violated for DI ending 0650 hrs due to insufficient availability of Fast Raise service. This constraint equation manages the Fast Raise requirements in Tasmania when Basslink is out of service.

The FCAS price of Raise Regulation and Fast Raise services also reduced to $6.76/MWh and $2.40/MWh for DI ending 0655 hrs when Hydro Tasmania offered more capacity to the lower priced bands.

The high 30-minute FCAS price was forecast in the pre-dispatch schedules. The high 30-minute spot price was not forecast in the pre-dispatch schedules due the sudden load increase.

Wednesday 13 January 2016 – High Energy price SA*

Market Outcomes: South Australia spot price reached $503.08/MWh for trading interval (TI) ending 0030 hrs.

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 South Australia were between $586.66/MWh and $591.99/MWh for four dispatch intervals (DIs) between DIs ending 0005 hrs and 0030 hrs. The moderately high price can be attributed to moderate wind generation, shifting and rebidding of generation capacity and unplanned outage of a generator.

- Moderate level of wind generation at 253 MW for TI ending 0030 hrs.
- Northern unit 2 was shutting down due to technical issues.
- Between DI ending 0005 hrs and 0015 hrs, 515 MW of generation capacity was either shifted or rebid from bands priced at less than $362/MWh to bands priced at more than $590/MWh.
- Cheaper priced generation was available during the high price interval but limited due to FCAS profile (Northern PS unit 1).
- During the high price intervals, target flow on the Heywood interconnector was limited up to 394 MW towards South Australia by the system normal constraint equation, V::S_NIL_MAXG_AUTO. This constraint equation manages the transient stability limit for the loss of the largest generation block in South Australia.
- During the high price intervals, target flow on the Murraylink interconnector was limited up to 170 MW towards South Australia by the voltage stability constraint equation, V^SML_NSWRB_2. This constraint equation avoids voltage collapse in Victoria for loss of the Darlington Point – Buronga (X5) 220 kV line.

South Australia dispatch price reduced to $356.66/MWh for DI ending 0035 hrs as the demand decreased and a total of 360 MW of generation capacity was shifted from higher priced bands to bands priced at $362/MWh.

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

Wednesday 13 January 2016 – High Energy Price VIC, SA

Market Outcomes: Spot price in Victoria reached $9,137.03/MWh for Trading Interval (TI) ending 1530 hrs, followed by spot prices of $7,477.35/MWh in Victoria and $5,173.04/MWh in South Australia for TI ending 1600 hrs.

FCAS prices in the mainland regions were higher than usual for TIs ending 1530 hrs to 1600 hrs, but did not reach the threshold value of $150/MWh for reporting purposes.

Energy prices for other regions and FCAS prices in Tasmania were not affected.

Counter price flows caused negative residues of approximately $4m to accumulate on the Victoria to New South Wales directional interconnector during the day. AEMO managed negative residues from 1515 hrs to 1620 hrs by reducing the flow on the interconnectors towards New South Wales. (Market notice 51317 and 51327)

Further information is provided below.

Detailed Analysis: The 5-Minute prices in Victoria were between $8,536.43/MWh and the Market Price Cap (MPC) of $13,800/MWh between dispatch intervals (DIs) ending 1515 hrs and 1550 hrs. The 5-Minute prices in South Australia reached $10,860.00/MWh between DIs ending 1535 hrs and 1545 hrs. The high prices occurred during the evening peak demand period when flow from the northern regions were limited due to the reclassification of critical transmission lines in Victoria in response to lightning storms in the vicinity.

Temperatures in Melbourne reached a maximum of 43.6°C and the demand reached 9,448 MW for TI ending 1600 hrs (Demand peaked at 9,505 MW for TI ending 1700 hrs). Temperatures in Adelaide reached a maximum of 35.1°C and the demand reached 2,251 MW for TI ending 1600 hrs.

In response to lightning storms in the area, the loss of both Dederang-Glenrowan No.1 and No.3 220kV lines was declared a credible contingency from DIs ending 1515 hrs to 1550 hrs (Market Notices 51316 and 51323). The reclassification constraint set V-DDGN_N-2 was invoked to manage the possible tripping of several transmission lines in Victoria. Constraint equation V>>DDSH_DDGN_N-2 within the set violated for the entire classification period. This constraint constrained down a large amount of generation from scheduled Victoria units and forced the VIC-NSW interconnector to flow towards New South Wales during the Victoria high priced periods.

Post-event investigation of the V>>DDSH_DDGN_N-2 constraint equation has verified that it is correctly designed. The constraint equation violated as the generation could not be scheduled in a way to relieve the violation and yet maintain the generation-demand balance in Victoria. Furthermore, Murray PS which is being constrained down changed its ramp rates from 30 MW/min to 3 MW/min effective of DI ending 1520 hrs with rebid reason of “VIC:ACT PRICE $13,500.10 HGR THN 5MPD 15:15@15:06”.

In Victoria, between DIs ending 1505 hrs and 1525 hrs, up to 25 MW from Valley Power Peaking Facility unit 3 bid unavailable with the reason "UPDATE AVAIL FOR CHANGE TO OUTAGE PLAN/PLANT CONDITIONS". Between DIs ending 1510 hrs and 1525 hrs, 130 MW from Yallourn W PS unit 1 bid unavailable with the reason "CAPACITY ADJ DUE TO MILL ISSUES".

In South Australia, for DI ending 1535 hrs, 90 MW of generation capacity from AGL was rebid from lower price bands to band priced at $10,860.00/MWh. Northern PS unit 2 was shut down since DI ending 0020 hrs due to technical issues.

Cheaper priced generation was available but limited due to ramp rates (Hazelwood PS unit 5), FCAS profiles (Northern PS unit 1), required more than one DI to synchronise (Bairnsdale PS unit 1, Jeeralang "A" PS unit 1 and 4), or constrained off by thermal constraint equations V>>DDSH_DDGN_N-2 in Victoria and S>BRTW_BWPA_HUWT in South Australia.

Due to the counter-price flow on the VIC-NSW interconnector, the negative residue management (NRM) constraint equation NRM_VIC1_NSW1 was invoked between DIs ending 1520 hrs and 1620 hrs. The NRM constraint equation reduced the interconnector flow towards New South Wales but violated between DIs ending 1520 hrs and DI ending 1550 hrs.

For DIs ending 1555 hrs and 1600 hrs, the 5-minute prices in Victoria and South Australia collapsed to negative prices. This was due to a total of 915 MW in Victoria and 850 MW in South Australia rebid to the Market Floor Price (MFP) of -$1,000/MWh as well as more generation was available when the constraint set V-DDGN_N-2 was revoked and the constraint equation S>BRTW_BWPA_HUWT was no longer binding.

The 5-minute price in Victoria and South Australia increased to $16.20/MWh and $14.87/MWh respectively for DI ending 1605 hrs. The price increase is due to 2,654 MW of generation capacity in Victoria and 1,193 MW of generation capacity in South Australia rebid from negative priced bands to band priced at or above $0/MWh.

The high 30-minute spot price for Victoria was not forecast in the latest pre-dispatch schedule, as it was a result of a reclassification of a non-credible contingency event. The high 30-minute spot price for Victoria and South Australia were forecast in the next pre-dispatch schedule.

Thursday 14 January 2016 – High Energy price NSW, High FCAS price NEM

Market Outcomes: New South Wales spot prices were $642.20/MWh and $5,022.74/MWh for trading intervals (TIs) ending 1330 hrs and 1400 hrs respectively.

FCAS price in mainland NEM was $294.64/MWh for TI ending 1400 hrs.

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

Actual Lack of Reserve Level 1 (LOR1) condition had been declared for the New South Wales region from 1100 hrs to 1430 hrs (Market notices 51358 and 51372). Actual LOR2 condition had been declared for the New South Wales region from 1330 hrs to 1430 hrs (Market notices 51362 and 51371).

Detailed Analysis: 5-Minute dispatch prices in New South Wales were between $935.85/MWh and $13,594.71/MWh for five dispatch intervals (DIs) between DIs ending 1305 hrs and 1345 hrs. The high price can be attributed to high demand and unplanned outage of a generator.

Temperatures in Sydney Airport reached a maximum of 41°C which contributed to the high demand of 12,844 MW for TI ending 1330 hrs in New South Wales.

At 1330 hrs, Liddell unit 3 tripped from 344 MW.

Cheaper priced generation was available but limited due to ramp rates (Eraring unit 2, Bayswater units 3 and 4), required more than one DI to synchronise (Colongra GT unit 1, 2 and 4), and majority of New South Wales generation being constrained down by the system normal constraint equations including N>>N-NIL__S and N>>N-NIL_64. The thermal constraint equation N>>N-NIL__S manages the post-contingent flow of the Mt Piper – Wallerawang no.70 330kV transmission line while constraint equation N>>N-NIL_64 manages the post-contingent flow of the Bannaby – Sydney West no.39 330kV transmission line.

During the high priced intervals, the target flow on the VIC-NSW interconnector towards New South Wales was limited up to 257 MW by system normal constraint equations, N>>N-NIL__S, N^^N_NIL_1 and N>>N-NIL__B_15M. The constraint equation N^^N_NIL_1 manages the voltage stability limit in the Upper Tumut – Canberra – Yass area. The constraint equation N>>N-NIL__B_15M manages the post-contingent flow of the Upper Tumut – Canberra no. 1 330 kV transmission line.

During the high priced intervals, the target flow on the QNI interconnector towards New South Wales was limited up to 607 MW by system normal constraint equations, N>>N-NIL_64 and N>>N-NIL__S.

During the high priced intervals, the target flow on the Terranora interconnector towards New South Wales was limited up to 89 MW by the system normal constraint equation N>>N-NIL_64 and the outage constraint equation N_X_MBTE2_B. The constraint equation N_X_MBTE2_B manages flow to Terranora load during the outage of two Directlink cables.

New South Wales dispatch price reduced to $473.31/MWh for DI ending 1350 hrs with the decrease in demand. By DI 1355 hrs the New South Wales price reduced to $27.62/MWh when approximately 94% of New South Wales generation was offered in the negative priced bands.

The high energy price in New South Wales was forecast in pre-dispatch schedules.

Raise Regulation service price for each of the mainland NEM regions reached $300/MWh for five dispatch intervals within TI ending 1400 hrs. FCAS support from Tasmania was unavailable due to the outage of the Basslink interconnector from 20 December 2015. As the NEM demand increased in the afternoon and the unplanned outage of Liddell unit 3, the accumulated time error in the mainland increased from -1.49 seconds at 1242 hrs to -4.47 seconds at 1338 hrs. Consequently, the Raise Requirement requirements have increased to manage the time error. Between DI ending 1345 hrs and 1400 hrs, constraint set F-MAIN_RREG_0300 was invoked to manage raise regulation requirements (Market notice 51367). The additional raise regulation had to be sourced from more expensive units when a number of generators were limited by their FCAS profiles.

The mainland FCAS prices for Raise Regulation services reduced to $25.40/MWh for DI ending 1405 hrs when the time error in the mainland had recovered and raise service requirements reduced.

The high 30-minute FCAS prices for mainland were not forecast in the pre-dispatch schedules, as the FCAS requirements in Pre-dispatch were much lesser than Dispatch.

Friday 29 January 2016 – High Energy price QLD

Market Outcomes: Queensland spot prices were $2,126.06/MWh and $2,472.01/MWh for trading intervals (TIs) ending 1330 hrs and 1430 hrs.

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

Detailed Analysis: 5-Minute dispatch price in Queensland reached $11,530.80/MWh and $13,799.98/MWh for dispatch intervals (DIs) ending 1330 hrs and 1425 hrs. The high prices can be attributed to high demand and rebidding.

Queensland demand peaked at 8,701 MW for TI ending 1430 hrs.

Between DIs ending 1315 hrs and 1330 hrs, CS Energy rebid 375 MW of generation capacity from Callide PS and Gladstone PS from bands priced at less than $300/MWh to the Market Price Cap (MPC) of $13,800/MWh. For DI ending 1425 hrs, CS Energy and Millmerran Energy rebid 360 MW of generation capacity from Callide PS, Gladstone PS and Millmerran unit 2 from bands priced at less than $300/MWh to the MPC.

Cheaper priced generation was available but limited due to ramp rates (Kogan Creek, Millmerran unit 1 and Stanwell unit 3), FCAS profiles (Stanwell unit 1, unit 2 and 4, and Tarong unit 1, and 3), or required more than one DI to synchronise (Braemar unit 5 and Townsville GT unit 1).

The target flow on the QNI interconnector was limited up to 186 MW towards Queensland during the high priced intervals by the voltage stability constraint equation, N^^Q_NIL_B1. This system normal constraint equation prevents voltage collapse in New South Wales for tripping of Kogan Creek PS. The target flow on the Terranora interconnector was limited up to 23 MW towards Queensland by the same voltage stability constraint equation and the thermal constraint equation, N>LSDU_LSDU. This constraint equation manages the post-contingent flow on a Lismore – Dunoon 132 kV line for the trip of the parallel line.

The 5-minute price reduced to below $50/MWh in the subsequent DIs to the high priced intervals with a decrease in Queensland demand and rebidding of capacity from higher priced bands to bands priced at -$1,000/MWh.

The high 30-minute spot price for Queensland was not forecast in the predispatch schedules as it was a result of rebidding of generation capacity within the affected trading interval.