Electricity Pricing Event Reports

JANUARY 2017

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Saturday 07 January 2017 – High Energy price SA

Market Outcomes: Spot price in South Australia (SA) reached $2,357.40/MWh for trading interval (TI) ending 1630 hrs on 7 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in South Australia reached $13,164/MWh for dispatch interval (DI) ending 1610 hrs on 7 January 2017. This high price can mainly be attributed to constrained interconnector flow during times of high demand.

Demand in SA was high, reaching 2,649 MW during the high priced TI. This high demand coincided with high temperatures in SA, with a daily peak of 39.2 degrees (Adelaide Airport).

Between DI ending 1605 hrs and 1610 hrs demand increased by 30 MW while wind generation in the region reduced by 56 MW.

At DI ending 1605 hrs, the target on the Heywood interconnector was 600 MW towards South Australia. However at 1605 hrs, the actual flow was 651 MW. The interconnector exceedance was caused by actual demand being higher than forecast in SA and a number of generators in SA not reaching their targets. This resulted in the target flow on the Heywood interconnector being limited to 549 MW towards South Australia by the oscillatory stability constraint equation V:S_600_HY_TEST_DYN. This constraint equation limits the dynamic headroom for the upper transfer limit on the VIC to SA Heywood interconnector to 600 MW. Once the 600 MW flow limit is exceeded by more than 10 MW, the limit is temporarily reduced by the amount of exceedance.

Between DIs ending 1605 hrs and 1610 hrs, flow on Murraylink towards SA reduced by 3 MW and was limited to 111 MW by the upper transfer limit constraint equation V^SML_NSWRB_2. V^SML_NSWRB_2 is a system normal voltage stability constraint equation which avoids voltage collapse in Victoria for the loss of the Darlington Point - Buronga (X5) 220 kV line.

For DI ending 1605 hrs, Origin shifted 45 MW of generation capacity from bands priced at $298.89/MWh or below to band priced at $13,164/MWh. Lower priced capacity was available but required more than one DI to synchronise (Snuggery) or was limited by ramp rates (Hallet PS).

For DI ending 1615 hrs, the 5-minute price reduced to $144.21/MWh when demand reduced by 40 MW and 300 MW of generation capacity in SA was rebid from bands priced at or above $278.81/MWh to the Market Floor Price (MFP) of -$1,000/MWh.

The high 30-minute spot price for South Australia was not forecast in the latest pre-dispatch schedules. This was due to a lower demand and increased flow across Heywood interconnector forecast in pre-dispatch as compared to dispatch.

Wednesday 11 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,361.08/MWh for trading interval (TI) ending 2300 hrs on 11 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch energy price in Queensland reached $13,996.45/MWh at dispatch interval (DI) ending 2240 hrs. This high price can mainly be attributed to rebidding of generation capacity while interconnector support was constrained.

For the high priced TI, the overnight demand in QLD was high reaching 6,867 MW.

Between DI ending 2235 hrs and 2240 hrs, the sum of the flow on the interconnectors towards Queensland increased by 6 MW to reach 228 MW. At DI ending 2240 hrs, the QNI and Terranora interconnector were limited by the constraint equations N^^Q_NIL_B1 and N>N-NIL_LSDU, respectively. The voltage stability constraint equation N^^Q_NIL_B1 avoids the voltage collapse on the loss of Kogan Creek PS. The thermal constraint equation N>N-NIL_LSDU avoids the overload of the Lismore - Dunoon 132 kV line (9U6 or 9U7) for the trip of the other parallel Lismore - Dunoon 132 kV line.

For DI ending 2240 hrs, CS Energy and Origin rebid 195 MW of generation capacity from bands priced at $295/MWh or below to band priced at the Market Price Cap (MPC) of $14,000/MWh. For the same DI, Mt Stuart PS unit 2 withdrew 140 MW of generation to 0 MW (while generating 45 MW for the previous DI). For the high priced DI, lower priced capacity was available but required more than one DI to synchronise (Braemar unit 5) or was limited by ramp rates (Braemar unit 6 and Oakey PS unit 1 & 2).

For DI ending 2245 hrs, the 5-minute dispatch energy price reduced to $16.80/MWh when demand in the region reduced by 269 MW and Origin, Arrow Energy and ERM Power rebid 810 MW from bands priced at $13.79/MWh or above to the Market Floor Price (MFP) of -$1,000/MWh. Mt Stuart PS unit 2 made 140 MW of generation capacity available at the MFP with reason of “UNFORECAST PRICE SPIKE $13996 @HHE2240 SL”.

The high 30-minute spot price for Queensland was not forecast in the pre-dispatch schedules as it was a result of rebidding.

Thursday 12 January 2017 – High Energy price QLD

Market Outcomes: Spot prices in Queensland (QLD) ranged between $2,343.31/MWh and $2,578.37/MWh for 7 trading intervals (TIs) between TI ending 1300 hrs and 1900 hrs on 12 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch energy prices in Queensland reached between $13,642/MWh and the Market Price Cap (MPC) of $14,000/MWh for 7 dispatch intervals (DIs) during the high price TIs. The high priced DIs were DI ending 1235 hrs, 1530 hrs, 1535 hrs, 1610 hrs, 1750 hrs, 1820 hrs and 1840 hrs. These high price can mainly be attributed to rebidding and shifting of generation capacity, during a period of high demand, while interconnector support was constrained.

Demand in QLD was high during the high priced TIs, ranging between 8,191 MW and 8,936 MW. This high demand coincided with high temperatures in QLD, with a daily peak of 37 degrees (Archerfield Airport).

Planned outage of the Kempsey – Raleigh No.9W2 132 kV line was scheduled between 1735 hrs on 09 January 2017 and 1557 hrs on 12 January 2017 and the Coffs Harbour – Koolkhan No.96H 132 kV line was scheduled between 0705 hrs on 10 January 2017 and 1700 hrs on 30 June 2017. The outage constraint set N-X_96H_9W2 was invoked between 0700 hrs on 10 January 2017 and 1605 hrs on 12 January 2017 and N-CHKK_96H was invoked between 1605 hrs on 12 January 2017 and 0700 hrs on 23 January 2017.

Flow on the Queensland – New South Wales Interconnector (QNI) ranged between 152 MW and 265 MW towards QLD during these high priced DIs, limited by the system normal constraint equations N^^Q_NIL_B1 and N>>N-NIL__3_OPENED. The thermal constraint equation N>>N-NIL__3_OPENED avoids overload of the Liddell – Muswellbrook No.83 330 kV line for the trip of the Liddell – Tamworth No.84 330 kV line. The N^^Q_NIL_B1 constraint equation avoids voltage collapse of Kogan Creek generator.

Flow on the Terranora interconnector ranged between 93 MW towards New South Wales (NSW) and 29 MW towards QLD. During four of these DIs, the flow on Terranora violated the limit set by the outage thermal constraint equations N>N-X+96H+9W2_1 and N>N-CHKK_TE_1. The N>N-X+96H+9W2_1 constraint equation avoids overload of the Armidale – Koolkhan No.966 132 kV line for the trip of the Coffs Harbour – Lismore No.89 330 kV line during the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line and Kempsey – Raleigh No.9W2 132 kV line. The N>N-CHKK_TE_1 constraint equation avoids overload of the Armidale – Koolkhan No.966 132 kV line for the trip of the Coffs Harbour – Lismore No.89 330 kV line during the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line.

For DI end 1235 hrs, Stanwell and Braemar Power rebid or shifted 152 MW from bands priced at $98.94/MWh or below to bands priced at $13,800/MWh and above. Lower priced capacity was available but required more than one DI to synchronise (Mt Stuart GT unit 3), or limited by ramp rates (Oakey PS unit 1).

For DI ending 1530 hrs, Stanwell rebid 180 MW from bands priced at $98.94/MWh to the MPC. Lower priced capacity was available but required more than one DI to synchronise.

For DI ending 1535 hrs, Callide C unit 3 withdrew 66 MW of capacity with the reason “1453A RRP 330 DI 1530 IN P5 RUN ABOVE 30MIN PD SL”. Flow on the Terranora interconnector was 56 MW towards NSW, violating the 98.50 MW limit set by the thermal constraint equation N>N-X+96H+9W2_1. Lower priced capacity was available but limited by their Fast Start Profile (Braemar 2 GT unit 5).

For DI ending 1605 hrs, 211 MW was shifted from bands priced at $60.94/MWh or below to the MPC. This reduced availability of lower priced capacity in addition to an increase in demand of 104 MW between DI ending 1605 hrs and 1610 hrs resulted in the dispatch price reaching $13,642/MWh for DI ending 1610hrs.

For DI ending 1745 hrs, Stanwell rebid 40 MW from bands priced at $60.94/MWh to the MPC. This reduction in lower priced capacity resulted in the dispatch priced reaching $13,654.53/MWh for DI

ending 1750 hrs. Additionally, at DI ending 1750 hrs, Gladstone PS unit 1 withdrew 35 MW of generation capacity with the reason "1742P UNIT RAMPING REBID TO MATCH-SL".

Between DI ending 1815 hrs and 1820 hrs, demand in QLD increased by 107 MW and flow towards QLD reduced by 29 MW. Flow on the Terranora interconnector was 91 MW towards NSW, violating the 101.90 MW limit set by the thermal constraint equation N>N-CHKK_TE_1. For this DI Gladstone PS unit 1 withdrew 20 MW from the MFP with the reason "1811P UNIT RAMPING REBID TO MATCH-RAMP DOWN TO OUTAGE-SL".

For DI ending 1835 hrs, Origin and Callide Power shifted 100 MW from the MFP to bands priced at or above $13,650.01/MWh. This reduced availability of lower priced capacity resulted in the dispatch price reaching $13,650.01/MWh for DI ending 1840 hrs when demand increased by 171 MW between DI ending 1835 hrs and 1840 hrs.

Following each high priced DI, the 5-minute energy spot price in Queensland reduced to or below $103.74/MWh as a result of demand decreasing and generation capacity being rebid from higher price bands to lower price bands.

The high 30-minute spot price for Queensland was forecast in the pre-dispatch schedules.

Friday 13 January 2017 – High Energy price QLD

Market Outcomes: Spot prices in Queensland (QLD) ranged between $2,200.28/MWh and $13,882.77/MWh for 8 trading intervals (TIs) between TI ending 0700 hrs and 2030 hrs on 13 January 2017. For TI ending 1700 hrs, the QLD spot price reached the all time high of $13,882.77/MWh.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Counter price flows caused negative settlement residues of approximately $1,130,000 to accumulate on the QLD to New South Wales (NSW) directional interconnector between 0700 hrs and 2330 hrs. AEMO managed negative settlement residues from 0655 hrs to 0715 hrs (Market Notices No. 56760 and 56761), 1850 hrs to 2115 hrs (Market Notices No. 56765 and 56767) and 2250 hrs to 2345 hrs (Market Notices No. 56776 and 56782).

Detailed Analysis: The 5-Minute dispatch energy prices in Queensland (QLD) reached between $12,518.69/MWh and the Market Price Cap (MPC) of $14,000/MWh for 13 dispatch intervals (DIs) during the high price TIs. The high priced DIs were DI ending 0640 hrs, 1445 hrs, 1605 hrs, 1635 to 1705 hrs, 1835 hrs, 1915 hrs and 2015 hrs. These high prices can mainly be attributed to rebidding and shifting of generation capacity, during a period of high demand, while interconnector support was constrained.

Demand in QLD was high during the high priced TIs, reaching a peak of 9,078 MW at TI ending 1700 hrs. This high demand coincided with consecutive high temperature days in QLD, with a daily peak of 33.7 degrees (Archerfield Airport) on the 13 January 2017.

During the high priced DIs, the target flow on the QNI interconnector towards QLD was limited between 169 MW and 267 MW by the system normal constraint equations N^^Q_NIL_B1 or N>>N-

NIL__3_OPENED. The N^^Q_NIL_B1 constraint equation avoids voltage collapse on the loss of Kogan Creek generator. The thermal constraint equation N>>N-NIL__3_OPENED avoids overload of the Liddell – Muswellbrook No.83 330 kV line for the trip of the Liddell – Tamworth No.84 330 kV line.

For DI ending 0640, the target flow on the Terranora interconnector towards QLD was limited at 64 MW by the system normal constraint equations N>N-NIL_LSDU. The thermal constraint equation N>N-NIL_LSDU avoids the overload of the Lismore - Dunoon 132 kV line for the trip of the other parallel Lismore - Dunoon 132 kV line. For all other high priced DIs, the target flow on the Terranora interconnector towards NSW was constrained at 95 MW by the system normal constraint equation N>>N-NIL__3_OPENED or the quick constraint equation #N-Q-MNSP1_I_E. The quick constraint equation #N-Q-MNSP1_I_E was built to manage oscillations on the Terranora interconnector caused by constraint action for the outage of Coffs Harbour – Koolkhan 96H 132 kV transmission line.

Generation capacity of up to 319 MW was shifted or rebid by a number of generators, from lower priced bands to bands priced at or above $13,641/MWh or the Market Price Cap (MPC) of $14,000/MWh. For the high priced DIs, cheaper priced generation was available but required more than one DI to synchronize, limited by ramp rates or by the FCAS trapezium profile.

The 5-minute energy spot prices in QLD reduced to or below $98.66/MWh in the DIs subsequent to the high priced intervals, when demand decreased and generation capacity was also rebid from higher price bands to lower price bands.

The high 30-minute spot price for QLD was forecast in the pre-dispatch schedules.

Saturday 14 January 2017 – High Energy price QLD

Market Outcomes: Spot prices in Queensland (QLD) ranged between $2,195.38/MWh and $12,641.69/MWh for 14 trading intervals (TIs) between TI ending 0700 hrs and 2300 hrs on 14 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Counter price flows caused negative settlement residues of approximately $500,000 to accumulate on the Queensland to New South Wales directional interconnector between TIs ending 0630 hrs and 0700 hrs. The Negative Residue Management (NRM) constraint did not operate during this period as a price revision event was under review when the accumulation of negative settlements residue exceeded the threshold of $100,000.

Detailed Analysis: The 5-Minute energy prices in Queensland (QLD) reached between $12,440.02/MWh and $13,800/MWh for 30 dispatch intervals (DIs) during the high price TIs. These high prices can be mainly attributed to rebidding and shifting of generation capacity during a period of high demand, while interconnector support was constrained.

Demand in QLD was high during the high priced TIs, reaching a peak of 8,666 MW for TI ending 1730 hrs. This high demand coincided with consecutive high temperature days in QLD, with a daily peak of 35 degrees (Archerfield Airport) on 14 January 2017.

Planned outage of the Coffs Harbour – Koolkhan No.96H 132 kV line is scheduled between 0705 hrs on 01 October 2016 and 1700 hrs on 30 June 2017. The outage constraint set N-CHKK_96H was invoked for the duration of the outage.

For most high priced DIs, generation capacity of up to 340 MW was shifted or rebid by a number of generators, from lower priced bands to bands priced at or above $12,518.69/MWh. Cheaper priced generation was available but were limited due to ramp rates, FCAS profiles or required more than one DI to synchronize. Lower priced generation was also constrained off by the system normal constraint equation Q>NIL_BI_FB. The Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line. This constraint equation violated for the high price DIs ending 1325 hrs, 1410 hrs, 1715 and 1945 hrs.

During the high priced DIs, the target flow on the QNI interconnector towards QLD was limited between 129 MW and 277 MW by the system normal constraint equations N^^Q_NIL_B1, N>>N-NIL__3_OPENED or N^Q_NIL_A. The N^^Q_NIL_B1 constraint equation avoids voltage collapse in NSW for the loss of Kogan Creek PS. The thermal constraint equation N>>N-NIL__3_OPENED avoids overload of the Liddell – Muswellbrook No.83 330 kV line for the trip of the parallel Liddell – Tamworth No.84 330 kV line. The N^Q_NIL_A constraint equation avoids voltage collapse in NSW for the trip of the Liddell – Muswellbrook No.83 330 kV line.

For DI ending 0640 hrs, the target flow on the Terranora interconnector was towards QLD and limited to 69 MW by the system normal constraint equation N^^Q_NIL_B1. For all other high priced DIs, the target flow on the Terranora interconnector was towards NSW and limited between 3 MW and 106 MW by constraint equations N^Q_NIL_A, N^^Q_NIL_B1, N>>N-NIL__3_OPENED, NQTE_ROC, N>N-CHKK_TE_1 or #N-Q-MNSP1_I_E. The constraint equation NQTE_ROC limits the rate of change on the Terranora interconnector to 80 MW per 5 minutes. The outage constraint equation N>N-CHKK_TE_1 avoids overload of the Armidale – Koolkhan No.966 132 kV line for the trip of the Coffs Harbour – Lismore No.89 330 kV line during the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line. The constraint equation #N-Q-MNSP1_I_E manages dispatch target oscillations on the Terranora interconnector caused by the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line.

The 5-minute energy spot prices in Queensland reduced to $310.02/MWh or below in the DIs subsequent to the high priced intervals, when demand decreased and generation capacity was also rebid from higher price bands to lower price bands.

The high 30-minute spot price for Queensland was forecast in the pre-dispatch schedules.

Sunday 15 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,609.08/MWh for trading interval (TI) ending 1230 hrs on 15 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in Queensland reached $13,800/MWh at dispatch interval (DI) ending 1215 hrs. This high price can mainly be attributed to an increase in

demand while interconnector support was constrained and limited lower priced generation was available in the region.

Demand in QLD was high, reaching 7,416 MW during the high priced TI. This high demand coincided with high temperatures in QLD, with a daily peak of 33.0 degrees (Archerfield Airport).

Between DI ending 1210 hrs and 1215 hrs, demand in Queensland increased by 50 MW. For DI ending 1215 hrs, flow was constrained on both the Queensland – New South Wales interconnector (QNI) and Terranora interconnector by the constraint equations N^^Q_NIL_B1 and N>LSDU_LSDU, respectively. The N^^Q_NIL_B1 system normal constraint equation avoids voltage collapse for the loss of Kogan Creek PS. The thermal constraint equation N>LSDU_LSDU avoids the overload of the Lismore No. 9U7/L 132 kV line for the trip of the parallel Lismore - Dunoon No. 9U6/L 132 kV line.

For DI ending 1210 hrs, InterGen rebid 50 MW from the Market Floor Price (MFP) of -$1,000/MWh to the Market Price Cap (MPC) of $14,000/MWh.

For DI ending 1215 hrs, Callide Power rebid 18 MW from the MFP to band priced at $13,999.99/MWh. Callide B unit 1 withdrew 5 MW of capacity from bands priced at $16.80/MWh with the reason “1206P AMBIENT CONDITIONS-VACUUM UNLOADING-SL”.

Lower priced generation was available but required more than one DI to synchronise (Mt Stuart GT unit 1), limited by ramp rates (Oakey GT unit 1) or was constrained off by the constraint equation Q>NIL_BI_FB binding (Gladstone PS unit 3, 4, 5 and 6). This constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line.

The 5-minute price reduced to $59.99/MWh for DI ending 1220 hrs, when demand in the region reduced by 48 MW. ERM Power and Arrow Energy rebid 375 MW from bands priced at $1,405.69/MWh or above to bands priced at MFP and lower priced capacity became available.

The high 30-minute spot price for Queensland was forecast in the latest pre-dispatch schedules.

Wednesday 18 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,404.56/MWh for trading interval (TI) ending 1700 hrs on 18 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in Queensland (QLD) reached $13,800/MWh at dispatch interval (DI) ending 1700 hrs. This high price can mainly be attributed to an increase in demand while interconnector support was constrained and lower priced generation was not available in the region.

Demand in QLD was high, reaching 9,356 MW during the high priced TI. This high demand coincided with high temperatures in QLD, with a daily peak of 36.0 degrees (Archerfield Airport). The QLD demand for DI ending 1800 hrs reached the record peak of 9,412 MW.

Between DI ending 1655 hrs and 1700 hrs, demand in QLD increased by 57 MW.

For DI ending 1700 hrs, the target flow on the QNI interconnector towards QLD reduced by 37 MW and was limited to 124 MW by the system normal constraint equation N>>N-NIL__3_OPENED. This constraint equation avoids overload of the Liddell – Muswellbrook No.83 330 kV line for the trip of the Liddell – Tamworth No.84 330 kV line.

For DI ending 1700 hrs, the target flow on the Terranora interconnector was constrained towards NSW to 147 MW by the outage thermal constraint equation N>N-CHKK_TE_1. The N>N-CHKK_TE_1 constraint equation avoids overload of the Armidale – Koolkhan No.966 132 kV line for the trip of the Coffs Harbour – Lismore No.89 330 kV line during the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line.

There was no other lower priced capacity available at the time of the high priced DI.

The 5-minute price reduced to $60.94/MWh for DI ending 1705 hrs, when demand in the region reduced by 261 MW. Callide Power, CS Energy and InterGen also shifted 146 MW from bands priced at or above $13,999.99/MWh to bands priced at or below $98.66/MWh. An additional 10 MW of generation was made available at Millmerran unit 1 at the Market Floor Price (MFP) of -$1,000/MWh.

The high 30-minute spot price for Queensland was forecast in the pre-dispatch schedules.

Thursday 19 January 2017 – High Energy price SA

Market Outcomes: Spot price in South Australia (SA) reached $2,399.21/MWh for trading interval (TI) ending 1700 hrs on 19 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute Energy price in South Australia reached $13,998.99/MWh for dispatch interval (DI) ending 1635 hrs on 19 January 2017. This high price can mainly be attributed to constrained interconnector flow during times of limited lower priced generation capacity.

At DI ending 1630 hrs, the target on the Heywood interconnector was 600 MW towards South Australia. However at 1635 hrs, the actual flow was 638 MW. The interconnector exceedance was caused by actual demand being higher than forecast in SA and a number of generators in SA not reaching their targets. This resulted in the target flow on the Heywood interconnector being limited to 562 MW towards South Australia by the oscillatory stability constraint equation V:S_600_HY_TEST_DYN. This constraint equation limits the dynamic headroom for the upper transfer limit on the VIC to SA Heywood interconnector to 600 MW. Once the 600 MW flow limit is exceeded by more than 10 MW, the limit is temporarily reduced by the amount of exceedance.

Between DIs ending 1630 hrs and 1635 hrs, flow on Murraylink towards SA increased by 13 MW and was limited to 179 MW by the upper transfer limit constraint equation V^SML_NSWRB_2. This constraint equation is a voltage stability constraint equation which avoids voltage collapse in Victoria for the loss of the Darlington Point - Buronga (X5) 220 kV line when NSW runback scheme is disabled.

Lower priced generation was available but required more than one DI to synchronise (Quarantine PS unit 5) or was limited by their Fast Start Profile (Dry Creek GT unit 3).

For DI ending 1640 hrs, the 5-minute price reduced to $108.03/MWh when 106 MW of generation capacity in SA was rebid from bands priced at or above $13,998.99/MWh to the Market Floor Price (MFP) of -$1,000/MWh.

The high 30-minute spot price for South Australia was not forecast in the latest pre-dispatch schedules. This was due to a lower demand and increased flow across Heywood interconnector forecast in pre-dispatch as compared to dispatch.

Friday 20 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,382.27/MWh and $2,457.65/MWh for trading intervals (TIs) ending 1500 hrs and 1700 hrs, respectively, on 20 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch energy price in Queensland reached $13,800/MWh for dispatch intervals (DIs) ending 1500 hrs and 1655 hrs. This high price can mainly be attributed to rebidding of generation capacity during periods of high demand while interconnector support was constrained.

For the high priced TIs, the demand in QLD was high reaching 8,777 MW and 9,173 MW for TI ending 1500 hrs and 1700 hrs, respectively. This high demand coincided with high temperatures in QLD, with a daily peak of 32.5 degrees (Archerfield Airport).

For DI ending 1455 hrs, Callide Power and InterGen rebid 116 MW of capacity from bands priced at the Market Floor Price (MFP) of -$1,000/MWh to bands priced at $13,999.99/MWh or the Market Price Cap (MPC) of $14,000/MWh. For DI ending 1500 hrs, Gladstone PS unit 3 withdrew 10 MW from bands priced at $98.66/MWh with the reason “1449P TECHNICAL ISSUES-ID FAN-SL”.

Between DI ending 1455 hrs and 1500 hrs, demand in the region increased by 286 MW.

Between DI ending 1455 hrs and 1500 hrs, the sum of the flow on the interconnectors towards QLD increased by 32 MW to reach 235 MW. At DI ending 1500 hrs, the Queensland – New South Wales interconnector (QNI) was limited by the constraint equations N^^Q_NIL_B1. The voltage stability constraint equation N^^Q_NIL_B1 avoids the voltage collapse on the loss of Kogan Creek PS. Flow on the Terranora interconnector for DI ending 1500 hrs was 42 MW towards QLD, causing the export limit of 76 MW towards NSW set by the constraint equation #N-Q-MNSP1_I_E to violate. The constraint equation #N-Q-MNSP1_I_E is a quick constraint equation and was violating between DIs ending 1450 hrs and 1515 hrs.

For DI ending 1650 hrs, Callide Power and CS Energy rebid 100 MW of capacity from bands priced at $98.66/MWh and below to bands priced at $13,800/MWh and above.

Between DI ending 1650 hrs and 1655 hrs, demand in the region increased by 56 MW and the sum of the flow on the interconnectors towards QLD reduced by 3 MW to reach 168 MW. At DI ending

1655 hrs, QNI was limited by the constraint equations N^^Q_NIL_B1. Flow on the Terranora interconnector was 87 MW towards NSW, forced by the outage thermal constraint equation N>N-CHKK_TE_1. The N>N-CHKK_TE_1 constraint equation avoids overload of the Armidale – Koolkhan No.966 132 kV line for the trip of the Coffs Harbour – Lismore No.89 330 kV line during the outage of the Coffs Harbour – Koolkhan No.96H 132 kV line.

Lower priced generation was available during the high priced DIs, but required more than one DI to synchronise (Braemar unit 5 & 7), was limited by FCAS trapezium profiles (Callide B unit 1), constrained off by the system normal constraint equation Q>NIL_BI_FB (Gladstone PS unit 3 & 4), or was limited by ramp rates (Mt Stuart units 1 & 3). The Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line.

The 5-minute energy spot prices in QLD reduced to or below $94.65/MWh in the DIs subsequent to the high priced intervals, when demand decreased and generation capacity was also shifted or rebid from higher price bands to lower price bands.

The high 30-minute spot prices for Queensland were not forecast in the latest pre-dispatch schedules as they were a result of rebidding.

Monday 23 January 2017 – High Energy and FCAS price SA

Market Outcomes: South Australia (SA) Energy spot price reached $2,458.04/MWh for trading interval (TI) ending 0530 hrs.

SA Raise Regulation Frequency Control Ancillary Service (FCAS) prices was high, reaching $4,671.60/MWh and $9,921.41/MWh for TIs ending 0530 hrs and 0600 hrs, respectively. SA Lower Regulation FCAS prices was also high, reaching $6,904.69/MWh and $9,234.86/MWh for TIs ending 0530 hrs and 0600 hrs, respectively.

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

Actual Lack of Reserve Level 2 (LOR2) conditions had been declared for the SA region between 0508 hrs and 0730 hrs on 23 January 2017 (Market Notices 56983 and 56985) due to an unplanned outage of the APD – Heywood – Mortlake No.2 500kV line in Victoria (VIC). During the LOR2 period, there were sufficient capacity reserves in the SA region to meet electricity demand. However in the event of a credible contingency, whereby SA separated from the rest of the NEM, power interruptions would have been likely as it may not have been possible to bring the required additional capacity into service in time to avoid automatic under-frequency load shedding.

Detailed Analysis: The 5-minute Energy dispatch price reached the Market Price Cap (MPC) of $14,000/MWh in SA for dispatch interval (DI) ending 0520 hrs. This high Energy price is mainly attributed to limited interconnector support caused by the unplanned outage of APD – Heywood – Mortlake No.2 500kV line.

The 5-minute SA Raise Regulation FCAS prices reached the MPC for all DIs between DIs ending 0525 hrs and 0550 hrs. The 5-minute SA Lower Regulation FCAS prices ranged between $13,799.99/MWh and $13,859.18/MWh for all DIs between DIs ending 0520 hrs and 0550 hrs. These high FCAS prices

can be mainly attributed to the application of local Regulation FCAS requirements within SA during the unplanned outage of APD – Heywood – Mortlake No.2 500kV line.

The SA wind generation was approximately 333.6 MW for the high priced TI ending 0530 hrs.

For the high energy priced DI, cheaper priced generation was available but limited due to ramp rates (Osborne GT, Torrens A unit 1, 2 and 4 and Torrens B unit 2 and 4) or required more than one DI to synchronise (Hallet GT, Dry Creek GT unit 3 and Snuggery GT).

APD – Heywood – Mortlake No.2 500kV line had an unplanned outage between 0508 hrs and 0718 hrs on 23 January 2017. This outage increased the risk of separation between SA and VIC, and the associate outage constraint sets F-V-HYMO, S-X_BC_CP, V-HYMO were invoked for the duration of the outage. The constraint equations F_S+LREG_0035 and F_S+RREG_0035 contained within the F-V-HYMO constraint set required 35 MW of Lower and Raise Regulation FCAS capacity to be sourced from within SA.

Between DIs ending 0515 hrs and 0520 hrs, the sum of the target flow on the interconnectors towards SA decreased by 213 MW to 471 MW. For DI ending 0520 hrs, the target flow towards SA on the Heywood interconnector was at 282 MW, which violated the limit of 225 MW set by the dynamic upper transfer limit constraint equation VS_250_DYN. This constraint equation is part of the constraint set V-HYMO which was invoked to manage the APD – Heywood – Mortlake No.2 500kV line outage, and limits the dynamic headroom for the upper transfer limit on the VIC to SA Heywood interconnector to 250 MW. Once the 250 MW flow limit is exceeded by more than 10 MW, the limit is temporarily reduced by the amount of exceedance.

The target flow towards SA on the Murraylink interconnector was limited to 189 MW by the Rate of Change of Frequency (RoCoF) constraint equation VSML_ROC_80. This constraint limits the rate of change on the Murraylink interconnectors to 80 MW per 5 Minutes.

For DI ending 0520 hrs, additional generation had to be sourced from Torrens Island A and B due to the decrease in interconnector flow. The increased dispatch in the Energy market reduced Torrens Island B unit 2 and 4 availability in the Raise Regulation FCAS market to zero. For this DI, the output from Torrens Island A PS unit 1, 2 and 4 were also below the unit's Regulation FCAS trapezium minimum enablement limit of 50 MW. As a result, these units were stranded (unavailable) for Regulation FCAS. This violated the F_S+RREG_0035 constraint equation (requirement of having 35 MW of local Raise Regulation in SA) as there was no Raise Regulation capacity available in SA. From DI ending 0525 hrs, the SA Raise Regulation FCAS prices reached up to the MPC as no cheaper Raise Regulation FCAS was available. The SA Lower Regulation FCAS prices were also high from DI ending 0520 hrs as no cheaper Lower Regulation FCAS was available.

For DI ending 0525 hrs, the 5-minute Energy price reduced to $484.99/MWh when Engie and Snowy Hydro rebid 207 MW of generation capacity from higher price bands to the Market Floor Price (MFP) of $1,000/MWh.

For DI ending 0555 hrs, the 5-minute Raise and Lower Regulation FCAS prices reduced $1,950.03 and $75/MWh, respectively, when Origin (Osborne GT) made 10 MW available in both the Raise and Lower Regulation FCAS market.

The high 30-minute spot price for SA was not forecast in the pre-dispatch schedules as a result of the unplanned outage. The high FCAS prices were forecast in pre-dispatch schedules published from the 0600 hrs run on 23 January 2016.

Tuesday 24 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,339.11/MWh for trading interval (TI) ending 1700 hrs on 24 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-minute dispatch energy price in Queensland reached $13,800/MWh at dispatch interval (DI) ending 1635 hrs. This high price can mainly be attributed to a tight supply-demand situation, whilst interconnector support was constrained.

Demand in QLD was high, reaching 8,348 MW during the high priced TI. This high demand coincided with high temperatures in QLD, with a daily peak of 32.4 degrees (Archerfield Airport).

Between DI ending 1630 hrs and 1635 hrs, demand in QLD increased by 37 MW and the sum of the target flow on the interconnectors towards QLD decreased by 45 MW. At DI ending 1635 hrs, flow on the QNI and Terranora interconnector were limited by the constraint equations N>>N-NIL__3_OPENED and N>N-CHKK_TE_1, respectively. The N>>N-NIL__3_OPENED system normal constraint equation avoids overload of the Liddell - Muswellbrook No.83 330 kV line for the trip of the Liddell - Tamworth No.84 330 kV line. The N>N-CHKK_TE_1 thermal constraint equation avoids overload of the Armidale - Koolkhan No.966 132 kV line for the trip of the Coffs Harbour - Lismore No.89 330 kV line during the outage of the Coffs Harbour - Koolkhan No.96H 132 kV line.

For DI ending 1635 hrs, low priced generation was available but required more than one DI to synchronise (Braemar unit 5), was limited by ramp rates (Milmerran PS unit 1), was limited by its Fast Start Profile (Mt Stuart unit 2), or was constrained (Oakey GT unit 1 & 2). The Q>NIL_MRTA_B thermal constraint equation limits the generation from Oakey PS based on the rating of the Middle Ridge - Tangkam No.732 110 kV line.

The 5-minute price reduced to $63.17 for DI ending 1640 hrs when demand in the region reduced by 133 MW. Callide Power and CS Energy rebid 260 MW of generation capacity from the Market Price Ceiling (MPC) of $14,000/MWh to the Market Floor Price (MFP) of -$1,000/MWh.

The high 30-minute spot price for Queensland was forecast in the pre-dispatch schedules.

Thursday 26 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,188.39/MWh for trading interval (TI) ending 1700 hrs on 26 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in Queensland (QLD) reached $12,499.02/MWh at dispatch interval (DI) ending 1650 hrs. This high price can mainly be attributed to an increase in demand while interconnector support was constrained.

Demand in QLD was 7,844 MW during the high priced TI. Between DIs ending 1645 hrs and 1650 hrs, demand in QLD increased by 132 MW.

Outages of two Directlink cables in the Terranora Interconnector were scheduled during the high priced DI. Directlink DC1 had an unplanned outage between 0325 hrs on 17 January 2017 and 1249 hrs on 15 February 2017. Directlink DC3 had a planned outage scheduled between 0700 hrs on 23 January 2017 and 1354 hrs on 08 February 2017. The outage constraint set N-X_MBTE_2 was invoked for the duration of two Directlink outages.

The outage constraint set N-X_MBTE_2 was invoked for the duration of two Directlink outages.

For DI ending 1650 hrs, the target flow on the QNI interconnector towards QLD was limited to 253 MW by the system normal constraint equation N^^Q_NIL_B1. This constraint equation avoids the voltage collapse on the loss of Kogan Creek PS.

For DI ending 1650 hrs, the target flow on the Terranora interconnector toward QLD was limited to 14 MW by the outage constraint equation N_X_MBTE2_A. This constraint equation manages flow on the Terranora interconnector towards QLD during the outage of two Directlink cables.

For DI ending 1645 hrs and 1650 hrs, Callide B PS unit 1 and 2 made a total of 30 MW of generation capacity from bands priced at below $17/MWh unavailable with the reason of “CONDENSER VACUUM LIMIT-SL”. For the high priced DI, lower priced generation was available but required more than one DI to synchronise (Braemar GT unit 5), limited by ramp rates (Oakey PS unit 1) or constrained off by the system normal constraint equation Q>NIL_BI_FB (Gladstone PS unit 3 and 4). The Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line.

The 5-minute price reduced to $37.07/MWh for DI ending 1655 hrs, when demand in the region reduced by 318 MW. Allinta, Arrow Energy, CS Energy, InterGen, ERM Power and AGL also rebid a total of 1,518 MW from higher price bands to bands priced at -$0.05/MWh or the Market Floor Price (MFP) of -$1,000/MWh.

The high 30-minute spot price for Queensland was forecast in the latest pre-dispatch schedule.

Friday 27 January 2017 – High Energy price QLD

Market Outcomes: Spot price in Queensland (QLD) reached $2,353.04/MWh for trading interval (TI) ending 1100 hrs on 27 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in Queensland reached the Market Price Cap (MPC) of $14,000/MWh at dispatch interval (DI) ending 1035 hrs. This high price can mainly be attributed to an increase in demand while interconnector support was constrained.

Between DIs ending 1030 hrs and 1035 hrs, demand in QLD increased by 75 MW.

Outages of two Directlink cables in the Terranora Interconnector were scheduled during the high priced DI. Directlink DC1 had an unplanned outage between 0325 hrs on 17 January 2017 and 1249 hrs on 15 February 2017. Directlink DC3 had a planned outage scheduled between 0700 hrs on 23 January 2017 and 1354 hrs on 08 February 2017. The outage constraint set N-X_MBTE_2 was invoked for the duration of two Directlink outages.

For DI ending 1035 hrs, the target flow on the QNI interconnector towards QLD was limited to 190 MW by the system normal constraint equation N^^Q_NIL_B1. This constraint equation avoids the voltage collapse on the loss of Kogan Creek PS.

For DI ending 1035 hrs, the target flow on the Terranora interconnector toward QLD was limited to 10 MW by the outage constraint equation N_X_MBTE2_A. This constraint equation manages flow on the Terranora interconnector towards QLD during the outage of two Directlink cables.

For DI ending 1035 hrs, Darling Downs GT made 5 MW of generation capacity unavailable with the reason of "0551A CONSTRAINT MANAGEMENT - N^^Q_NIL_B1 SL". Lower priced generation was available but required more than one DI to synchronise (Braemar GT unit 2), limited by ramp rates (Gladstone PS unit 6 and Oakey PS unit 1) or constrained off by the system normal constraint equation Q>NIL_BI_FB (Gladstone PS unit 3, 4 and 5). The Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line.

The 5-minute price reduced to $72.25/MWh for DI ending 1040 hrs, when demand in the region reduced by 264 MW.

The high 30-minute spot price for Queensland was not forecast in the pre-dispatch schedules due to pre-dispatch demand forecast lower than dispatch demand forecast.

Sunday 29 January 2017 – High Energy price QLD

Market Outcomes: Spot prices in Queensland (QLD) were $2,408.10/MWh and $2,339.46/MWh for trading intervals (TIs) ending 1630 hrs and 1830 hrs respectively on 29 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Counter price flows caused negative settlement residues of approximately $410,000 to accumulate on the Queensland to New South Wales directional interconnector for TI ending 1630 hrs. AEMO managed negative settlement residues from 1640 hrs to 1715 hrs (Market Notices No. 57074 and 57075).

Detailed Analysis: The 5-Minute dispatch Energy prices in Queensland was near or at the Market Price Cap (MPC) of $14,000/MWh for dispatch intervals (DIs) ending 1605 hrs and 1805 hrs. This high price can mainly be attributed to rebidding of generation capacity during the peak demand period.

Demand in QLD was high during the high priced TIs, reaching 7,493 MW for TI ending 1630 hrs and 7,776 MW for TI ending 1830 hrs. This high demand coincided with high temperatures in QLD, with a daily peak of 31.5 degrees (Archerfield).

For DI ending 1605 hrs, CS Energy, Stanwell, ERM, Arrow Energy and InterGen shifted 315 MW of generation capacity from bands priced at below $100/MWh to the MPC. Lower priced generation was available but required more than one DI to synchronise (Braemar GT unit 1 and Mt Stuart GT unit 1) or limited by ramp up rates (Millmerran unit 2 and Oakey GT unit 1). The target flow on the QNI interconnector towards Queensland was limited to 144 MW by the system normal constraint equation N^^Q_NIL_B1. This constraint equation avoids voltage collapse on the loss of Kogan Creek PS. The target flow on the Terranora interconnector towards Queensland was limited to 17 MW by the outage constraint equation N_X_MBTE2_A that manages the outage of two Directlink cables. Directlink DC1 was on an unplanned outage scheduled between 0325 hrs on 17 January 2017 and 1249 hrs on 15 February 2017. Directlink DC3 was on a planned outage scheduled between 0700 hrs on 23 January 2017 and 1354hrs on 08 February 2017.

The 5-minute price reduced to $99.47/MWh for DI ending 1610 hrs, when 1,005 MW of generation capacity was rebid to bands priced at the Market Floor Price (MFP) and demand in the region reduced by 157 MW.

For DI ending 1805 hrs, Stanwell, CS Energy and InterGen shifted 485 MW of generation capacity from bands priced at below $100/MWh to the MPC. Lower priced generation was available but limited by its fast start profile (Braemar GT unit 5) or constrained off by the system normal constraint equation Q>NIL_BI_FB (Gladstone PS unit 3). The Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line. The target flows on the QNI and Terranora interconnectors towards Queensland were limited to 138 MW and 8 MW respectively by the same constraint equations as that of DI ending 1605 hrs.

The 5-minute price reduced to $0/MWh for DI ending 1610 hrs, when 523MW of generation capacity was rebid to bands priced at either $0/MWh or the MFP and demand in the region reduced by 190 MW.

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

Monday 30 January 2017 – High Energy price QLD NSW Negative Energy price TAS

Market Outcomes: Spot prices in Queensland (QLD) were $2,377.63/MWh and $2,423.63/MWh for trading intervals (TIs) ending 0700 hrs and 1700 hrs respectively on 30 January 2017. Spot price in New South Wales (NSW) was $2,346.05/MWh for TI ending 1700 hrs. Spot price in Tasmania (TAS) was -$168.30/MWh for TI ending 1700 hrs.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-Minute dispatch Energy price in QLD was $13,800/MWh for dispatch interval (DI) ending 0650 hrs. This high price can be attributed to rebidding of generation capacity during the morning peak demand period and limited interconnector flow.

Between DI ending 0645 hrs and 0650 hrs, Queensland demand increased by 113 MW.

Between DIs ending 0635 hrs and 0640 hrs, CS Energy and InterGen either shifted or rebid 510 MW of generation capacity from bands priced at below $100/MWh to the Market Price Cap (MPC) of $14,000/MWh. Lower priced generation was available from Braemar GT unit 7 but required more than one DI to synchronise.

For DI ending 0650 hrs, the target flow on the QNI interconnector towards Queensland was limited to 207 MW by the system normal constraint equation N^^Q_NIL_B1. This constraint equation avoids voltage collapse on the loss of Kogan Creek PS. The target flow on the Terranora interconnector towards Queensland was limited to 6 MW by the outage constraint equation N_X_MBTE2_A. This outage constraint manages the outage of two Directlink cables. Directlink DC1 had an unplanned outage between 0325 hrs on 17 January 2017 and 1249 hrs on 15 February 2017. Directlink DC3 had a planned outage scheduled between 0700 hrs on 23 January 2017 and 1354 hrs on 08 February 2017.

The 5-minute price reduced to $99.93/MWh for DI ending 0655 hrs, when 605 MW of generation capacity was rebid from higher price bands to bands priced at the Market Floor Price (MFP) of -$1,000/MWh and demand in the region reduced by 173 MW.

The 5-Minute dispatch Energy prices in QLD and NSW were $13,440.69/MWh and $13,036.93/MWh respectively for DI ending 1650 hrs. This high price can be attributed to rebidding of generation capacity in NSW.

In NSW, between 1635 hrs and 1650 hrs, Snowy Hydro rebid 649 MW of generation capacity from bands priced at below $300/MWh to bands priced above $13,997/MWh. The reason given were "*16:26:00 A NSW 5MIN PD PRICE $2,415.47 HIGHER THAN 30MIN PD 16:35@16:02 ($2,813.68)*" and "*16:40:05 A NSW 5MIN ACTUAL PRICE $2,603.92 LOWER THAN 5MIN PD 16:45@16:36 ($288.00)*". In QLD, lower priced generation was available but required more than one DI to synchronise (Braemar GT unit 5).

For DI ending 1650 hrs, target flow on the VIC1-NSW1 interconnector towards NSW was limited to 645 MW by the thermal constraint equation V>>V_NIL_2A_R. This constraint equation prevents the overload of South Morang F2 500/330 kV transformer under system normal conditions.

The 5-minute price in QLD and NSW reduced to $59.73/MWh and $55.95/MWh respectively for DI ending 1655 hrs when generation capacity in both regions was rebid to the lower priced bands and demand reduced in NSW.

The 5-minute prices in SA, TAS and VIC all collapsed to below -$960/MWh for DI ending 1700 hrs when around 3,767 MW of generation capacity in all NEM regions except TAS continued to rebid to bands priced below $0/MWh. Target flow on the VIC1-NSW1 interconnector towards NSW was limited to 676 MW by the thermal constraint equation N>>N-NIL__B_15M. This constraint equation prevents the overload of Upper Tumut – Canberra No.01 330 kV line on the trip of Lower Tumut – Canberra No.07 330 kV line.

For DI ending 1705 hrs, the 5-minute prices in SA, TAS and VIC increased to $28.34/MWh, -$74.72/MWh and $23.49/MWh, respectively, when generation capacity in the three regions rebid from the MFP to higher priced bands and target flow on the VIC1-NSW1 interconnector towards NSW increased to 1,021 MW.

The high 30-minute spot prices for QLD were forecast in some of the pre-dispatch schedules. The high 30-minute spot price for NSW and negative 30-minute spot price for TAS were not forecast in the pre-dispatch schedules as it was a result of rebidding within the trading interval.

Tuesday 31 January 2017 – High Energy price QLD

Market Outcomes: Spot prices in Queensland (QLD) reached $2,297.84/MWh and $2,367.31/MWh for trading intervals (TIs) ending 1600 hrs and 1630 hrs respectively on 31 January 2017.

Energy prices in other regions were not affected by this event. FCAS prices in all regions were not affected by this event.

Detailed Analysis: The 5-minute dispatch energy prices in QLD were $13,399.95/MWh for dispatch intervals (DIs) ending 1540 hrs and 1630 hrs. These high prices can be attributed to rebidding of cheaper priced generation capacity and an increase in demand, while interconnector support was constrained.

Demand in QLD was high, reaching 8,505 MW and 8,729 MW for TIs ending 1600 hrs and 1630 hrs respectively. This high demand coincided with high temperatures in QLD, with a daily peak of 33.5 degrees (Archerfield Airport).

Between DIs ending 1535 hrs and 1540 hrs, demand in QLD increased by 106 MW and the sum of the target flow on the interconnectors towards QLD decreased by 31 MW to 126 MW. At DI ending 1540 hrs, target flow on the QNI interconnector towards QLD was limited to 205 MW by the system normal constraint equation N>>N-NIL__3_OPENED. This constraint avoids overload of the Liddell - Muswellbrook No.83 330 kV line for the trip of the Liddell - Tamworth No.84 330 kV line. For the same DI, target flow on the Terranora interconnector was forced towards NSW of 79 MW by the thermal outage constraint equation N>N-CHKK_TE_1. This outage avoids overload of the Armidale - Koolkhan No.966 132 kV line for the trip of the Coffs Harbour - Lismore No.89 330 kV line during the outage of the Coffs Harbour - Koolkhan No.96H 132 kV line.

For DI ending 1540 hrs, CS Energy rebid 250 MW of generation capacity from band priced at $0/MWh to the Market Price Cap (MPC) of $14,000/MWh. Cheaper priced generation was available but was limited due to ramp rates (Millmerran PS unit 1 and Gladstone PS unit 3).

The 5-minute price in QLD reduced to $46.55/MWh for DI ending 1545 hrs, when demand in the region decreased by 100 MW. Alinta, Arrow Energy, InterGen, Origin, Stanwell and CS Energy also rebid 724 MW of generation capacity from the MPC to bands priced at $0/MWh or below.

Between DIs ending 1625 hrs and 1630 hrs, demand in QLD increased by 25 MW and the sum of the target flow on the interconnectors towards QLD decreased by 11 MW to 107 MW. At DI ending 1630 hrs, flow on the QNI (190 MW towards QLD) and Terranora (83 MW towards NSW) interconnector were limited by the constraint equations N>>N-NIL__3_OPENED and N>N-CHKK_TE_1, respectively.

For DI ending 1630 hrs, Alinta rebid 137 MW of generation capacity from bands priced at $254.13/MWh and below to the MPC. Cheaper priced generation was available but was constrained off by the system normal constraint equation Q>NIL_BI_FB (Gladstone PS unit 3 and 4). The

Q>NIL_BI_FB constraint equation avoids overloading the Boyne Island feeder bushing on Calliope River – Boyne Island 132 kV lines, for the loss of a single Calliope River – Boyne Island 132 kV line.

The 5-minute price in QLD reduced to $74.11/MWh for DI ending 1635 hrs, when demand in the region decreased by 268 MW. Alinta also shifted 137 MW of generation capacity from the MPC to band priced at $74.74/MWh.

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