

Electricity Pricing Event Report – Wednesday 13 July 2016

Market Outcomes: Spot price in South Australia ranged between \$547.60/MWh and \$7,068.49/MWh for 8 trading intervals (TIs) between TIs ending 0630 hrs on 13 July and 0000 hrs on 14 July.

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

Actual Lack of Reserve Level 1 (LOR1) conditions were declared for the South Australia region between 1800 hrs and 2100 hrs on 13 July 2016 (Market Notices 54478 and 54480).

Counter price flows caused negative settlement residues of approximately \$133,000 to accumulate on the South Australia to Victoria directional interconnectors between TIs ending 0700 hrs and 1200 hrs. AEMO managed negative residues from 0900 hrs to 1000 hrs and from 1030 hrs to 1130 hrs (Market Notices 54466, 54467, 54468 and 54469).

Detailed Analysis: The 5-Minute dispatch price in South Australia ranged between \$578.81/MWh and the Market Price Cap (MPC) of \$14,000/MWh for 25 dispatch intervals (DIs) between DIs ending 0620 hrs and 2335 hrs. These high prices can be mainly attributed to a planned network outage limiting flow towards South Australia on the Heywood interconnector, planned generator outages and a steep supply curve in South Australia.

The Tailem Bend West 275 kV Bus (including Tailem Bend to South East No 1 275 kV line) was on a planned outage from 0811 hrs on 04 July and returned to service at 2039 hrs on 14 July. This planned outage reduced the interconnector capacity on the Heywood Interconnector. Constraint set S-TB_275KV_W_BUS was invoked for the duration of the outage.

The transient stability constraint equation $V::S_TB_275KV_W_B_1$, from the constraint set S-TB_275KV_W_BUS, limited the Heywood interconnector for all high priced DIs. This constraint equation prevents the transient instability across the VIC-SA cutset for the loss of the South East – Tailem Bend No. 2 275 kV line, during the outage of the Tailem Bend West 275 kV Bus (including Tailem Bend – South East No. 1 275 kV line). The target flow on the Heywood interconnector ranged between 78 MW and 282 MW towards Victoria for all high priced DIs between 0620 hrs and 1930 hrs.

For the high priced DIs between 0620 hrs and 1930 hrs, the target flow towards South Australia on the Murraylink interconnector was limited to between 210 MW and 220 MW by the thermal constraint equation $V^SML_NSWRB_2$ or the upper transfer limit constraint equation $VSML_220$. The $V^SML_NSWRB_2$ constraint equation prevents voltage collapse in Victoria for loss of the Darlington Point – Buronga (X5) 220 kV line.

In South Australia, Torrens Island B unit 4 (210 MW) had been unavailable since Sunday 10 July and Pelican Point CCGT (510 MW) had been unavailable since 28 April 2016. Torrens Island A units 1, 2 and 4 (120 MW) were available from DIs ending 1105 hrs, 1335 hrs and 0705 hrs respectively.

South Australian wind generation reduced, from 861 MW to 490 MW, between TIs ending 0630 hrs and 1000 hrs.

For the high priced DIs, between TIs ending 0630 hrs and 1030 hrs, up to 130 MW of generation capacity was offered between \$400/MWh and \$10,000/MWh, resulting in a steep supply curve in South Australia.

For DI ending 0905 hrs, Origin Energy and AGL shifted 44 MW of generation capacity from the Market Floor Price (MFP) of $-\$1,000/\text{MWh}$ to bands priced at $\$13,329.90/\text{MWh}$ or above.

For DI ending 0935 hrs, Origin Energy and Synergen shifted 100 MW from the MFP to bands priced at $\$13,300/\text{MWh}$ or above.

Due to the counter-price flow on the South Australia to Victoria directional interconnector, the Negative Settlement Residue Management (NRM) constraint equation NRM_SA1_VIC1 was binding for 19 DIs between DIs ending 0910 hrs and 1130 hrs and violating for DI ending 0905 hrs. The outage constraint equation V::S_TB_275KV_W_B_1 forced counter price flows toward Victoria across the Heywood interconnector, resulting in negative residues.

The 5-Minute dispatch price in South Australia was $-\$999.23/\text{MWh}$ or below for 7 DIs between DIs ending 0915 hrs and 1000 hrs, when up to 36 MW of generation capacity was rebid from bands priced at $\$13,300.30/\text{MWh}$ to the MFP. For the DIs subsequent to the negative priced DIs, the dispatch price increased to $-\$89.22/\text{MWh}$ or above, when wind generation decreased by up to 12 MW and target flows on the Heywood interconnector increased by up to 75 MW towards Victoria.

South Australian demand reached its daily maximum of 2,215 MW for TI ending 1900 hrs. Wind generation had been decreasing since 1600 hrs, and reached 334 MW and 275 MW for TIs ending 1900 hrs and 1930 hrs, respectively.

For the high priced DIs during TIs ending 1900 hrs and 1930 hrs, between 120 MW and 150 MW was offered between $\$400/\text{MWh}$ and $\$10,000/\text{MWh}$, resulting in a steep supply curve in South Australia.

For the DIs subsequent to the high priced DIs (that is DIs ending 1900 hrs, 1920 hrs and 1935 hrs), the dispatch price in South Australia reduced to $\$484.99/\text{MWh}$, when demand reduced by up to 32 MW.

Between DIs ending 2330 hrs and 2335 hrs, South Australian demand increased by 212 MW due to hot water load management. The 5-minute dispatch price reached $\$3,481.48/\text{MWh}$ for DI ending 2335 hrs. Wind generation in South Australia was low at 220 MW for DI ending 2335 hrs.

For DI ending 2335 hrs, target flow towards Victoria on the Heywood interconnector was limited to 32 MW by transient stability constraint equation V::S_TB_275KV_W_B_1, and the target flow towards South Australia on the Murraylink interconnector was limited to 86 MW by the system normal thermal constraint equation V>>SML_NIL_CONT_7B. The V>>SML_NIL_CONT_7B constraint equation prevents the overload of the Buangor – Arrarat 66kV line for the loss of the Ballarat – Horsham 220kV line.

For DI ending 2340 hrs, the 5-minute dispatch price in South Australia reduced to $\$48.52/\text{MWh}$, when 100 MW of generation capacity was rebid or shifted from bands priced at $\$578.81/\text{MWh}$ or above to the MFP.

During the high priced DIs, lower priced generation was available but limited due to ramp rates (Dry Creek GT unit 2, Torrens Island PS B units 1 and 2), was limited by fast start profiles (Port Stanvac PS 1, Angaston PS, Lonsdale PS), required more than one DI to synchronise (Dry Creek GT units 1 and 2, Hallett GT, Port Lincoln GT units 1 and 3, Mintaro GT, Snuggery PS, Quarantine PS units 1, 2, 3, 4 and 5) or was constrained off by the transient stability constraint equation V::S_TB_275KV_W_B_1 (Lake Bonney WF Stage 2 and 3).

High energy prices were forecast in the latest Pre-dispatch schedules relevant to the high priced TIs.

