

Electricity Pricing Event Report – 01 November 2015 (Sunday)

Market Outcomes: South Australian Energy price reached \$1,820.80/MWh for trading interval (TI) ending 2230 hrs.

South Australian Frequency Control Ancillary Service (FCAS) price (sum of all services) reached \$106,399.97/MWh for the same TI. The prices for Fast Raise, Slow Raise, Delayed Raise, Regulation Raise and Fast Lower services reached Market Price Cap (\$13,800/MWh). The prices for Slow Lower, Delayed Lower and Regulation Lower services reached \$12,199.97/MWh, \$12,200/MWh and \$13,000/MWh respectively.

Energy and FCAS prices in other regions of the NEM were not affected.

Actual Lack of Reserve Level 2 (LOR2) condition had been declared for the South Australia region between 1900 hrs and 2255 hrs due to the planned outage of the Heywood – South East no.2 275 kV transmission line (Market Notices No. 50251 and 50268).

Further information is provided below.

Detailed Analysis:

5-minute Energy price in South Australia reached \$2,173.93/MWh and \$10,759.20/MWh for Dispatch Intervals (DIs) ending 2200 hrs and 2220 hrs respectively.

For each 5-minute within the 2230 hrs TI, the FCAS prices in South Australia reached Market Price Cap (\$13,800/MWh) for Fast Raise, Slow Raise, Delayed Raise, Regulation Raise and Fast Lower services. For each 5-minute within the same TI, the FCAS price for Slow Lower, Delayed Lower and Regulation Lower services ranged between \$8,999.90/MWh and \$13,800/MWh.

The high Energy and FCAS prices can be attributed to insufficient FCAS services being available within South Australia following the islanding of South Australia from the rest of the NEM.

At 2151 hrs, the circuit breakers (CBs) at the South East end of the Heywood – South East no.1 275 kV transmission line tripped, resulting in the separation of South Australia region from the rest of the NEM (Market Notice No.50258). The Heywood – South East no.2 275 kV transmission line was on a planned outage between 0705 hrs on 29 October 2015 and 1730 hrs on 07 November 2015.

South Australia frequency dropped to 48.96 Hz following the separation. As a result, approximately 150 MW of load was interrupted due to under-frequency load shedding to restore the frequency back to 50 Hz. The demand in SA reduced from 1306 MW to 1149 MW between DIs ending 2155 hrs and 2200 hrs.

Wind generation in SA was low at 235 MW for TI ending 2230 hrs.

Following the separation, AEMO invoked the South Australia separation constraint sets SA_ESTN_ISLE, F-SA_ISLE, F-ESTN_ISLE and F-SA_ESTN_ISLE_REG from DI ending 2200 hrs. The SA_ESTN_ISLE constraint set limits the interconnector flow across the Heywood Interconnector to 0 MW in both directions and prevents transient instability across the VIC-NSW cutset for the loss of key transmission elements. The F-SA_ISLE constraint set manages Raise and Lower FCAS requirements for Fast, Slow and Delayed services within South Australia under island conditions. The F-ESTN_ISLE constraint set manages Raise and Lower FCAS requirements for Fast, Slow and Delayed

services for the rest of the NEM. The F-SA_ESTN_ISLE_REG constraint set manages the Raise and Lower FCAS requirements for Regulation services within SA and the rest of the NEM.

The separation resulted in increased requirements for all FCAS services within South Australia. A number of constraint equations within the F-SA_ISLE constraint set for Fast Raise, Slow Raise, Delayed Raise, Fast Lower and Delayed Lower FCAS requirements violated between 2200 hrs and 2235 hrs. These constraint equations violated due to insufficient availability of these services during this period. There was sufficient availability of Raise and Lower Regulation services during this period except for DI ending 2220 hrs.

For DIs ending 2200 hrs and 2220 hrs, generation from Northern PS Units 1 and 2 and Torrens Island Units B2 and B4 were limited by local FCAS requirement constraint equations within the F-SA_ISLE constraint set. The constraint equations limited the output from the generators to reduce the FCAS requirements within South Australia. Other generation within South Australia were limited by fast-start profiles (Hallett PS, Labroke 1 Unit) and ramp rates (Torrens Island Unit A4, Dry Creek GT3).

The target flow on Murraylink interconnector was limited to 75 MW towards South Australia for DI ending 2220 hrs. The flow was limited by the V::N_ESTN_HYSE_VD constraint equation, which prevents transient instability across the VIC-NSW cutset for the loss of a Hazelwood – South Morang 500 kV transmission line.

The Heywood – South East no.1 275 kV line was returned to service at 2226 hrs, thus re-connecting the South Australia region to the rest of the NEM. The SA_ESTN_ISLE, F-SA_ISLE, F-ESTN_ISLE and F-SA_ESTN_ISLE_REG constraint sets were revoked at 2235 hrs.

As the cause of the unplanned outage of Heywood – South East no.1 275 kV line was being investigated, AEMO invoked the constraint set I-VS_080 at 2235 hrs to reduce the likelihood of under-frequency load shedding in the event of another trip. The I-VS_080 constraint set limits interconnector flow across Heywood in the Victoria to South Australia direction to an upper transfer limit of 80 MW (Market Notice No.50267). The I-VS_080 constraint set was revoked at 2255 hrs and a constraint set I-VS_050 with a revised limit of 50 MW was applied based on the operational conditions at the time (Market Notice No.50269).

The interrupted load was restored from 2230 hrs and completed by 2337 hrs.

The energy price reduced to \$25.93/MWh for DI ending 2205 hrs when 53 MW of generation capacity was rebid from higher priced bands to Market Floor Price (-\$1000/MWh). 49 MW of non-scheduled generation came online in South Australia during the same DI.

The energy price reduced to \$54.99/MWh for DI ending 2225 hrs when up to 274 MW of generation capacity was rebid from higher priced bands to Market Floor Price (-\$1000/MWh).

The constraint set I-VS_050 was revoked at 1800 hrs on 05 November 2015 when Electranet advised AEMO of the cause of the trip and AEMO was satisfied that Electranet had taken sufficient corrective actions to remove the risk of a re-occurrence of the trip event (Market Notice 50340).

The high energy and FCAS prices were not forecast in pre-dispatch schedules since it was a result of an unplanned outage of the Heywood – South East no.1 275 kV line.