

## Electricity Pricing Event Report - Friday 3 March 2017

**Market Outcomes:** The spot price in South Australia (SA) reached \$4,921.39/MWh for trading interval (TI) ending 1530 hrs on 3 March 2017.

Energy prices in other regions were not affected by this event. The Mainland Raise Regulation FCAS price was elevated, but did not reach the price threshold for reporting purposes. Other FCAS prices across all regions were not affected by this event.

At 1503 hrs, a non-credible contingency event occurred whereby multiple generating units in SA tripped (MN 57817). An Actual Lack of Reserve Level 2 (LOR2) was declared for the South Australia region from 1503 hrs until 1730 hrs (MN 57818, 57819 and 57820). Demand reduction of approximately 250 MW in SA occurred as a result of the voltage disturbance associated with the loss of the generating units. AEMO did not instruct load shedding, and SA Power Networks have confirmed there was no operation of the under frequency load shedding (UFLS) scheme. The power system in SA was not in a secure operating state from 1503 hrs to 1543 hrs.

**Detailed Analysis:** The 5-minute dispatch energy price in South Australia (SA) reached the market Price Cap (MPC) of \$14,000/MWh for dispatch intervals (DIs) ending 1520 hrs and 1525 hrs. These high prices can mainly be attributed to sudden generator outages while interconnector support was constrained and limited lower priced generation was available.

Relative to online generation, demand in SA was high, reaching 1,889 MW for TI ending 1530 hrs. This coincided with high temperatures in SA, with a daily peak of 34 degrees (Adelaide).

For DI ending 0015 hrs, total wind generation in SA reached the daily peak of 1,001 MW. SA wind generation steadily decreased throughout the day, reaching 452 MW (DI ending 1520 hrs) and 463 MW (DI ending 1525 hrs) during the high priced DIs.

Starting at 15:03:46 hrs, a series of three faults occurred at the Torrens Island switchyard. These faults resulted in the loss of five generating units in SA within five minutes of the initial fault, totalling 610 MW of generator capacity.

- At 15:03:46.262 hrs, a capacitor voltage transformer (CVT) in the Torrens Island switchyard failed explosively. This caused Torrens Island B unit 4 to trip (130 MW).
- At 15:03:46.364 hrs, Pelican Point GT 11 tripped (150 MW) due to operation of over-current protection external to the power station.
- At 15:03:47.812 hrs, Torrens Island B unit 3 tripped (130 MW), likely associated with the explosion of the CVT.
- At 15:05:15.031 hrs, Pelican Point steam turbine tripped (70 MW) as a consequence of the earlier trip of Pelican Point GT 11.
- At 15:07:34.020 hrs, Torrens Island B unit 2 tripped (130 MW).

The faults at the Torrens Island switchyard resulted in the near simultaneous disconnection of 610 MW of generation. This resulted in the power flow on the Heywood interconnector peaking at 963 MW just after the Pelican Point GT 11 tripped, before levelling off at around 600 MW a few seconds later. The rapid reduction in the Heywood interconnector power flow was a result of demand

reduction of approximately 250 MW in SA as a result of the voltage disturbance. AEMO did not instruct load shedding, and SA Power Networks have confirmed there was no operation of the under frequency load shedding (UFLS) scheme.

Immediately following the event at 1503 hrs, the power system in SA was not in a secure operating state. AEMO must ensure sufficient system strength in SA to ensure the power system in SA is in a secure operating state. To manage this, AEMO has a requirement that a minimum number of large synchronous generating units (or equivalent) are in service in SA. This requirement was met by 1543 hrs after additional synchronous generating units were dispatched. The power system in SA was not in a secure operating state from 1503 hrs to 1543 hrs, a period of 40 minutes.

The target flow on the Heywood interconnector was 512 MW towards SA for DI ending 1515 hrs, and 525 MW towards SA during both high priced DIs. This flow violated the upper transfer limit of 316 MW (DI ending 1515 hrs), 322 MW (DI ending 1520 hrs) and 388 MW (DI ending 1525 hrs) set by the constraint equation  $V\_S\_NIL\_ROCOF$ . This system normal Rate of Change of Frequency (RoCoF) constraint equation limits the flow on the Heywood interconnector from VIC to SA to prevent the RoCoF exceeding 3 Hz/sec in SA following the loss of the Heywood interconnector.

The target flow on the Murraylink interconnector was 220 MW towards SA during both high priced DIs. This flow violated the upper transfer limit of 195 MW (DI ending 1520 hrs) and 207 MW (DI ending 1525 hrs) set by the constraint equation  $V^SML\_NSWRB\_2$ . This voltage stability constraint equation avoids voltage collapse in Victoria for loss of the Darlington – Buronga (X5) 220 kV line.

Cheaper priced generation was available for DIs ending 1520 hrs and 1525 hrs, but either:

- a) required more than one DI to synchronise (Dry Creek GT unit 1 & 3, Hallett PS, Quarantine PS unit 5 and Snuggery unit 1), or;
- b) was limited by its Fast Start Profile (Dry Creek GT unit 2 and Hallett PS), or;
- c) was limited by ramp rates (Dry Creek GT unit 2, North Brown Hill Wind Farm, Snuggery unit 1 and Torrens Island B unit 1).

The 5-minute energy price in SA reduced to \$578.81/MWh for DI ending 1530 hrs when generation capacity of 139 MW was rebid from band priced at the MPC to bands priced at \$300.04/MWh and below.

The high 30-minute spot price for South Australia was not forecast in the pre-dispatch schedules as it was due to sudden generator outages.

For further details regarding the loss of the generating units, please refer to AEMO's [System Event Report](#).