

Electricity Pricing Event Report - Monday 20 March and Tuesday 21 March 2017

Market Outcomes: Spot prices in South Australia (SA) reached between \$1,958.44/MWh and \$2,651.96/MWh for trading intervals (TIs) ending 1300 hrs and 1400 hrs on 20 March 2017, and \$2,402.10/MWh for TI ending 1130 hrs on 21 March 2017.

The SA Raise Regulation Frequency Control Ancillary Service (FCAS) prices reached \$2,404.51/MWh and \$459.06/MWh for TIs ending 0900 hrs and 1430 hrs on 20 March 2017, respectively. The SA Lower Regulation FCAS prices reached \$2,227.00/MWh and \$388.20/MWh for TIs ending 1200 hrs and 1300 hrs on 20 March 2017, respectively.

The SA Raise Regulation FCAS prices reached between \$2,028.20/MWh and \$10,576.23/MWh for all TIs between TIs ending 1100 hrs and 1630 hrs on 21 March 2017. The SA Lower Regulation FCAS prices reached between \$387.46/MWh and \$9,647.00/MWh for all TIs between TIs ending 1100 hrs and 1630 hrs on 21 March 2017.

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

Detailed Analysis:

High energy prices on 20 March and 21 March 2017

The 5-minute dispatch energy price in South Australia (SA) reached between \$10,578.87/MWh and \$13,998.99/MWh for dispatch intervals (DIs) ending 1255 hrs, 1320 hrs and 1335 hrs on 20 March 2017, and DI ending 1105 hrs on 21 March 2017. These high prices can mainly be attributed to the rebidding of generation volume during a period of tight supply/demand balance, while interconnector support was constrained during a planned outage.

The Moorabool – Mortlake 500 kV line had a planned outage between 0504 hrs and 1429 hrs on 20 March 2017. This outage increased the risk of separation between SA and Victoria (VIC), and the associated outage constraint sets #VIC1_E_20170319, F-V-MLMO, I-VS_050 and V-MLMO were invoked between 0500 hrs and 1445 hrs.

The Moorabool – Tarrone 500 kV line had a planned outage between 0610 hrs and 1615 hrs on 21 March 2017. This outage increased the risk of separation between SA and VIC, and the associated outage constraint sets F-V-MLTR, I-VS_050, S-X_BC_CP and V-MLTR were invoked between 0600 hrs and 1625 hrs.

The constraint equation VS_050 contained within the I-VS_050 constraint set restricted the flow from Victoria to SA along Heywood to 50 MW during both outages.

Demand in SA reached 2,092 MW for TI ending 1400 hrs on 20 March 2017. This higher demand coincided with high temperatures in SA, with a daily peak of 34.4 degrees (Adelaide).

For DI ending 0025 hrs on 20 March 2017, total wind generation in SA reached the morning peak of 653 MW. SA wind generation steadily decreased throughout the day, reaching between 174 MW and 203 MW during the high priced DIs. Similarly, SA wind generation was low on 21 March 2017, reaching 237 MW during the high priced DI following a morning peak of 802 MW.

Target flow on the Heywood interconnector was 50 MW towards SA for all four high priced DIs, due to the constraint equation VS_050. Target flow on the Murraylink interconnector ranged between 9 MW and 169 MW from VIC to SA during the high priced DIs, due to the constraint equations V^SML_NSWRB_2 and VSML_ROC_80. The V^SML_NSWRB_2 voltage stability constraint equation avoids voltage collapse in Victoria for loss of the Darlington – Buronga (X5) 220 kV line. The VSML_ROC_80 ramping Rate of Change of Frequency (RoCoF) constraint equation limits the change in flow on the Murraylink interconnector towards SA to 80 MW in 5 minutes.

During the high priced DIs on 20 March 2017, AGL, EnergyAustralia and Infratil Energy/ Snowy Hydro rebid 147 MW of generation volume between bands priced at \$79.99/MWh or below to bands priced at \$10,578.87/MWh or above.

During the high priced DIs on 21 March 2017, EnergyAustralia, Synergen Power, Infratil Energy/ Snowy and Origin Energy rebid 254 MW of generation volume from bands priced at \$418.81/MWh or below, to bands priced at \$10,578.87/MWh or above.

Furthermore, between TIs ending 1200 hrs and 1300 hrs on 21 March 2017, generator outages (unavailability of Torrens Island A unit 1 & 3) and continued rebidding caused the dispatch energy price to reach \$10,587.87/MWh or above for all starting DIs in a TI, before falling to the Market Floor Price (MFP) of -\$1,000/MWh for all subsequent DIs in a given TI.

Lower priced generation was available but required more than one DI to synchronise (Dry Creek GT unit 1 and Snuggery), or was limited by ramp rates (Mintaro GT, Dry Creek GT unit 3 and Snuggery).

The 5-minute dispatch energy prices reduced to \$497.42/MWh or less when up to 214 MW of generation priced at \$13,099.09/MWh and above was rebid to the MPF.

The high 30-minute spot prices for South Australia were not forecast in pre-dispatch schedules as they were due to rebidding of generation volume.

High FCAS prices on 20 March 2017

The 5-minute dispatch Raise Regulation Frequency Control Ancillary Service (FCAS) price reached between \$300.99/MWh and \$13,045.06/MWh for DIs ending 0840 hrs, 1405 hrs and 1420 hrs on 20 March 2017. The 5-minute dispatch Lower Regulation FCAS price reached \$11,982.00/MWh for DI ending 1145 hrs and \$949.20/MWh for DI ending 1255 hrs on 20 March 2017.

The 5-minute dispatch Raise Regulation FCAS price reached between \$1,150.41/MWh and \$13,943.89/MWh for 67 DIs between DIs ending 1040 hrs and 1625 hrs on 21 March 2017. The 5-minute dispatch Lower Regulation FCAS price reached between \$918.88/MWh and \$11,982.00/MWh for 66 DIs between DIs ending 1045 hrs and 1625 hrs on 21 March 2017.

These high prices can mainly be attributed local Regulation FCAS requirements within SA during a planned outage and limited lower priced Regulation FCAS capacity.

The constraint equations F_S+LREG_0035 and F_S+RREG_0035 contained within the F-V-MLMO constraint set (invoked for the Moorabool – Mortlake 500 kV line planned outage) and F-V- MLTR constraint set (invoked for the Moorabool – Tarrone 500 kV line planned outage) required 35 MW of Lower and Raise Regulation FCAS capacity to be sourced from within SA.

Raise and Lower Regulation FCAS in SA during the outage period was provided by Torrens Island, Quarantine PS and Pelican Point PS. Lower priced Regulation FCAS was available but was limited by its FCAS trapezium (Quarantine PS unit 5, Torrens Island B unit 1, 3 & 4).

During the high priced Regulation FCAS DIs on 21 March 2017, the Regulation FCAS availability was adjusted against the energy dispatch. This co-optimisation between Energy and FCAS markets contributed to the high Regulation FCAS prices.

The 5-minute Raise and Lower Regulation FCAS prices in SA reduced to \$276/MWh when lower priced Regulation FCAS was available and enabled, or the local Regulation FCAS requirement was no longer required.

The high 30-minute Lower and Raise Regulation 30-min FCAS prices for South Australia on 20 March 2017 were not forecast in the pre-dispatch schedules as they were due to FCAS capacity that could not be enabled, however the high 30-minute Regulation prices on 21 March 2017 were forecast.