

# BSUoS Outturn

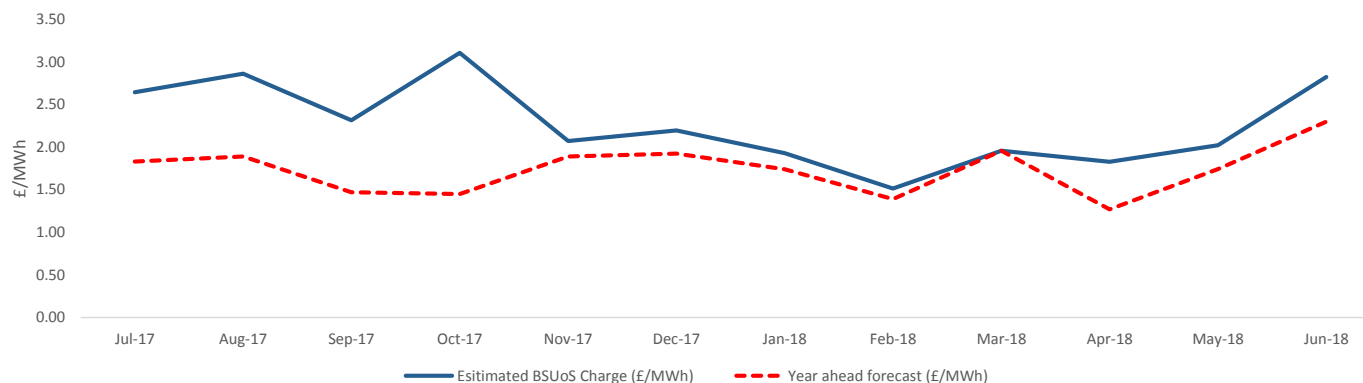
National Grid

Average BSUoS charge	£/MWh
Jun-18	2.82
Past 12 months	2.24
2017/18	2.31

Outturn costs for June were higher than forecast, driven by high wind constraint costs in the middle of the month, and higher than average RoCoF costs caused by high volumes of embedded generation and low demand.

The blue line on the chart shows the estimated monthly average BSUoS charge for the past 12 months. The red line shows our forecast for each month, made at year ahead. The table shows the outturn balancing costs that make up the BSUoS charge, broken down by cost category. It also shows the monthly estimated BSUoS volume, ESO profit and loss, internal costs, and the resulting BSUoS charge estimate. The total cost of system balancing divided by the BSUoS volume gives the estimated average BSUoS charge for the month.

Historical outturn vs year ahead forecast



Month	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18
<b>Energy Imbalance</b>	-3.0	-2.7	-1.3	-2.8	-3.1	5.1	-1.9	-3.0	3.3	-5.7	-6.8	-2.8
<b>Operating Reserve</b>	4.6	6.0	5.9	6.1	6.1	9.0	8.6	9.2	15.9	4.1	4.5	3.6
<b>BM Startup</b>	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.0	0.0	0.0
<b>STOR</b>	6.6	6.4	6.0	6.2	8.9	9.4	9.4	8.6	8.1	3.7	3.6	4.3
<b>Constraints - E&amp;W</b>	7.5	7.7	3.8	4.6	16.1	6.4	7.5	3.4	17.1	4.6	10.5	22.7
<b>Constraints - Cheviot</b>	19.3	22.6	17.8	54.6	15.5	19.2	11.9	5.4	2.3	13.2	1.5	7.9
<b>Constraints - Scotland</b>	2.7	4.5	1.0	3.0	7.1	5.2	5.4	2.8	1.4	0.4	2.1	6.4
<b>Footroom</b>	1.3	0.9	0.7	0.8	0.6	0.1	0.9	0.1	0.4	0.4	2.0	0.4
<b>Fast Reserve</b>	7.2	8.0	7.6	9.0	8.1	8.8	9.3	7.9	8.8	7.8	6.4	6.7
<b>Response</b>	13.5	12.0	11.7	11.4	10.3	11.4	10.4	9.3	11.6	12.1	11.9	11.3
<b>Reactive</b>	6.9	6.4	6.2	6.3	6.2	6.7	6.6	5.7	5.9	7.0	8.0	7.5
<b>Minor Components</b>	2.6	1.6	1.9	3.3	0.9	2.1	1.8	1.6	1.2	0.7	0.3	1.0
<b>ROCOF (E&amp;W)</b>	5.6	8.9	6.0	6.9	2.9	5.3	5.2	0.9	0.8	4.5	9.9	10.4
<b>Black Start (non-incentivised)</b>	6.4	6.2	5.8	4.6	3.5	4.5	3.8	3.4	3.7	4.2	3.4	3.5
<b>Total BSUOs</b>	81.4	88.5	73.2	114.0	83.4	93.4	79.4	55.3	80.7	57.1	57.4	82.9
<b>Estimated BSUOs Vol (TWh)</b>	36.4	36.1	37.8	41.5	47.2	49.2	48.9	45.4	48.7	40.4	37.0	35.3
<b>Estimated NGET Profit/(Loss)</b>	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.2	1.3	1.2
<b>Estimated Internal BSUOs (£m)</b>	14.0	14.0	13.5	14.0	13.5	14.0	14.0	12.6	14.0	15.6	16.1	15.6
<b>Estimated BSUoS Charge (£/MWh)</b>	2.64	2.86	2.32	3.11	2.07	2.20	1.93	1.51	1.96	1.83	2.02	2.82

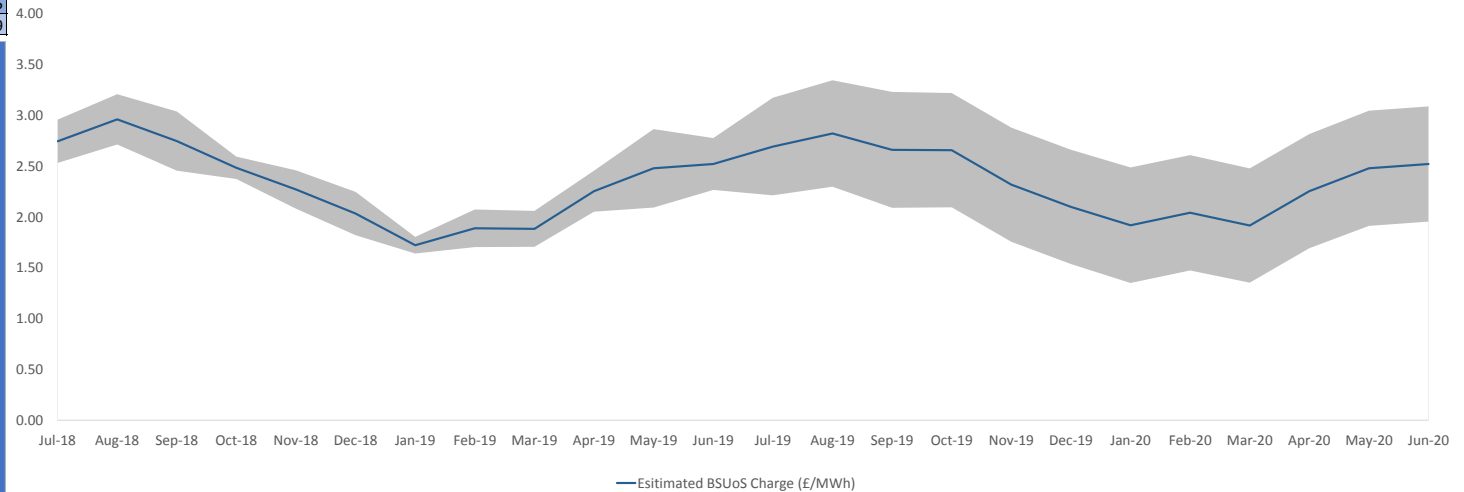
# BSUoS Forecast

Average BSUoS charge	£/MWh
Jul-18	2.74
2018/19	2.25
2019/20	2.35
Next 12 months	2.29

The latest information on the Western Link HVDC is that a further cable fault has meant that planned commissioning was not completed at the end of June. Based on this information we have updated the BSUoS forecast assuming that the Western Link will be fully commissioned at the end of August. We have increased the forecast cost of managing constraints in July and August.

The chart shows the average monthly BSUoS forecast for the next 24 months. The grey band shows the upper and lower range of the forecast based on historical forecast accuracy. The forecast is done using a combination of forecast models and historical data. For the constraints cost category we use a model of the transmission outage plan for the current financial year, and then historical trends for the following year. Constraint costs are then adjusted in line with major changes to the outage plan, system faults, and commissioning, and attempts to take account of the associated risks and uncertainties. The other energy cost categories are forecast using a baseline of historical trends with adjustments for expected changes in system operation or balancing services markets.

24 month rolling forecast with error bands

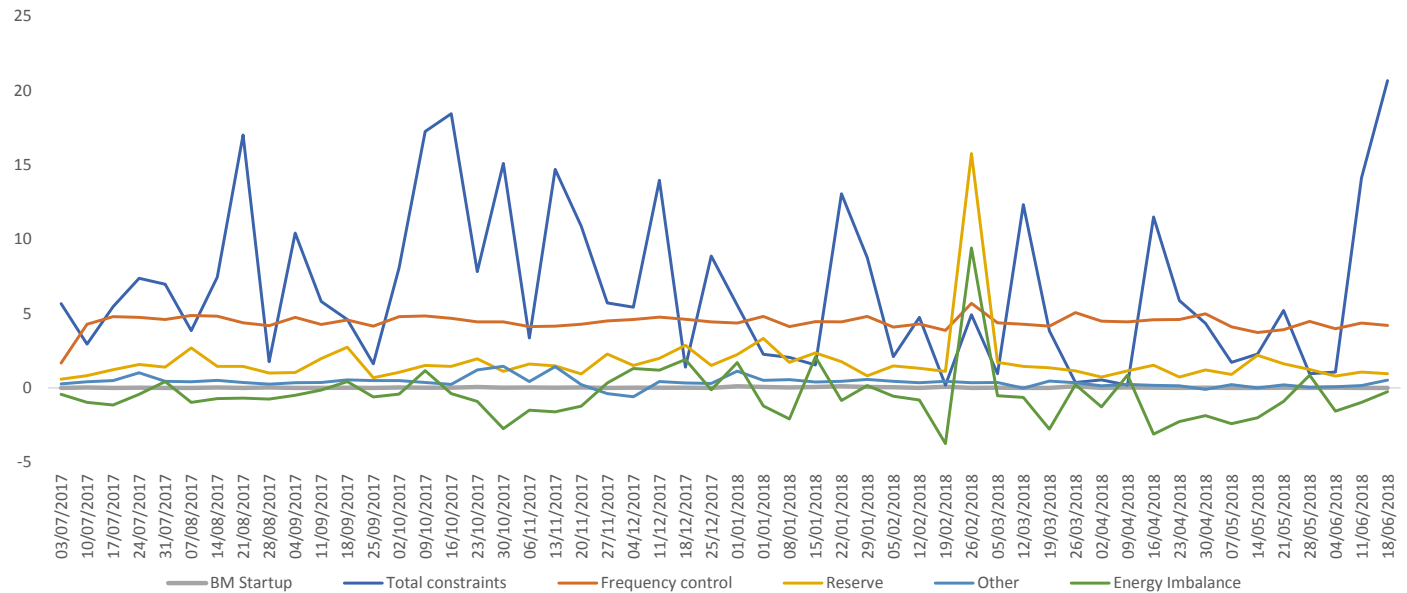


Month	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20
<b>Energy Imbalance</b>	-1.8	-4.1	-2.3	-1.5	-1.5	-1.7	-0.9	1.1	-1.9	-6.9	-4.9	-4.2	-3.5	-4.1	-2.3	-1.5	-1.5	-1.7	-0.9	1.0	-2.0	-6.9	-4.9	-4.2
<b>Operating Reserve</b>	6.2	8.2	14.1	16.4	16.1	11.9	10.1	12.9	13.2	8.3	9.0	5.8	7.0	8.2	14.1	16.4	16.1	11.9	10.1	13.1	13.2	8.3	9.0	5.8
<b>BM Startup</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>STOR</b>	5.5	5.8	6.3	6.2	7.4	7.5	7.6	6.5	7.4	5.2	5.6	5.4	6.0	5.8	6.3	6.2	7.4	7.5	7.6	6.5	7.4	5.2	5.6	5.4
<b>Constraints - E&amp;W</b>	11.1	10.1	9.2	7.5	9.9	8.0	3.9	3.8	6.1	6.0	8.0	4.6	7.4	10.1	9.2	7.5	9.9	8.0	3.3	3.8	6.1	6.0	8.0	4.6
<b>Constraints - Cheviot</b>	13.7	20.3	13.5	11.0	14.6	11.8	4.1	6.0	8.3	7.6	9.2	10.8	11.5	12.8	11.8	12.5	11.5	10.4	8.9	7.8	6.3	7.6	9.2	10.8
<b>Constraints - Scotland</b>	3.7	5.4	3.3	2.7	3.5	2.9	1.2	1.4	2.2	2.0	2.4	2.8	3.0	3.0	3.0	3.0	3.6	2.5	2.2	1.9	1.5	2.0	2.4	2.8
<b>Footroom</b>	1.7	1.7	1.8	1.2	0.5	0.5	0.6	0.1	0.2	0.4	0.9	1.6	1.8	1.7	1.8	1.2	0.5	0.5	0.6	0.1	0.2	0.4	0.9	1.6
<b>Fast Reserve</b>	8.7	9.6	8.8	9.1	9.4	10.0	10.3	8.7	9.7	9.0	9.0	8.8	9.1	9.6	8.8	9.1	9.4	10.0	10.3	8.7	9.7	9.0	9.0	8.8
<b>Response</b>	14.6	14.5	15.3	14.7	14.1	14.3	14.0	12.3	13.4	13.9	14.5	14.0	14.8	14.5	15.3	14.7	14.1	14.3	14.0	12.3	13.4	13.9	14.5	14.0
<b>Reactive</b>	6.7	6.1	5.9	6.1	5.8	6.4	6.3	5.1	5.4	6.0	6.8	6.4	6.2	6.1	5.9	6.1	5.8	6.4	6.3	5.1	5.4	6.0	6.8	6.4
<b>Minor Components</b>	1.8	1.3	0.7	1.7	0.0	0.9	-0.8	2.2	0.1	2.9	2.9	2.4	2.3	1.3	0.7	1.7	0.0	0.9	-0.8	2.2	0.1	2.9	2.9	2.4
<b>ROCOF</b>	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
<b>Black Start (non-incentivised)</b>	3.8	3.8	3.7	3.8	3.7	3.8	3.8	3.5	3.8	3.7	3.8	3.7	3.8	3.8	3.7	3.8	3.7	3.8	3.8	3.5	3.8	3.7	3.8	3.7
<b>Total BSUOs</b>	81.5	88.4	85.9	84.6	89.2	81.8	65.9	69.2	73.5	63.9	72.7	67.8	75.0	78.6	83.9	86.3	86.1	80.0	71.0	71.6	70.7	63.9	72.7	67.8
<b>Estimated BSUOs Vol (TWh)</b>	36.0	35.7	37.4	41.0	46.7	48.7	48.4	44.9	48.3	35.3	35.8	33.1	33.8	33.6	37.4	38.6	43.9	45.8	45.4	42.2	45.3	35.3	35.8	33.1
<b>Estimated NGET Profit/(Loss)</b>	1.3	1.3	1.2	1.3	1.2	1.3	1.3	1.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Estimated Internal BSUOs(£m)</b>	16.1	16.1	15.6	16.1	15.6	16.1	16.1	14.5	16.1	15.6	16.1	15.6	16.1	16.1	15.6	16.1	15.6	16.1	16.1	14.6	16.1	15.6	16.1	15.6
<b>Estimated BSUoS Charge (£/MWh)</b>	2.74	2.96	2.75	2.48	2.27	2.03	1.72	1.89	1.88	2.25	2.48	2.52	2.69	2.82	2.66	2.66	2.32	2.10	1.92	2.04	1.92	2.25	2.48	2.52

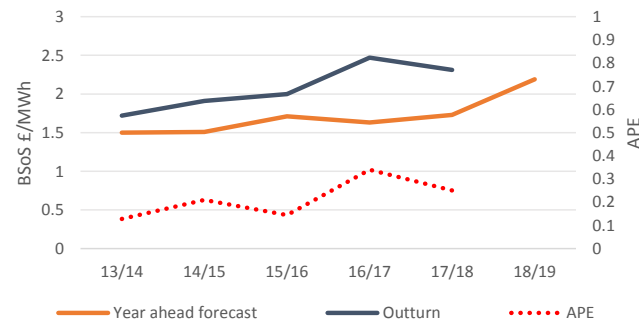
# BSUoS Volatility and Forecast Accuracy

There was a significant increase in constraint costs in the middle of June caused by high volumes of wind output. The spike in Reserve costs at the end of February 2018 was due to tight margins during cold and snowy weather. The first chart shows the volatility of the cost categories that make up BSUoS. Constraint costs shown in blue are the most variable and difficult to predict, mainly driven by the output of wind generation combined with the transmission outage plan at the time. A fault on the transmission system can add to the underlying volatility and cause large unforeseen increases in constraint costs. Reserve, shown in yellow, is generally stable but can have large deviations when the cost of generator margin increases significantly when generation is short. Predicting increases in the cost of reserve is difficult at long timescales, and can have a significant impact on the average BSUoS charge. Energy Imbalance is the other category that contributes to BSUoS volatility, which is the cost of residual balancing when the energy market is long or short. The other cost categories are relatively stable across the year, although there may be longer term trends that we consider. The second chart shows the annual outturn BSUoS charge compared with the forecast made at 12 months ahead, and the absolute percentage error for each year. The third chart shows the month ahead forecast compared with outturn and absolute percentage error.

Cost volatility by category over past 12 months



Yearly History and APE



Month ahead forecast vs actual and APE

