

BSUoS Outturn

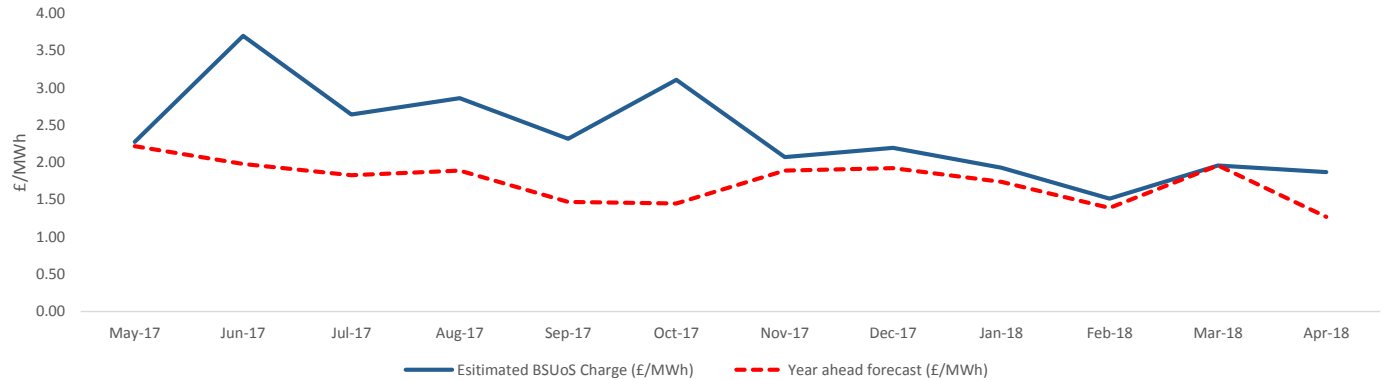
National Grid

Average BSUoS charge	£/MWh
Apr-18	1.87
Past 12 months	2.37
2017/18	2.33

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.

The error in the year ahead forecast for June to October was caused by a transmission fault which significantly increased the cost of managing constraints. The fault also meant that transmission outages we re-planned causing additional cost later in the year.

Historical outturn vs year ahead forecast



Month	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18
Energy Imbalance	-1.0	-3.1	-3.0	-2.7	-1.3	-2.8	-3.1	5.1	-1.9	-3.0	3.3	-5.7
Operating Reserve	9.4	5.5	4.6	6.0	5.9	6.1	6.1	9.0	8.6	9.2	15.9	4.3
BM Startup	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.0
STOR	6.9	6.0	6.6	6.4	6.0	6.2	8.9	9.4	9.4	8.6	8.1	9.9
Constraints - E&W	12.9	26.9	7.5	7.7	3.8	4.6	16.1	6.4	7.5	3.4	17.1	5.4
Constraints - Cheviot	2.2	26.1	19.3	22.6	17.8	54.6	15.5	19.2	11.9	5.4	2.3	13.4
Constraints - Scotland	1.7	10.2	2.7	4.5	1.0	3.0	7.1	5.2	5.4	2.8	1.4	0.9
Footroom	2.6	1.2	1.3	0.9	0.7	0.8	0.6	0.1	0.9	0.1	0.4	0.4
Fast Reserve	7.5	7.5	7.2	8.0	7.6	9.0	8.1	8.8	9.3	7.9	8.8	11.9
Response	13.1	13.9	13.5	12.0	11.7	11.4	10.3	11.4	10.4	9.3	11.6	2.0
Reactive	7.7	6.3	6.9	6.4	6.2	6.3	6.2	6.7	6.6	5.7	5.9	0.8
Minor Components	1.7	2.4	2.6	1.6	1.9	3.3	0.9	2.1	1.8	1.6	1.2	6.5
ROCOF (E&W)	3.6	7.2	5.6	8.9	6.0	6.9	2.9	5.3	5.2	0.9	0.8	4.5
Black Start (non-incentivised)	4.6	6.8	6.4	6.2	5.8	4.6	3.5	4.5	3.8	3.4	3.7	4.2
Total BSUOs	72.9	117.2	81.4	88.5	73.2	114.0	83.4	93.4	79.4	55.3	80.7	58.7
Estimated BSUOs Vol (TWh)	38.5	35.6	36.4	36.1	37.8	41.5	47.2	49.2	48.9	45.4	48.7	40.4
Estimated NGET Profit/(Loss)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.2
Estimated Internal BSUOs (£m)	14.0	13.5	14.0	14.0	13.5	14.0	13.5	14.0	14.0	12.6	14.0	15.6
Estimated BSUoS Charge (£/MWh)	2.28	3.70	2.64	2.86	2.32	3.11	2.07	2.20	1.93	1.51	1.96	1.87

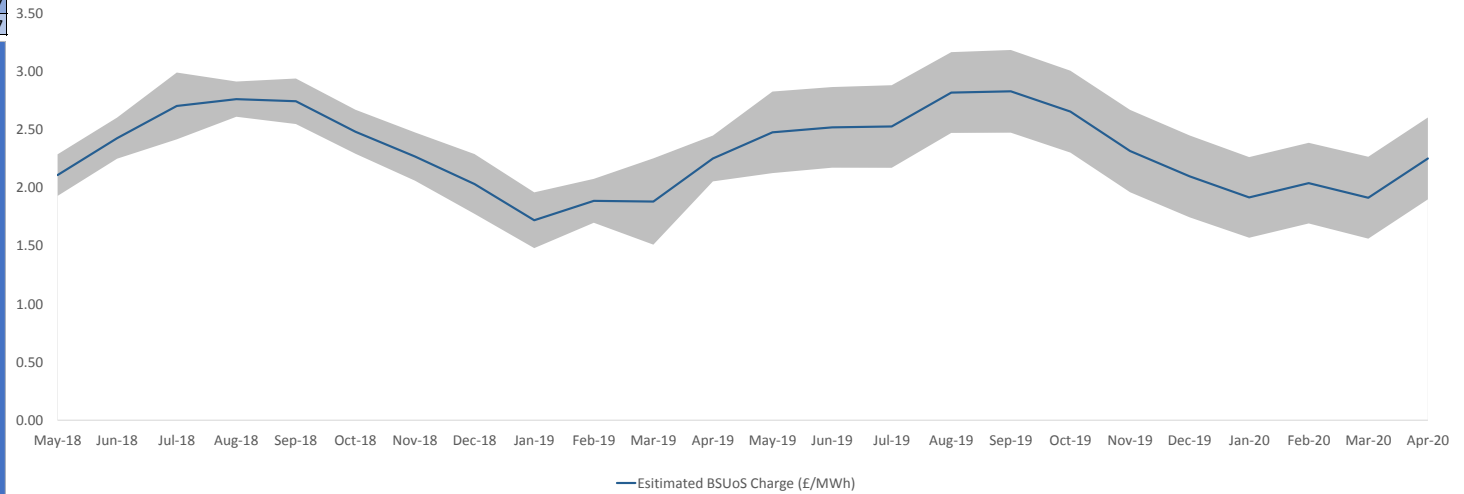
BSUoS Forecast

Average BSUoS charge	£/MWh
May-18	2.11
2018/19	2.24
2019/20	2.37
Next 12 months	2.27

This month we have reviewed the forecast for the next 24 months, and made adjustments for the Western Link HVDC outage. Based on the latest information we have assumed the link out of service until the end of June, and in service at full capacity from July onwards. We have also revised our forecast of BSUoS volume for 2018 and 2019.

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	May-18	Jun-18	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	
Energy Imbalance	-7.7	-4.2	-3.5	-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	
Operating Reserve	6.2	5.8	7.0	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	
BM Startup	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	0.0
STOR	6.9	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	6.0	5.8	6.3	6.2	7.4	7.5	7.6	6.5	7.4	5.2	
Constraints - E&W	10.4	6.7	9.5	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	
Constraints - Cheviot	7.6	9.9	14.1	15.0	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	
Constraints - Scotland	3.2	2.4	3.4	3.6	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	
Footroom	2.1	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	1.8	1.7	1.8	1.2	0.5	0.5	0.6	0.1	0.2	0.4	
Fast Reserve	10.4	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	9.1	9.6	8.8	9.1	9.4	10.0	10.3	8.7	9.7	9.0	
Response	8.9	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	14.8	14.5	15.3	14.7	14.1	14.3	14.0	12.3	13.4	13.9	
Reactive	2.6	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	6.2	6.1	5.9	6.1	5.8	6.4	6.3	5.1	5.4	6.0	
Minor Components	3.0	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	2.3	1.3	0.7	1.7	0.0	0.9	-0.8	2.2	0.1	2.9	
ROCOF	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	
Black Start (non-incentivised)	3.8	3.7	3.8	3.8	3.7	3.8	3.7	3.8	3.7	3.8	3.5	3.8	3.7	3.8	3.7	3.8	3.7	3.8	3.7	3.8	3.8	3.5	3.8	3.7	
Total BSUOs	63.1	68.7	80.1	81.4	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	
Estimated BSUOs Vol (TWh)	38.1	35.2	36.0	35.7	37.4	41.0	46.7	48.7	48.4	44.9	48.3	35.3	35.8	33.1	36.0	33.6	35.1	38.6	43.9	45.8	45.4	42.2	45.3	35.3	
Estimated NGET Profit/(Loss)	1.3	1.2	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	
Estimated Internal BSUoS(£m)	16.1	15.6	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	
Estimated BSUoS Charge (£/MWh)	2.11	2.43	2.71	2.76	2.75	2.48	2.27	2.03	1.72	1.89	1.88	2.25	2.48	2.52	2.53	2.82	2.83	2.66	2.32	2.10	1.92	2.04	1.92	2.25	

BSUoS Volatility and Forecast Accuracy

National Grid

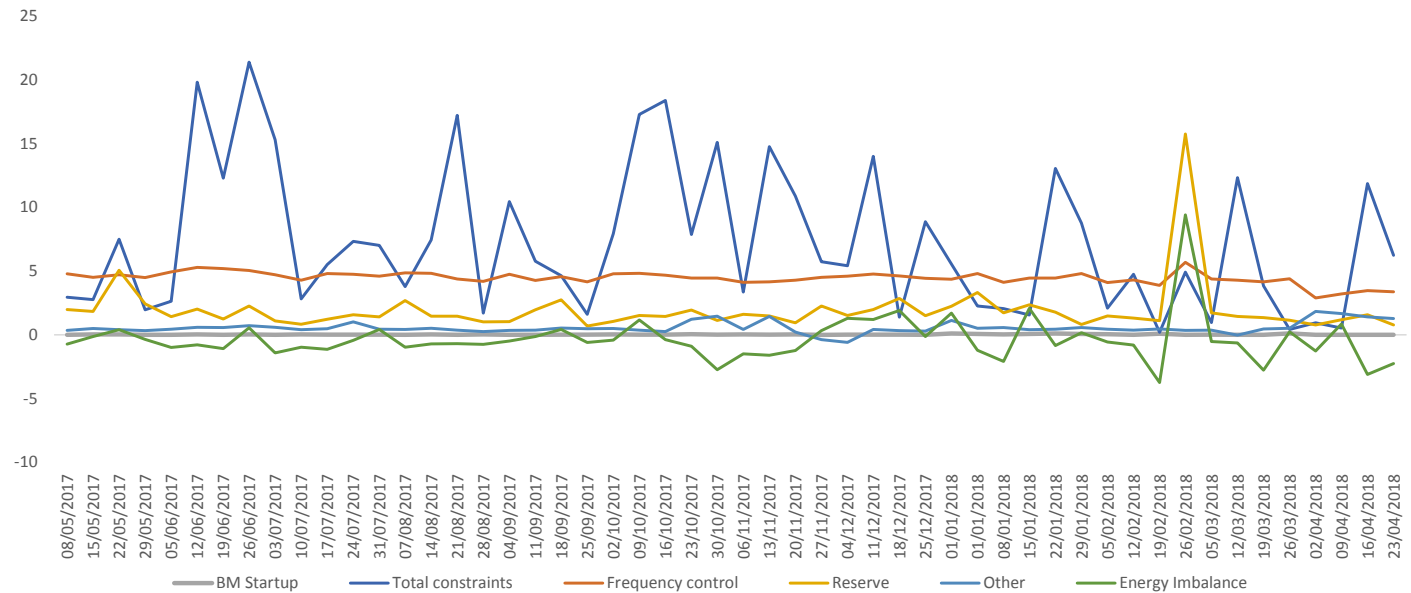
The first chart shows the volatility of the cost categories that make up BSUoS. Constraint costs shown in blue are the most variable and difficult to predict, mainly driven by the output of wind generation combined with the transmission outage plan at the time. A fault on the transmission system can add to the underlying volatility and cause large unforeseen increases 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.

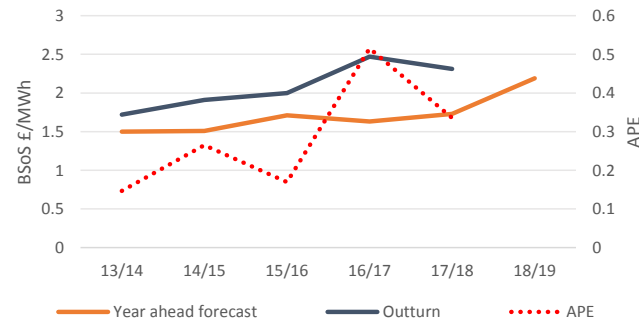
The third chart shows the month ahead forecast compared with outturn and absolute percentage error.

The spike in Reserve costs at the end of March 2018, shown in the first chart, was due to tight margins during cold and snowy weather. The high constraint costs in June 2018 were due to a transmission asset fault in Scotland.

Cost volatility by category over past 12 months



Yearly History and APE



Month ahead forecast vs actual and APE

