

BSUoS Outturn

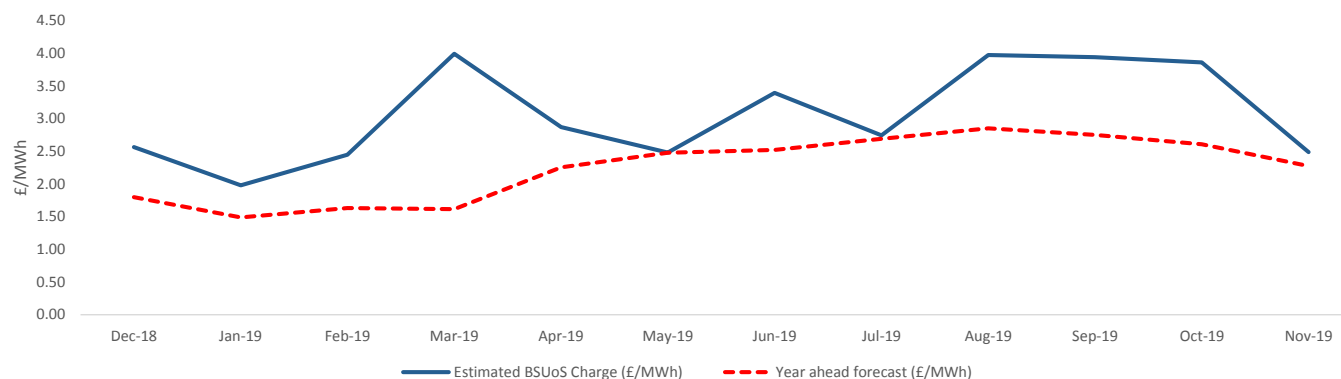
Average BSUoS charge	£/MWh
Nov-19	2.49
Past 12 months	3.01
2018/19	2.88

Outturn costs for November were significantly lower than October. Operating Reserve was slightly higher than October but almost all other categories were lower than the previous month.

The BSUoS volume was up slightly by 3.3TWh on October which combined with the lower cost of system operation resulted in substantially lower BSUoS charges for the month..

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 a breakdown of the elements that make up the BSUoS charge (including volume), broken down by cost category. The total cost divided by the volume gives the estimated average charge.

Historical outturn vs year ahead forecast



Month	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19
Energy Imbalance	-2.3	-5.5	-5.1	0.2	-0.8	0.0	2.2	-0.4	2.4	2.5	7.4	6.0
Operating Reserve	8.2	6.8	4.7	4.4	4.7	4.8	4.9	4.5	6.5	7.5	7.6	9.7
STOR	6.0	6.1	4.6	5.1	3.8	3.9	4.6	4.4	4.3	3.7	6.2	3.8
Constraints - E&W	26.5	9.3	21.2	23.3	17.0	14.8	44.6	24.1	42.0	34.8	47.4	20.4
Constraints - Cheviot	2.2	13.3	11.1	30.8	17.3	0.4	0.1	0.1	1.0	5.2	18.3	5.9
Constraints - Scotland	16.4	10.7	10.5	31.6	4.2	6.0	0.9	4.7	12.3	15.1	8.6	6.0
Constraints - AS	8.2	7.3	6.8	6.5	5.2	2.5	1.3	2.4	1.9	2.9	1.2	0.3
Negative Reserve	0.4	0.2	0.1	0.1	0.3	0.1	0.7	0.1	1.4	2.0	0.3	0.1
Fast Reserve	7.6	9.8	7.8	8.2	8.6	7.5	7.6	7.7	6.8	8.3	8.3	6.7
Response	11.8	9.7	9.1	11.5	9.7	10.9	10.1	10.0	13.8	15.9	15.0	14.5
Other Reserve	1.5	1.4	1.4	1.3	1.5	1.5	1.5	1.3	1.8	1.5	1.5	1.4
Reactive	7.9	7.5	6.1	6.0	5.9	6.6	6.0	5.5	5.4	5.7	5.5	4.8
Minor Components	1.8	1.3	2.0	12.6	3.0	1.6	2.0	2.7	5.2	2.8	2.8	3.5
Black Start	3.8	3.6	3.6	5.3	3.6	3.6	3.2	3.8	3.4	3.6	4.0	3.8
Total BSUoS	99.9	81.6	83.8	147.0	83.9	64.5	89.7	71.0	108.3	111.5	134.0	86.9
Estimated BSUoS Vol (TWh)	45.7	50.0	40.6	41.2	38.2	36.7	34.1	35.6	34.0	34.9	41.6	44.9
Estimated Internal BSUoS (£m)	16.1	16.1	14.5	16.1	24.9	25.7	24.9	25.7	25.7	24.9	25.7	24.9
ESO Incentive	1.3	1.3	1.2	1.3	1.0	1.0	1.0	1.0	1.0	1.0	-1.4	-2.5
ALoMCP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4
Estimated BSUoS Charge (£/MWh)	2.57	1.98	2.45	3.99	2.87	2.48	3.39	2.75	3.97	3.94	3.86	2.49
Year ahead forecast (£/MWh)	1.80	1.49	1.63	1.62	2.25	2.48	2.52	2.69	2.85	2.75	2.61	2.28

BSUoS Forecast



Average BSUoS charge	£/MWh
Dec-19	3.70
2019/20	3.11
2020/21	3.00
Next 12 months	3.19

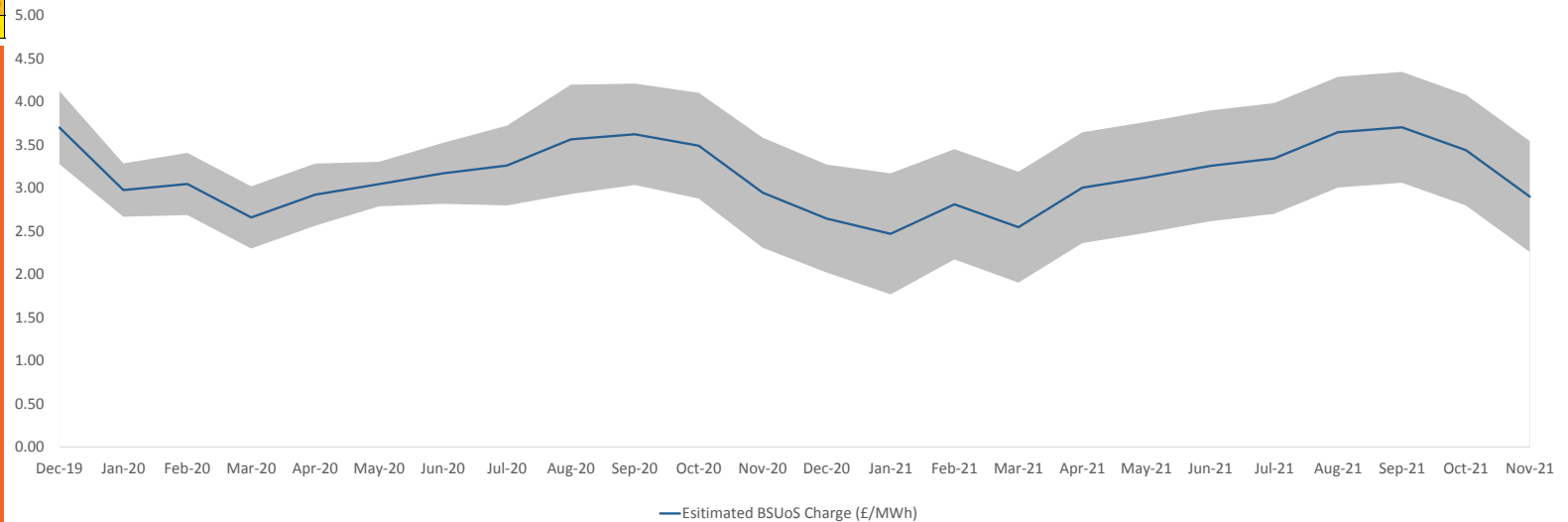
Accelerated Loss of Mains Change Programme: an additional line has been added to the forecast for the recovery of the costs of the Loss of Mains Change Programme. £100m will be recovered over a 2 year period from October 2019, £2.4m per month for the first 6 months and £4.8m for the following 18 months. Programme benefits are expected to be in excess of £150m per annum.

Changes have been made to the ESO incentive scheme element of the BSUoS charge, details can be found in the Ofgem letter: https://www.ofgem.gov.uk/system/files/docs/2019/10/authoritys_consent_new.pdf

£110m was added to the Internal BSUoS figure in the December 18 issue for 2019/20 following the BSUoS circular sent on 5th December (also available on our website - <https://www.nationalgrideso.com/charging/balancing-services-use-system-bsuos-charges>).

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. The forecast uses a combination of forecast models and historical data. Constraint costs are adjusted in line with major changes to the outage plan, system faults, and commissioning programmes. 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	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21
Energy Imbalance	5.5	2.3	1.5	-1.4	-6.4	-4.4	-3.7	-2.9	-3.6	-1.8	-0.9	-1.0	-1.1	-0.3	1.7	-1.2	-6.4	-4.4	-3.7	-2.9	-3.6	-1.8	-0.9	-1.0
Operating Reserve	12.2	10.0	13.0	12.9	8.3	9.0	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
STOR	8.2	7.6	6.5	7.6	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	6.0	5.8	6.3	6.2	7.4
Constraints	84.5	57.5	52.9	44.0	36.2	36.7	36.5	37.7	46.7	50.4	53.2	49.9	43.7	37.0	42.8	38.8	38.9	39.5	39.2	40.5	49.5	53.1	56.0	52.6
Negative Reserve	0.4	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	1.8	1.7	1.8	1.2	0.5
Fast Reserve	8.9	10.3	8.7	9.9	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	9.1	9.6	8.8	9.1	9.4
Response	12.0	11.2	11.1	11.6	11.8	12.6	11.9	12.6	13.1	11.3	11.2	11.2	11.3	11.1	10.5	11.4	11.8	12.6	11.9	12.6	13.1	11.3	11.2	11.2
Other Reserve	1.0	0.9	0.9	1.0	1.1	0.9	1.0	1.2	1.3	1.0	0.9	0.9	0.9	0.9	0.9	1.0	1.1	0.9	1.0	1.2	1.3	1.0	0.9	0.9
Reactive	6.8	7.0	5.7	6.1	6.7	7.5	7.0	6.9	6.8	6.6	6.7	6.5	7.1	7.0	5.7	6.1	6.7	7.5	7.0	6.9	6.8	6.6	6.7	6.5
Minor Components	0.4	-1.6	1.3	-0.6	3.0	3.0	2.6	2.6	1.5	1.1	2.1	0.6	1.0	-0.6	2.3	0.3	3.0	3.0	2.6	2.6	1.5	1.1	2.1	0.6
Black Start	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	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Total BSUoS	143.9	109.7	105.3	95.0	79.1	84.4	80.8	85.7	94.9	103.2	109.9	105.2	96.5	87.5	95.9	90.8	81.9	87.2	83.6	88.4	97.7	106.1	112.7	108.0
Estimated BSUoS Vol (TWh)	45.8	45.4	42.2	45.3	35.3	35.8	33.1	33.8	33.6	35.1	38.6	43.9	45.8	45.4	42.2	45.3	35.3	35.8	33.1	33.8	33.6	35.1	38.6	43.9
Estimated Internal BSUoS (£m)	25.7	25.7	23.2	25.7	18.3	18.9	18.3	18.9	18.9	18.3	18.9	18.3	18.9	18.9	17.1	18.9	18.3	18.9	18.3	18.9	18.9	18.3	18.9	18.3
ESO Incentive	-2.5	-2.5	-2.3	-2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
ALoMCP	2.4	2.4	2.4	2.4	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Estimated BSUoS Charge (£/MWh)	3.70	2.98	3.05	2.66	2.92	3.05	3.17	3.26	3.56	3.62	3.49	2.95	2.65	2.47	2.81	2.55	3.00	3.12	3.26	3.34	3.65	3.70	3.44	2.90

High Error Band (£/MWh)	4.12	3.29	3.41	3.02	3.28	3.30	3.52	3.72	4.20	4.21	4.10	3.58	3.27	3.17	3.45	3.19	3.65	3.77	3.90	3.99	4.29	4.35	4.08	3.54
Low Error Band (£/MWh)	3.28	2.67	2.69	2.30	2.56	2.79	2.82	2.80	2.93	3.04	2.88	2.31	2.02	1.77	2.17	1.91	2.36	2.48	2.61	2.70	3.01	3.06	2.80	2.26

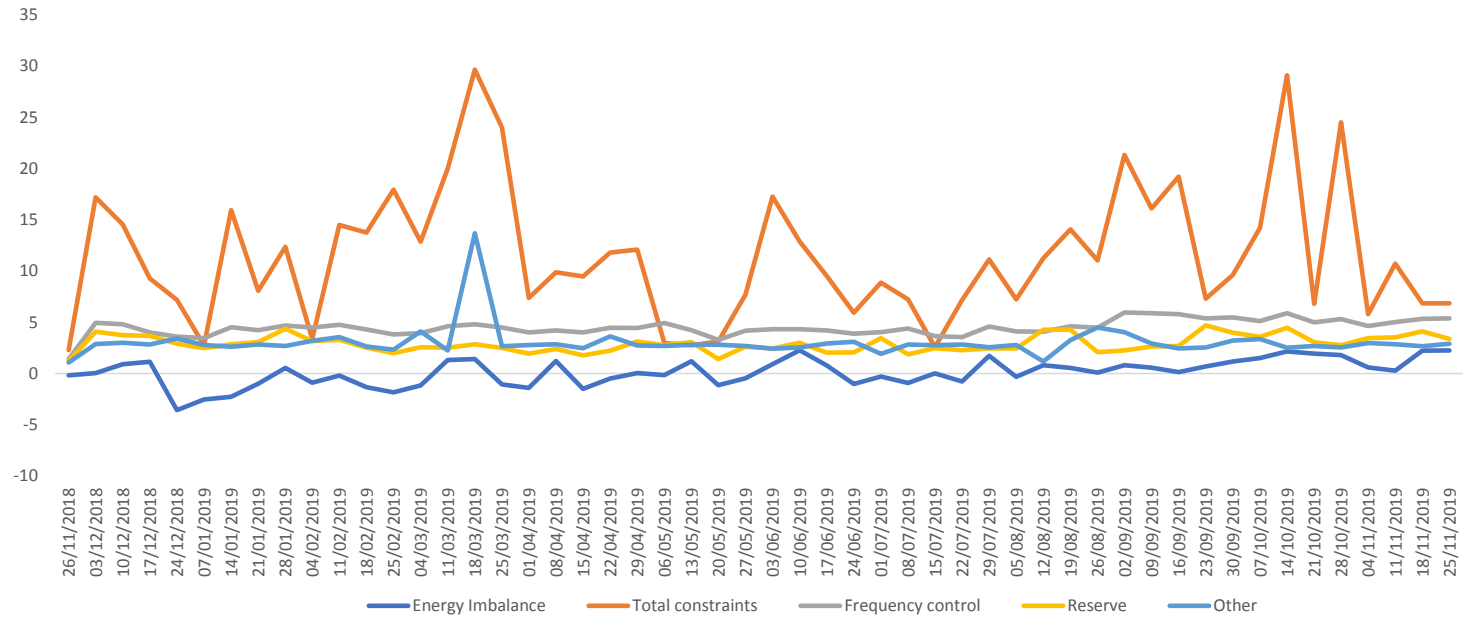
BSUoS Volatility and Forecast Accuracy

The first chart shows the volatility of the cost categories that make up BSUoS. Constraint costs shown in red 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.

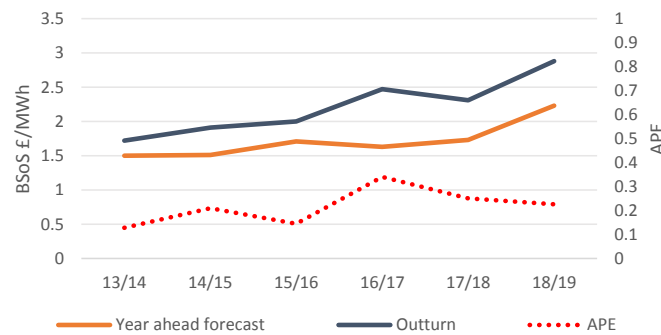
The second chart shows the annual outturn BSUoS charge compared with the forecast made at 12 months ahead, and the absolute percentage error for each year.

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

Cost volatility by category over past 12 months



Yearly History and APE



Month ahead forecast vs actual and APE

