BSUoS Outturn

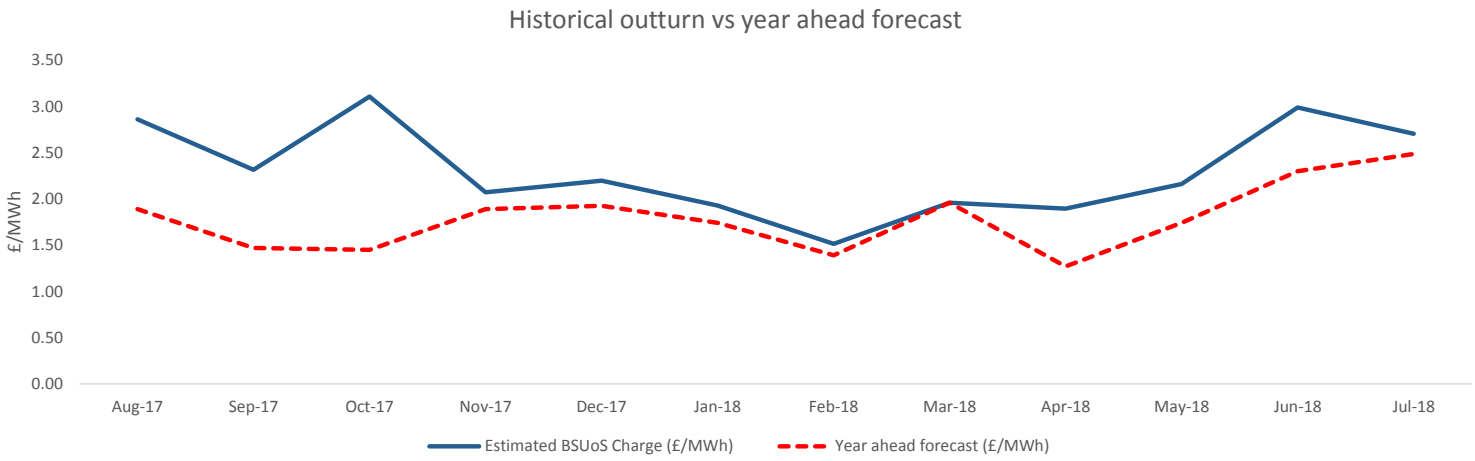
National Grid

Average BSUoS charge	£/MWh
Jul-18	2.71
Past 12 months	2.27
2017/18	2.31

Outturn costs for July were lower than forecast, driven by the stable weather conditions which kept constraint, operating reserve and response costs low across the month.
However, the weekend of 28th/29th saw high constraint costs (~£15m) due to a record low demand and high wind in Scotland and North England.

NOTE: Cost categories have been adjusted to align with the daily cost reports and MBSS.

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 monthy 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



Month	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18
Energy Imbalance	-2.7	-1.3	-2.8	-3.1	5.1	-1.9	-3.0	3.3	-5.7	-6.8	-2.8	-1.2
Operating Reserve	6.0	5.8	6.0	6.1	9.0	8.6	9.2	15.9	4.1	4.5	3.6	4.7
STOR	6.4	6.0	6.2	8.9	9.4	9.4	8.6	8.1	5.8	6.8	6.5	7.2
Constraints - E&W	16.0	9.1	10.0	16.3	9.8	12.3	4.0	14.2	9.1	20.4	33.3	37.2
Constraints - Cheviot	21.6	17.2	54.6	15.5	19.2	11.9	5.4	2.3	13.2	1.5	7.8	1.4
Constraints - Scotland	3.4	0.1	2.9	7.1	5.2	5.4	2.8	1.4	0.4	2.1	6.3	0.2
Constraints - AS	2.7	2.3	1.7	2.7	1.9	0.5	0.4	3.7	2.7	0.6	3.5	0.2
Negative Reserve	0.9	0.7	0.8	0.6	0.1	0.9	0.1	0.4	0.4	2.1	0.4	0.6
Fast Reserve	6.2	6.4	7.6	7.0	7.7	8.1	6.9	7.8	6.6	6.6	6.2	7.9
Response	12.0	11.7	11.4	10.3	11.4	10.4	9.3	11.6	11.0	12.2	11.4	10.0
Other Reserve	1.9	1.3	1.6	1.2	1.3	1.6	1.2	1.1	0.7	0.8	0.8	1.0
Reactive	6.4	6.2	6.3	6.2	6.7	6.6	5.7	5.9	6.3	7.0	7.3	6.4
Minor Components	1.6	1.9	3.3	0.9	2.1	1.8	1.6	1.2	1.6	1.0	1.2	1.4
Black Start	6.2	5.8	4.6	3.5	4.5	3.8	3.4	3.7	3.4	3.7	3.2	3.0
Total BSUos	88.5	73.2	114.0	83.4	93.4	79.4	55.3	80.7	59.7	62.5	88.7	79.9
Estimated BSUos Vol (TWh)	36.1	37.8	41.5	47.2	49.2	48.9	45.4	48.7	40.4	37.0	35.3	36.0
Estimated Internal BSUos(£m)	14.0	13.5	14.0	13.5	14.0	14.0	12.6	14.0	15.6	16.1	15.6	16.1
Estimated NGET Profit/(Loss)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.2	1.3	1.2	1.3
Estimated BSUoS Charge (£/MWh)	2.86	2.32	3.11	2.07	2.20	1.93	1.51	1.96	1.90	2.16	2.99	2.71

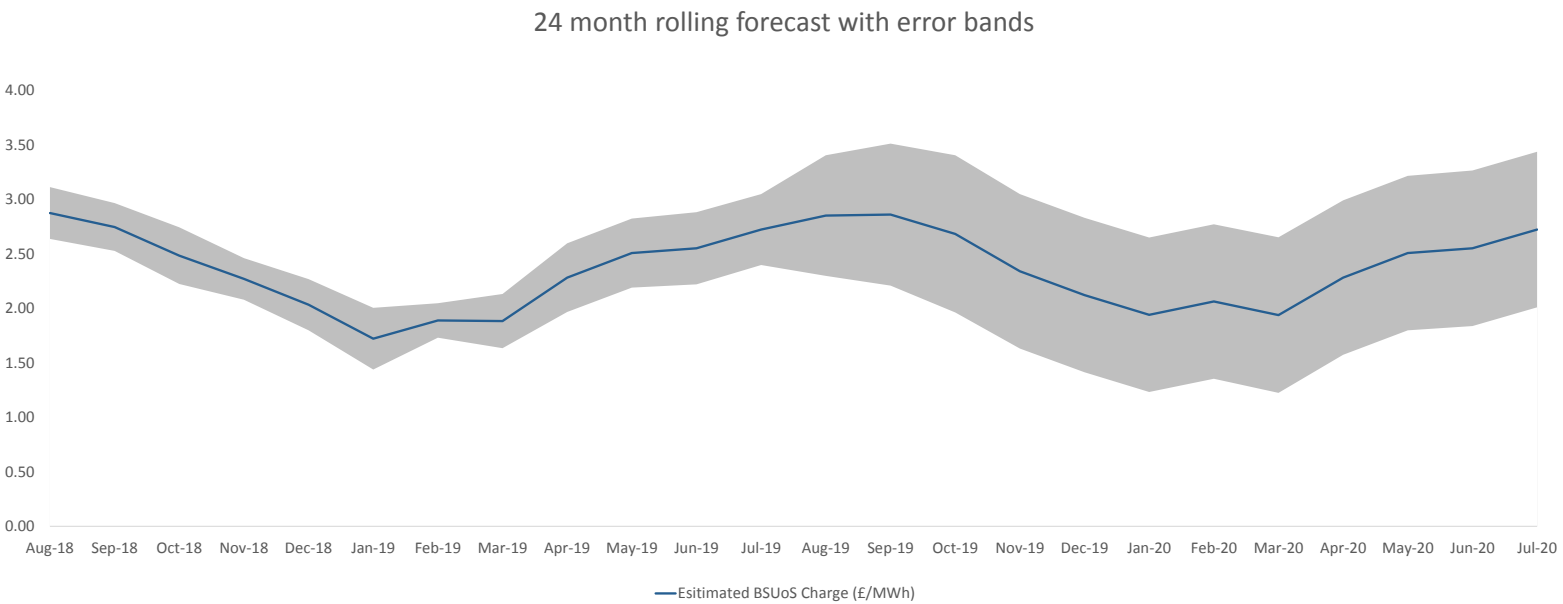
BSUoS Forecast

National Grid

Average BSUoS charge	£/MWh
Aug-18	2.87
2018/19	2.26
2019/20	2.37
Next 12 months	2.29

Based on the HVDC update of 27th July; it is expected to be fully commissioned in September, so we have not updated constraint costs. With a return to average temperatures and weather we have not updated the August forecast except for the first few days of the month (£3m reduction).

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 takes 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.



Month	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	Jul-20
Energy Imbalance	-4.5	-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	-3.5
Operating Reserve	7.1	14.0	16.2	16.1	11.7	9.8	12.8	13.1	8.2	8.9	5.8	7.0	8.2	14.1	16.3	16.1	11.8	10.0	13.0	12.9	8.3	9.0	5.8	7.0
STOR	6.0	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	6.0
Constraints	41.0	31.6	26.8	33.6	28.2	14.8	16.8	22.1	21.3	25.2	23.7	27.5	31.6	29.6	28.6	30.5	26.5	19.9	19.1	19.5	21.3	25.2	23.7	27.5
Negative Reserve	1.4	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	1.8
Fast Reserve	8.9	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	9.1
Response	13.7	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	14.8
Other Reserve	1.9	1.3	1.6	1.2	1.3	1.6	1.2	1.1	1.1	0.9	1.0	1.2	1.3	1.0	0.9	0.9	0.9	0.9	0.9	1.0	0.0	0.0	0.0	0.0
Reactive	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	6.2
Minor Components	-0.1	-0.4	0.3	-1.1	-0.3	-2.0	1.1	-0.8	1.8	2.1	1.4	1.1	0.1	-0.3	0.9	-0.8	0.0	-1.6	1.3	-0.6	2.9	2.9	2.4	2.3
Black Start	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	3.8
Total BSUos	85.3	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	75.0
Esitmated BSUos Vol (TWh)	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	35.1	38.6	43.9	45.8	45.4	42.2	45.3	35.3	35.8	33.1	33.8
Estimated Internal BSUos(£m)	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	16.1
Esitmated NGET Profit/(Loss)	1.3	1.2	1.3	1.2	1.3	1.3	1.2	1.3	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
Esitmated BSUoS Charge (£/MWh)	2.87	2.75	2.48	2.27	2.03	1.72	1.89	1.88	2.28	2.51	2.55	2.72	2.85	2.86	2.68	2.34	2.12	1.94	2.06	1.94	2.28	2.51	2.55	2.72

High Error Band (£/MWh)	3.11	2.97	2.74	2.46	2.27	2.00	2.05	2.13	2.60	2.82	2.88	3.05	3.41	3.51	3.41	3.05	2.83	2.65	2.77	2.65	2.99	3.22	3.27	3.44
Low Error Band (£/MWh)	2.63713	2.52681	2.22388	2.07969	1.79852	1.439	1.73116	1.63403	1.96694	2.19055	2.2207	2.39755	2.29803	2.20864	1.96204	1.63164	1.41318	1.23195	1.35429	1.22435	1.5734	1.79881	1.83761	2.00923

BSUoS Volatility and Forecast Accuracy

National Grid

There was a significant increase in constraint costs at the end of July (28th/29th) caused by high volumes of wind output and very low demands.

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.