nationalgridESO

ESO Forward Plan 2020-21

Monthly Reporting: November

21 December 2020

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Foreword

Welcome to our monthly performance report for November 2020. Each month, we report on a subset of metrics and performance indicators. This report provides an update on our performance and metrics against our deliverables set out in the 2020-21 Forward Plan Addendum[1].

We report our progress against our deliverables on the Forward Plan tracker[2] which is updated monthly on our website. The Forward Plan tracker has been updated to take account of the revisions to deliverables set out in the Forward Plan Addendum.

Summary

In November we have successfully delivered the following notable events:

- Announced six new Black Start contracts
- Held the ESO Operational Forum
- Consulted on the C16 statements and held a forum to engage with stakeholders
- Published the 2021-22 Transmission Network Use of System (TNUoS) draft tariffs
- Shared the latest version of the Manually Activated Reserves Initiative (MARI) despatch document with the MARI workgroup
- Grid Code modification GC0144 (Alignment of Market Suspension Rights to the EU Emergency and Restoration Code Article 35.1(b)) progressed to Workgroup Consultation
- Published the Electricity Ten Year Statement (ETYS)
- Went live with the N-3 intertripping Regional Development Programme (RDP) project with UKPN
- Published the Future Energy Scenario (FES) 2020 costing report and held a webinar to discuss and engage with stakeholders

We did not meet the benchmark for balancing costs as there was suppressed demand due to the November lockdown, coupled with high wind levels and significant boundary capacity reduction. This resulted in an increased volume of actions required to manage the system. The benchmarks for System Access Management, Demand Forecasting Accuracy, and Month Ahead Balancing Service Use of System (BSUoS) Forecasting were unfortunately not met. More information on the reasons for not meeting these benchmarks are set out further in the report. We did, however, meet our target for Wind Forecasting Accuracy and Right First Time Connection Offers. We exceeded expectations for Security of Supply.

[1] https://www.nationalgrideso.com/document/173131/download
[2] https://www.nationalgrideso.com/document/162046/download

A summary of our monthly metrics and performance indicators covering November is shown in Table 1 below.

Metric/Performance Indicator	Performance	Frequency	Status
Balancing Cost Management	£193.6m outturn against £82.8m benchmark	Monthly	●
Energy Forecasting Accuracy	Demand MMAE: 606.8 MW; Wind MAPE[3]. 4.21%	Monthly	●
Security of Supply	0 excursions for voltage and frequency	Monthly	●
System Access Management	2.85/1000 cancellations	Monthly	●
Month-ahead BSUoS Forecast	36% forecasting error	Monthly	●
Right First Time Connection Offers	95% first time connection offers	Monthly	●

Table 1: Summary of metrics and performance indicators

● **Exceeding expectations**

● **Meeting expectations**[4]

● **Below expectations**

You can find out about our vision, plans, deliverables and full metric suite in the Forward Plan pages of our website[5].We welcome feedback on our performance reporting to box.soincentives.electricity@nationalgrideso.com

Gareth Davies
ESO Regulation Senior Manager

[3] MAPE (Monthly Average Percentage Error) corrected on 28 January 2021
[4] We have updated the colour scheme for our metrics to give increased transparency of our performance, noting that meeting expectations still represents good performance. This should give a clearer representation of the status of our activities.
[5] https://www.nationalgrideso.com/our-strategy/forward-plan

Role 1 Control Centre operations

1A Balancing cost management

November 2020 Performance

The approach we use for measuring our Balancing Costs performance is based on a linear trend in a five year rolling mean, based on annual Balancing Services Costs (excluding Black Start). In order to meaningfully employ a linear trend, the data points need to handle one-off permanent changes to the system network which would not be captured by the five-year trend. So far, the only change modelled in this way has been the Western Link. We also make adjustments for significant events which we expect to have an impact on balancing costs, whether this is an upwards or downwards adjustment. These are trends which we would not expect to be captured in the 5-year rolling average, because they relate to either new assets or new trends in market behaviour. Additional information regarding balancing costs calculation and benchmark adjustment can be found on our website [6].

Low demand periods are challenging to manage and the volume of actions required by the ESO to ensure the system remains secure lead to higher costs. During the period where demand is impacted by the COVID-19 pandemic, the ESO's balancing costs spend is expected to be significantly higher than the benchmarks stated here. During this period, we will continue to report our performance in comparison to the benchmark but will focus on providing a detailed narrative which explains the costs we have incurred. We also welcome Ofgem's review of costs incurred over the summer period and will be transparent with our stakeholders about the actions we have taken.

Please note that the benchmarks were re-calculated in July 2020 to remove the ElecLink adjustor since the interconnector go-live date has been delayed.

	Apr	May	Jun	Jul	Aug	Sep
Benchmark cost (£m)	67.0	48.2	82.6	65.5	102.0	103.7
Additional cost forecast due to WHVDC fault (£m)	0	0	0	0	0	0
Benchmark adjusted for WHVDC (£m)	67.0	48.2	82.6	65.5	102.0	103.7
Outturn cost (£m)	122.4	159.1	135.6	136.0	117.7	135.6
Status						

Table 2: Apr-Sep 2020 Monthly balancing cost benchmark and outturn.

	Oct	Nov	Dec	Jan	Feb	Mar	Total
Benchmark cost (£m)	126.9	82.8	126.6	133.2	142.5	118.3	1199.3
Additional cost forecast due to WHVDC fault (£m)	0	0	0	0	0	0	0
Benchmark adjusted for WHVDC (£m)	126.9	82.8	126.6	133.2	142.5	118.3	1199.3
Outturn cost (£m)	142.4	193.6					1142.4 [YTD]
Status							

Table 3: Oct-Mar 2020-21 Monthly balancing cost benchmark and outturn.

[6] https://www.nationalgrideso.com/document/166231/download

Supporting information

The balancing costs for November were high. Costs were primarily driven by actions taken to manage constraints on the system, particularly in the North of England and Scotland during sustained periods of high wind. Constraint boundary capacities were significantly reduced by outages on the network which had been taken to facilitate important network upgrades and new connections. Suppressed demand due to the November lockdown was another contributing factor. The combined effect of suppressed demands, sustained periods of high wind and significantly reduced boundary capacities resulted in an increased volume of actions being required to manage the system and increased balancing costs as a result.

Performance benchmarks

- **Exceeding expectations:** at least 10% lower than the figure implied by the benchmark.
- **Meeting expectations:** within 10% of the figure implied by the benchmark
- **Below expectations:** at least 10% higher than the figure implied by the benchmark.

1B Energy forecasting accuracy

November 2020 Demand Forecasting Performance

As outlined in the Forward Plan Role 1 Energy Forecasting Accuracy metric (Metric 1b), the ESO's forecasting performance will be assessed at the end of the performance year. Annual performance targets have been calculated with exceeding, in-line with and below expectations values set out. To allow transparency of our performance during the year, each month we will report an indicative performance for both metrics.

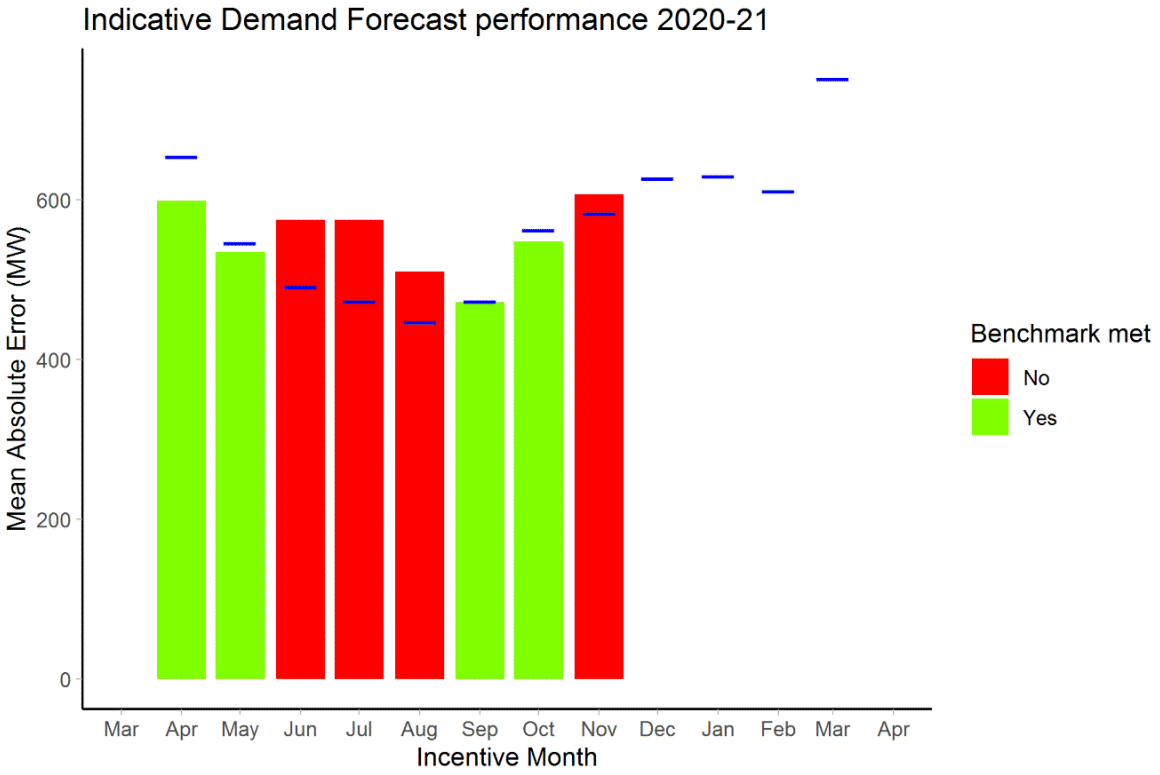

Figure 1: Demand Forecasting , shows our performance from April to October as the green histogram against the blue target line.

Day ahead demand forecast benchmarks for financial year 2020-21			
Month	**Benchmark (MW)**	**Month**	**Benchmark (MW)**
April	654	October	562
May	546	November	583
June	491	December	627
July	473	January	630
August	447	February	611
September	473	March	752

Table 4: Demand Forecasting Benchmarks

Supporting information

DA Demand Indicative Performance for November: 606.8 MW

In November 2020, our day ahead demand forecast indicative performance was outside of the benchmark of 583MW. November's MMAE (monthly mean average error) was 606.8MW, 23.8MW away from the monthly target.

Demand forecasting in November was challenging due to several factors; the country moving into another national lockdown on 5 November, the uncertainty of the level of restrictions following the lockdown, which was announced at the end of October, and November being the first month of the 2020-21 triad season. The Triads are the three half-hour settlement periods of highest demand on the GB electricity transmission system between November and February (inclusive) each year, separated by at least ten clear days. The ESO uses the Triads to determine TNUoS demand charges for customers with half hourly meters. The Triads are designed to encourage demand customers to avoid taking energy off the system during peak times if possible. This can lead to some uncertainty in forecasting peak demands over the winter months. More on the Triad season and its impact on operational demand forecasting can be found on the ESO Data Portal.[7]

With regards to the national lockdown, the level of conformance to the rules was expected to be less than the first national lockdown in summer, making the element of underlying demand driven by the impact of human behaviour, due to the pandemic, less predictable.

Across the month, the largest average absolute errors were observed during the afternoon peak, darkness peak (DP) and late evening peak. The main contributing factor for the errors over the afternoon peak was the performance of the solar generation forecast. The uncertainty caused by the second lockdown combined with the additional uncertainty posed by the triad avoidance activity were the main drivers of the errors over DP and late evening peak.

[7] Operational Transparency Forum, presentation from 2 December 2020

November 2020 Wind Generation Performance

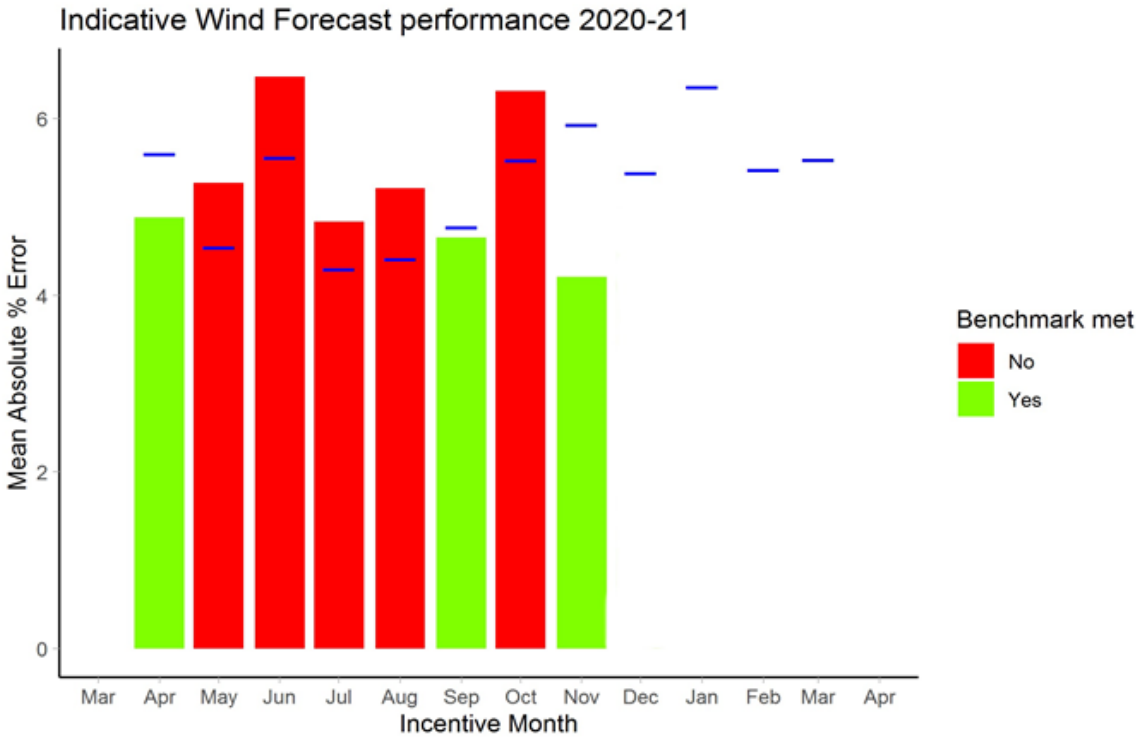

Figure 2 shows our performance this month as the green histogram, against the blue monthly target.[8]

BMU wind generation forecast benchmarks for financial year 2020-21			
Month	**Benchmark (%)**	**Month**	**Benchmark (%)**
April	5.60	October	5.53
May	4.54	November	5.93
June	5.56	December	5.38
July	4.29	January	6.36
August	4.41	February	5.42
September	4.77	March	5.54

Table 5: Wind Forecasting Benchmarks

[8] Corrected on 28 January 2021

Supporting information

DA Wind Indicative Performance for November: 4.21%[9]

In November 2020, our day ahead wind forecast indicative performance was within the monthly MMAPE (monthly mean absolute percentage error) target of 5.93%. November's MAPE was 4.21%[8].

On 1 November we experienced the remnants of ex-Hurricane Zeta with some lightning across the Western Isles of Scotland and South Wales. On 11 November there was a complex weather system over the UK with some lightning in the north east, and 13 November there was a cold front moving across the UK with active squall lines. The 14 and 15 of November we experienced very heavy rain showers and high winds across Cumbria, Merseyside and the English Channel. This included lightning storms making their way up the English Channel. For 24 to 26 November there was a frontal system moving slowly eastwards over the UK, passing over the Thames Estuary on the 26th. Additionally, on 30 November there was an active weather system that moved across the north west heading over to eastern areas thus giving a complex weather scenario.

Negative electricity prices occurred on 2 November from 04:00 to 05:00 and on 16 November from 02:00 to 05:00. Since these time periods are less than six hours in duration it is not believed that these negative prices affected the wind power output of Contracts for Difference (CfD) Wind farms.

November wind power forecasting is normally difficult because it represents the transition from the autumn to the stormier winter weather patterns. This transition, in combination with the fact that the jet stream was weak, and meandering, made the weather forecasting conditions particularly difficult in November.

We have revised our wind power forecasting models to incorporate the latest behaviour from new wind farms. This will have improved the forecast accuracy compared to what it otherwise would have been. We have also been working with the Met Office to investigate whether ensemble forecasting techniques provide a good route to improved forecasting accuracy. Ensemble forecasting is where instead of running just a single forecast, the computer model is run several times from slightly different starting conditions. The complete set of forecasts is referred to as the ensemble, and individual forecasts within it as ensemble members.

Performance benchmarks

- **Exceeding expectations:** Error which is at least 5% lower than the benchmark
- **Meeting expectations:** Error which is within 5% of the benchmark
- **Below expectations:** Error which is at least 5% higher than the benchmark

[9] Corrected on 28 January 2021

1C Security of Supply

November 2020 Performance

Quality of service delivered in running the electricity network by providing the number of reportable voltage and frequency excursions that occurred during the previous month, and a total for the year to date.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Voltage excursions	0	0	0	0	0	0	0	0				
Frequency excursions	0	0	0	0	0	0	0	0				

Table 6: voltage and frequency excursions over 2020-21

Supporting information

There were no excursions on both voltage and frequency. Our performance was therefore exceeding expectations in November.

Performance benchmarks

- **Exceeding expectations:** 0 excursions for both voltage and frequency over 2020-21
- **Meeting expectations:** 1 excursion for either voltage or frequency over 2020-21
- **Below expectations:** More than 2 excursions in total over 2020-21

1D System Access Management

Publishing this metric encourages the ESO to investigate the causes of outage cancellations and amend processes where appropriate to prevent a repeat. We will ensure that we seek to minimise costs across the whole system and all timescales when making a decision to recall or delay an outage on the transmission system.

November 2020 Performance

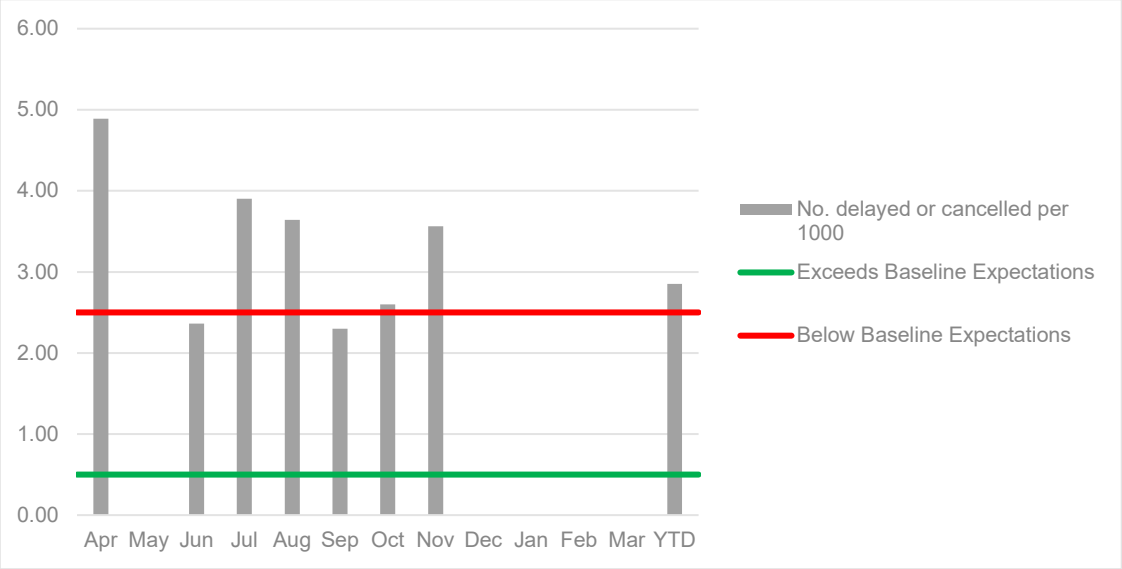

Figure 3: Number of outages delayed by > 1 hour, or cancelled, per 1000 outages

	Number of outages	Outages delayed/cancelled	Number of outages delayed or cancelled per 1000 outages
Apr	409	2	4.89
May	629	0	0
Jun	847	2	2.36
July	769	3	3.90
Aug	824	3	3.64
Sep	870	2	2.3
Oct	770	2	2.60
Nov	842	3	3.56
Dec			
Jan			
Feb			
YTD	5960	17	2.85

Table 7: Number of outages delayed by > 1 hour, or cancelled, per 1000 outages

Supporting information

Our November performance was below expectations. The number of delays or stoppages per 1000 outages has risen from 2.74 to 2.85, caused by three events. However, we have successfully released 842 outages which is an increase from 822 in November 2019.

- The first stoppage was due to an outage, identified by the control room, which had potential to cause post-fault generation instability. This outage had been planned to align with a generation shutdown; however, following issue of a margin notice, the generator delayed the start of this planned shutdown at midday the day before the outage was due to commence, and this was not picked up at the planning stage. The stability was assessed during the overnight control room shift, but on release of the outage it was identified that further system changes were required for overnight voltage management which would result in post-fault generator instability. As a result, the circuit was re-called, and this outage was re-planned to align the delayed generator shutdown several days later. An Operational Learning Note (OLN) has been written between the planning and control room teams, identifying several corrective actions of further checks when a margin notice is issued to reduce the likelihood of this reoccurring.

- The second event was due to a DNO not being agreeable to release a Super Grid Transformer (SGT) for switching time. This was rejected outside of normal working hours. The planning engineer had been liaising with the DNO throughout the week informing them that an outage request was due to be sent following agreement from the ESO internal outage sanctioning process. As a result, it was believed this outage would be provisionally acceptable to the DNO and was sent late afternoon on a Friday but was subsequently rejected out of hours. Therefore, this outage was not picked up until Monday morning when the outage was requested by the TO and it was too late to agree the outage with the DNO. The remedial actions we are taking forward are:

    - Outage planning engineers should ask DNO planners by what time they require confirmation on whether the outage will be going ahead or not.
    - In some circumstances, and as a last resort, consider asking the DNO whether they are agreeable to putting the outage into their plan on the expectation that it may be agreed.
    - Outage planning engineers should carefully check the Week Ahead programme to ensure all DNO impacted outages are on the list. For this event, the outage was missing on the list.

- The final event for November was an unacceptable risk to demand missed by both ESO planning and the TO. This was a maintenance outage planned at year ahead and bundled with further TO project work at this substation to help minimise constraint costs. The outage was required to be re-planned due to knock-on project delays experienced earlier in the year and the maintenance was required to be re-sequenced. This would have put a sensitive demand group at single circuit risk which was missed, due to the large workload seen in delivery timescales, and the directly connected customers were not notified. The outage was stopped by the ESO (ENCC) with the support of the TO. An OLN has been written identifying several corrective actions that has been shared with the planning teams.

Performance benchmarks

- **Exceeding expectations:** < 1 outage cancellations per 1,000 outages

- **Meeting expectations:** 1 - 2.5 outage cancellations per 1,000 outages
- **Below expectations:** > 2.5 outage cancellations per 1,000 outages

Notable events this month

Black Start contracts

On Monday 9 November we announced contracts with six providers for Black Start services in the South West and Midlands, the result of a new approach and tender process for awarding such contracts. The six contracts, five of which are new, total £84 million with each bid offering commercial benefits compared to other bidders and Black Start options. The South West and Midlands tender was launched in February 2019 and these new agreements, which will run instead of bilateral agreements, will provide services from July 2022 for five years, with an incentive to commence earlier if possible and at the discretion of the ESO.

ESO Operational Forum

On Wednesday 11 November we held our Operational Forum. This forum aims to provide visibility and awareness for our customers, providers and stakeholders to help understand and discuss the operation and performance of our balancing services. We received great feedback from stakeholders regarding the improved transparency. During the live event we had over 130 people attend, covered six hours of material, and answered over 100 questions. All the material, including a recording of the event, is available on our website.[10]

[10] https://www.nationalgrideso.com/industry-information/balancing-services/get-involved

Role 2 Market development and transactions

2E Month ahead forecast vs outturn monthly BSUoS

BSUoS forecasts are important to our stakeholders, although we note that our ability to forecast BSUoS is impacted by factors outside of our control. BSUoS costs are factored into the wholesale price of energy charged by generators, and therefore a forecast is vital for those parties when working out where to price their generation.

Due to the volatility in the comparison of our month ahead forecast with the outturn, we report the percentage variance so there can be large swings in accuracy. This metric does not just look explicitly at the volatility, but at the number of occurrences outside of a 10% and 20% band.

November 2020 Performance

Month	Actual	Month-ahead Forecast	APE	APE>20%	APE<10%
April-20	4.74	3.69	22%	1	0
May-20	6.24	3.87	38%	1	0
June-20	5.28	7.18	36%	1	0
July-20	4.79	5.56	16%	0	0
Aug-20	4.09	5.61	37%	1	0
Sept-20	4.68	5.16	10%	0	1
Oct-20	4.26	4.24	0.3%	0	1
Nov-20	5.48	3.5	36%	1	0
Dec-20					
Jan-21					
Feb-21					
Mar-21					

Table 8: Month ahead forecast vs. outturn BSUoS (£/MWh) Performance

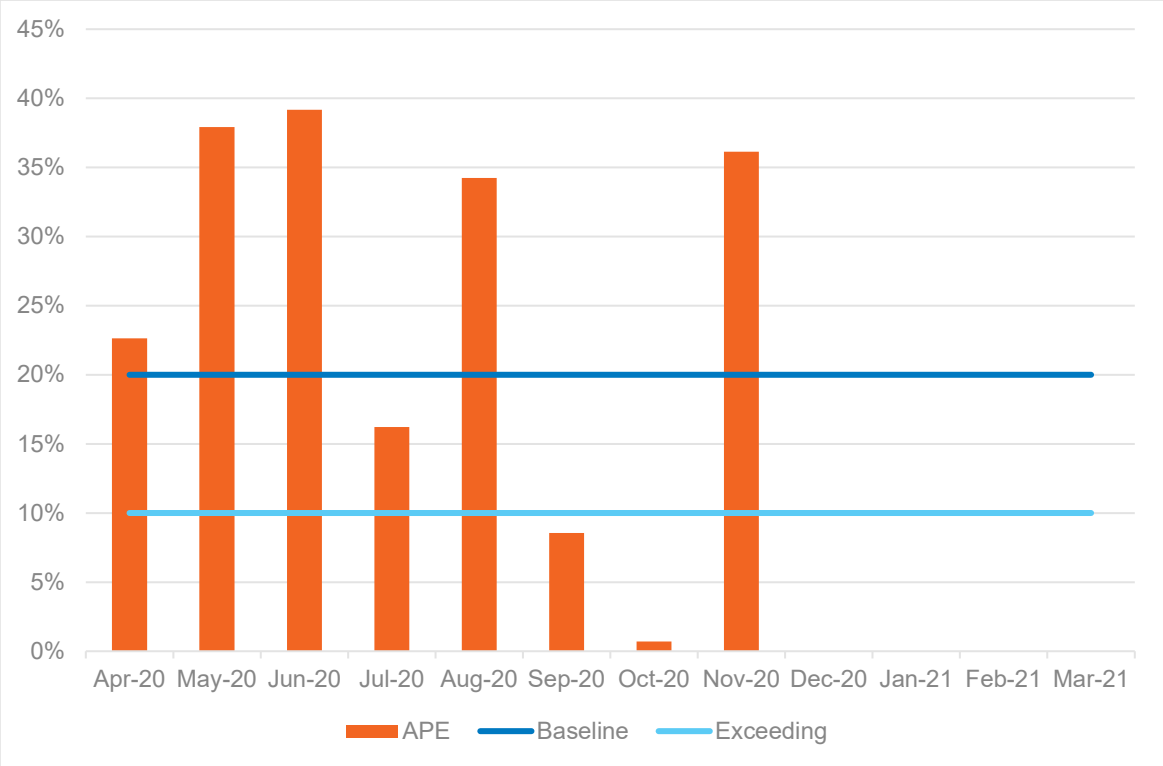

Figure 4: Monthly BSUoS forecasting performance

Supporting information

The outturn BSUoS for November was significantly higher than forecast. This was driven by both increased Balancing Costs and decreased demand. Balancing Costs were driven by constraint costs. These were largely incurred managing the B7 boundary with a capacity reduction of over 2GW coupled with high wind, outturning 19% higher than November 2019 after control room action. Demand outturned lower than forecast due to the November lockdown.

Our latest view of BSUoS can be found at the following link:
https://data.nationalgrideso.com/balancing/bsuos-monthly-forecast

Performance benchmarks

- **Exceeding expectations:** Less than 5 out of 12 monthly forecasts are above 20% Absolute Percentage Error, and 5 or more forecasts less than 10% Absolute Percentage Error
- **Meeting expectations:** Less than 5 out of 12 monthly forecasts are above 20% Absolute Percentage Error
- **Below expectations:** 5 or more out of 12 monthly forecasts above 20% Absolute Percentage Error

Notable events this month

C16 statements consultation and forum

We invited views for our annual review of changes to the five C16 licence condition statements in a consultation issued on Tuesday 17 November. This follows an industry forum on 10 November and is prior to the required formal consultation, allowing the ESO to do more fact finding and conduct a more efficient and thorough review.

We have proposed the following areas of focus for review this year: existing products such as Short Term Operating Reserve and Fast Reserve; new products such as Dynamic Containment; consideration of further products including Reserve Reform and a downward flexibility product similar to Optional Downward Flexibility Management; and a review of the reports and how they could be improved in the future.

A formal consultation is planned for January, with the revised statements, if approved by Ofgem, due to go live on 1 April 2021. Responses to the consultation closed on Monday 7 December.

Transmission Network Use of System (TNUoS) draft tariffs published

On Monday 30 November we published our draft tariffs for 2021-22 Transmission Network Use of System (TNUoS) charges[11].

As there are uncertainties with several ongoing charging methodology changes, such as the Targeted Charging Review (TCR), we have therefore also included a number of sensitivity scenario analyses to help the industry to understand the potential implications.

The impact of demand suppression due to COVID-19 has been incorporated in the demand charging bases for the draft tariffs.

The charging year 2021-22 will be in the new RIIO-2 price control period for onshore transmission owners (TOs). There are various parameters that are due to be revised at the start of each price control. We are reviewing these RIIO-2 related elements, which are to be finalised after Ofgem make their final decision.

Grid Code modification GC0144

Grid Code modification GC0144 (Alignment of Market Suspension Rights to the EU Emergency and Restoration Code Article 35.1(b)) was established at the request of Ofgem to provide greater transparency and clarity as to how Article 35.1(b) would be reflected in the GB Grid Code. This relates to the conditions under which the wholesale market in GB is suspended and how the Trans-European Replacement Reserve Exchange (TERRE) Market would also be suspended.

The initial issue was discussed between Ofgem and Elexon earlier in the year and after complex discussions, a proposal was put forward together with draft legal text which was presented to the Grid Code Review Panel who recommended it should proceed to a Workgroup.

The first workgroup was held on 4 November 2020 leading to the conclusion that the solution was well developed and should proceed to a Workgroup Consultation, this was issued on 7 December.

The speed and smoothness of the process has largely been down to developing a solution early with key stakeholders ahead of formation of the Workgroup. The Workgroup also worked well to develop an agreed solution once the original proposal had been developed.

Manually Activated Reserves Initiative (MARI) code modification

The latest version of the MARI despatch document has been shared to the MARI workgroup. The second draft of the document has been updated based upon internal and external feedback.

We have added a specific section for the Interconnectors, this was not included in the TERRE document. The additional sections create more of a reference document for the MARI product. We are hoping that by making it more inclusive this will allow us to offer greater transparency to wider industry and those who wish to participate in the MARI market.

We are also seeking feedback from industry stakeholders to advise if we need to further expand or include additional information as we develop the document.

[11] https://www.nationalgrideso.com/charging/transmission-network-use-system-tnuos-charges

Role 3 System insight, planning and network development

3A Right First Time connection offers

November 2020 Performance

This metric measures whether the ESO aspects of connection offers were correct the first time they were sent out to customers.

Connections Offers	Results
Year to date number of connections offers	208
Year to date ESO related reoffers	10
Year to date percentage of Right First Time connections offers determined from ESO related reoffers	95%

Table 9: Connections re-offers data

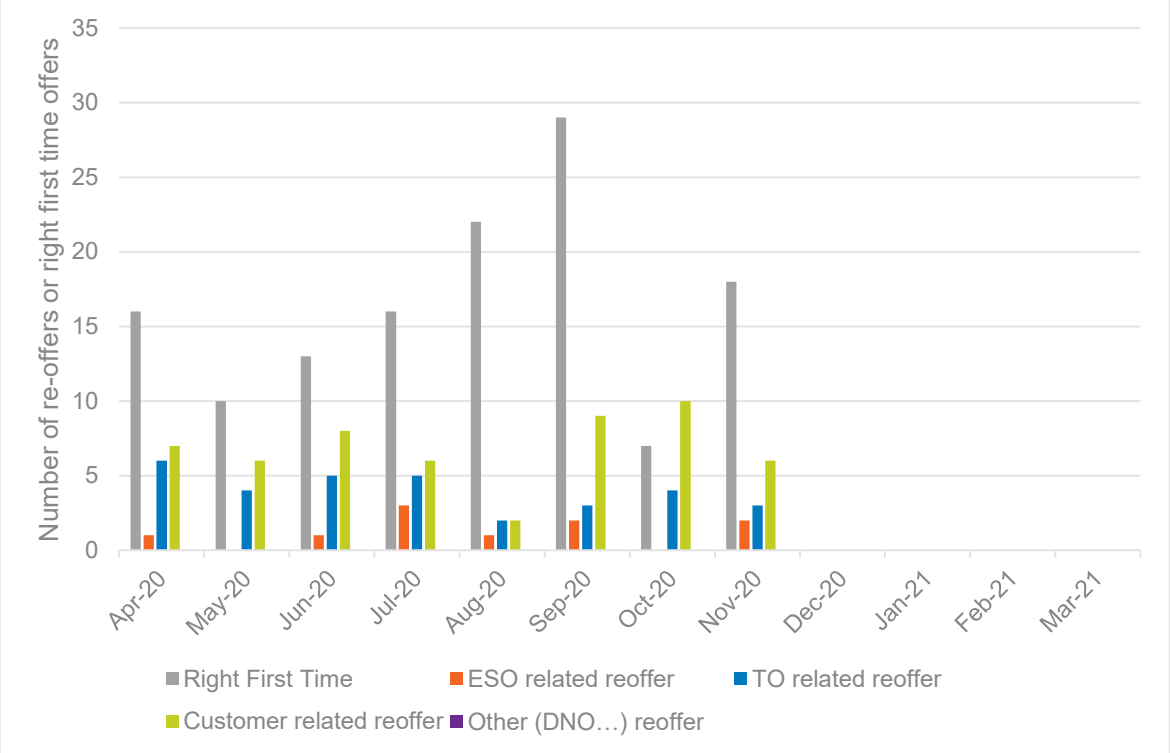

Figure 5: Connections offers monthly performance

Supporting information

We saw 24 offers returned in November, seven of which were subject to a re-offer. There were two recorded ESO related re-offers on contracts signed in this period which means that we are still meeting our target at 95% Right First Time.

- A customer had requested the connection date be pushed out to April 2024. We also needed to update the One-Off charges as they were incorrect in the original offer.
- At a customer request, we revised MM 1,2,3 statements (Attributable Works) to include Firm and Non-Firm changes reflected throughout contract documents. Attributable Works contains a list of attributable schemes, a subset of works in Appendix H.

Customers must secure against these works. Appendix MM also shows the Local Asset Reuse Factor (LARF) and the Strategic Investment Factor (SIF) for each attributable scheme. Typographical errors were corrected at the same time.

Performance benchmarks

- **Exceeding expectations:** 100% of connection offers Right First Time (excluding those where the error was not due to the ESO)
- **Meeting expectations:** 95-99.9% of connection offers Right First Time (excluding those where the error was not due to the ESO)
- **Below expectations:** Less than 95% of connection offers Right First Time (excluding those where the error was not due to the ESO)

Notable events this month

Electricity Ten Year Statement (ETYS) publication

On Monday 30 November we published our Electricity Ten Year Statement (ETYS)[12]. This is an annual publication in which we share our latest assessment of the future requirements of Great Britain's electricity transmission system. It highlights areas where there are uncertain future power flows and network reinforcements are needed. This creates opportunities for other industry participants to get involved by proposing innovative ideas and solutions that help us to further develop the electricity transmission system.

This year we have taken a new approach to the ETYS and have published the analysis in a series of interactive webpages.

N-3 intertripping goes live with UKPN

Our N-3 intertripping Regional Development Programme (RDP) project with UKPN and NGET went live in the ESO control room on 20 November.

This project allows us to access the DNO's control systems providing us with greater visibility and control of Distributed Energy Resource (DER) on the UKPN networks. This will free up capacity on the transmission system allowing up to 600MW of new DER to connect on the south coast. Similar works are due to commission in 2021 with WPD and SSE-N.

FES 2020 costing report publication and webinar

On Monday 30 November we held a webinar to share our findings from our FES 2020 costing report[13]. The 2020 Future Energy Scenarios (FES)[14] were published in July this year and we have committed to costing the scenarios in response to feedback from stakeholders. The aim of the costing project was to cost the FES 2020 scenarios for the energy sector, providing a comparison across the four scenarios.

Our costing work supports the key messages from our FES 2020 report showing that the key messages in July not only were technologically sound but are also economically sound. The overall cost is broadly similar across the scenarios, and costs are kept lower when consumers are engaged, energy efficiency is pursued, and we have negative emissions in the energy sector.

This report sets out the results of this costing work in different sectors, the scope of what is included and excluded and the key sensitivities that have impacted the analysis. We have also published a data workbook alongside this report with full detail of the data behind it, in order to be fully transparent.

[12] https://www.nationalgrideso.com/research-publications/etys-2020
[13] https://www.nationalgrideso.com/future-energy/future-energy-scenarios
[14] https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents

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