ESO RIIO2 Business Plan 2 (2023-25)

October 2023-24 Incentives Report

23 November 2023

Contents

Introduction

As part of the RIIO-2 price control, we submitted a second Business Plan to Ofgem in August 2022. It sets out our proposed activities, deliverables, and investments for years three and four of RIIO-2 (2023-2025) as we respond to the rapidly changing external environment.

The ESO's Delivery Schedule sets out in more detail what the ESO will deliver, along with associated milestones and outputs, for the "Business Plan 2" period.

Ofgem, as part of its Final Determinations for the RIIO-2 price control, set out that the ESO would be subject to an evaluative incentive framework, assessing our performance in delivering the Business Plan.

The updated ESO Reporting and Incentives (ESORI) guidance sets out the process and criteria for assessing the performance of the ESO, and the reporting requirements which form part of the incentive scheme for the BP2 period. Every month, we report on a set of monthly performance measures; Performance Metrics (which have benchmarks) and Regularly Reported Evidence items (which do not have benchmarks). This report is published on the 17th working day of each month, covering the preceding month.

Every quarter, we report on a larger set of performance measures, and also provide an update on our progress against our Delivery Schedule in the RIIO-2 deliverables tracker. Our six-month and eighteen-month reports will broadly be similar to our usual quarterly report.

Our mid-scheme and end of scheme reports will be more detailed, covering all of the criteria used to assess our performance.

Following our Business Plan 2 (BP2) submission, Ofgem outlined the requirement for a Cost Monitoring Framework (CMF). The objective of the CMF is to provide visibility of our BP2 Digital, Data and Technology (DD&T) delivery progress and cost management, and the value being delivered across the BP2 DD&T investment portfolio. As per the ESORI guidance, we are required to provide quarterly reports directly to Ofgem as part of the CMF. We feel it is important to share updates with our external stakeholders and industry as part of the framework. So, we'll be including a summary of the CMF update every six months alongside our incentives reporting.

Please see our website for more information.

Summary of Notable Events

In October we successfully delivered the following notable events and publications. We provide further detail on each of these under the role sections:

- On 16 October, we welcomed over 75 stakeholders from across the energy industry to our 'Enhancing Energy Storage in the Balancing Mechanism' event where we outlined our plan to enhance the use of storage assets in our balancing activities and the timelines to achieve this.
- On 9 October 2023, we published a report that details the methodology, results, and findings from the Distributed Restart Redhouse live trial, undertaken in June 2023. This world-first live trial, used distributed energy resources to build, maintain and optimise power islands isolated from the main grid, with a view to driving down the time it would take to restore the network following the extremely unlikely event of total shutdown of Great Britain's electricity grid.
- On 27 October, Ofgem granted approval for our Demand Flexibility Service (DFS) which has been available from 30 October 2023. DFS incentivises households with smart meters, as well as industrial and commercial users, to voluntarily flex the time they use their electricity to help manage the system this winter during periods where margins are tightest.
- On 12 and 17 October, we hosted our annual Revenue and Charging Forum. This was an in-person and online event to provide an introduction to our various charges; how they're forecast, calculated, billed, and imminent industry modifications that will impact them.
- The Enduring Auction Capability (EAC) platform launched on the 19 October, with the platform becoming open for bid submissions. The EAC is a RIIO-2 deliverable, designed to deliver co-optimised procurement for our day-ahead frequency response and reserve products. The EAC platform enables us to procure Dynamic Containment, Dynamic Regulation, and Dynamic Moderation response services.
- On 9 October the ESO Connections team held their biggest event to date 'ESO Connections Seminar 2023' with nearly 300 customers attending the seminar in person, in London. From feedback responses received the average satisfaction rating was 8.45, with 91% saying the day met their expectations in terms of format and content. 166 attendees participated in slido online polls and Q&A.
- In October, we reported the success of completing the Contracts for Difference (CfD) Allocation Round 5. Since then, we conducted a customer satisfaction survey with the CfD AR5 participants to gather feedback for our continuous improvement. Customers gave us an overall 8.64/10, a record high score and a significant increase from last year's 8.1.

Summary of Metrics and RREs

The tables below summarise our Metrics and Regularly Reported Evidence (RRE) for October 2023.

Metric/RRE		Performance	Status
Metric 1A	**Balancing Costs**	£332m vs benchmark of £258m	●
Metric 1B	**Demand Forecasting**	Forecasting error of 604MW vs indicative benchmark of 554MW	●
Metric 1C	**Wind Generation Forecasting**	Forecasting error of 6.48% vs indicative benchmark of 5.15%	●
Metric 1D	**Short Notice Changes to Planned Outages**	0 delays or cancellations per 1000 outages due to an ESO process failure (vs benchmark of 1 to 2.5).	●
RRE 1E	**Transparency of Operational Decision Making**	92.3% of actions taken in merit order	N/A
RRE 1G	**Carbon intensity of ESO actions**	9.9gCO_2/kWh of actions taken by the ESO	N/A
RRE 1I	**Security of Supply**	0 instances where frequency was more than ±0.3Hz away from 50Hz for more than 60 seconds. 0 voltage excursions	N/A
RRE 1J	**CNI Outages**	1 planned and 0 unplanned system outages	N/A
RRE 2E	**Accuracy of Forecasts for Charge Setting**	Month ahead BSUoS forecasting accuracy (absolute percentage error) of 36.0%	N/A

Below expectations ● **Meeting expectations** ● **Exceeding expectations** ●

We welcome feedback on our performance reporting to box.soincentives.electricity@nationalgrideso.com

Adelle Wainwright

Acting ESO Regulation Senior Manager

Role 1 (Control Centre operations)

ESO

Metric 1A Balancing cost management

This metric measures the ESO's outturn balancing costs (including Electricity System Restoration costs) against a balancing cost benchmark.

A new benchmark has been introduced for BP2. Analysis has shown that the two most significant measurable external drivers of balancing costs are wholesale price and outturn wind generation. The new benchmark has been derived using the historical relationships between those two drivers and balancing costs:

i. The benchmark was created using monthly data from the preceding 3 years.

ii. A straight-line relationship has been established between historic constraint costs, outturn wind generation and the historic wholesale day ahead price of electricity.

iii. A straight-line relationship established between historic non-constraint costs and the historic wholesale day ahead price of electricity.

iv. Ex-post actual data inputted into the equation created by the historic relationships to create the monthly benchmarks.

The formulas used are as follows (with Day Ahead Baseload being the measure of wholesale price):

Non-constraint costs = 54.48 + (Day Ahead baseload x 0.52)
Constraint costs = -32.66 + (Day Ahead baseload x 0.34) + (Outturn wind x 25.72)

Benchmark (Total) = 21.82 + (Day Ahead baseload x 0.86) + (Outturn wind x 25.72)

**Constants in the formulas above are derived from the benchmark model*

ESO Operational Transparency Forum: The ESO hosts a weekly forum that provides additional transparency on operational actions taken in previous weeks. It also gives industry the opportunity to ask questions to our National Control panel. Details of how to sign up and recordings of previous meetings are available here.

October 2023-24 performance

Figure 1: 2023-24 Monthly balancing cost outturn versus benchmark

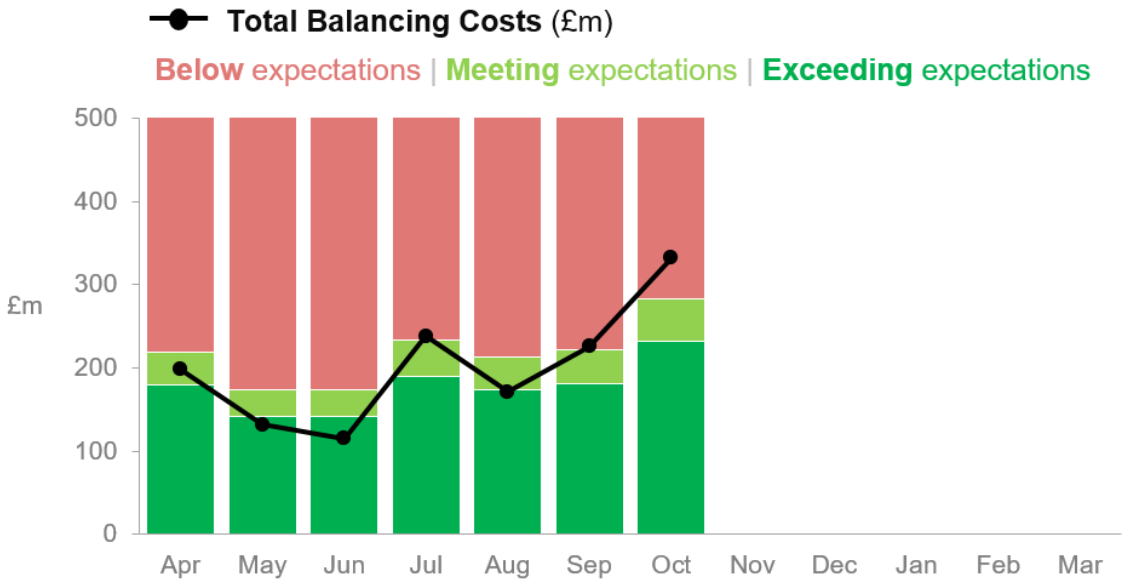


Table 1: 2023-24 Monthly breakdown of balancing cost benchmark and outturn

All costs in £m	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	YTD
Outturn wind (TWh)	3.4	2.6	2.4	4.6	3.8	4.2	6.2						27.18
Average Day Ahead Baseload (£/MWh)	105	81	87	82	86	83	89						n/a
Benchmark	200	157	158	212	194	201	258						1379
Outturn balancing costs[1]	**198**	**132**	**115**	**238**	**171**	**226**	**332**						**1413**
Status	●	●	●	●	●	●	●						●

Previous months' outturn balancing costs are updated every month with reconciled values. Figures are rounded to the nearest whole number, except outturn wind which is rounded to one decimal place.

Performance benchmarks:

- ● **Exceeding expectations:** 10% lower than the annual balancing cost benchmark
- ● **Meeting expectations:** within ±10% of the annual balancing cost benchmark
- ● **Below expectations:** 10% higher than the annual balancing cost benchmark

Supporting information

Ongoing data issue:

Please note that due to a data issue, over the previous months the Minor Components line in Non-Constraint Costs is capturing some costs which should be attributed to different categories. It has been identified that a significant portion of these costs should be allocated to the Operating Reserve Category. Although the categorisation of costs is not correct, we are confident that the total costs are correct in all months.

We continue to investigate and will advise when we have a resolution.

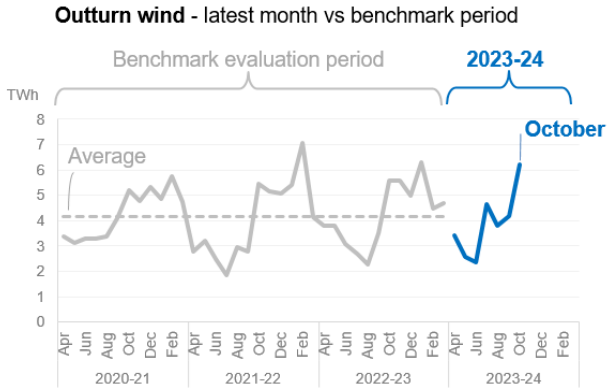
This month's benchmark

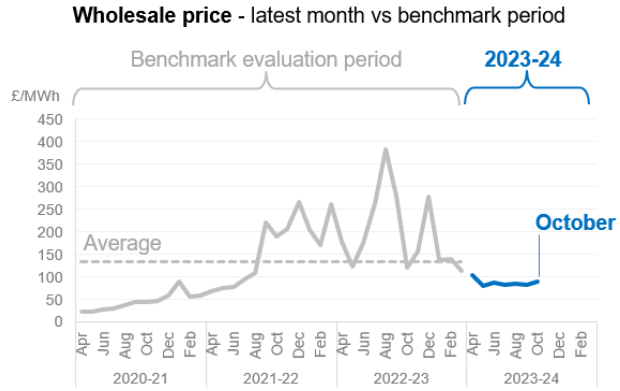
As noted in the introduction to this section, a new benchmark was introduced for BP2. The benchmark is derived using the historical relationships between two drivers (wholesale price and outturn wind generation) and balancing costs.

The October benchmark of £258m is the highest so far in 2023-24, and this reflects:

- an **outturn wind** figure that is very high compared to the benchmark evaluation period (the last three years). Only one month in the benchmark period (February 2022) had a higher outturn wind figure than this month.
- a relatively low average monthly **wholesale price** (Day Ahead Baseload) compared to the benchmark evaluation period (the last three years).

[1] Outturn balancing costs excludes Winter Contingency costs for comparison to the benchmark as agreed with Ofgem. However, in the rest of this section we continue to include those costs for transparency and analysis purposes.





October performance

October's total balancing costs were £332m which is £74m (29%) above the benchmark of £258m, and therefore performance is below expectations. As you can see from the above graphs, although the average wholesale price had a slight increase, the wind outturn had a much more significant increase compared with last month. Storm Babet brought very difficult system conditions with high wind curtailment volumes shown in the 'Wind Curtailment, Daily Costs' section further below. This is one of the contributing factors to an increase in balancing cost actuals of £105.3m between September and October.

Balancing Costs variance (£m): October 2023 vs September 2023

		(a) Sep-23	(b) Oct-23	(b) - (a) Variance	decrease ◄► increase Variance chart
Non-Constraint Costs	Energy Imbalance	8.1	21.7	13.6	
	Operating Reserve	11.5	20.0	8.4	
	STOR	3.1	3.6	0.4	
	Negative Reserve	0.5	1.2	0.7	
	Fast Reserve	13.9	16.8	2.9	
	Response	17.7	21.0	3.4	
	Other Reserve	0.9	1.6	0.7	
	Reactive	14.2	14.7	0.5	
	Restoration	2.8	7.5	4.7	
	Winter Contingency	0.0	0.0	0.0	
	Minor Components	6.2	12.4	6.2	
Constraint Costs	Constraints - E&W	47.7	42.0	(5.7)	
	Constraints - Cheviot	0.7	1.5	0.8	
	Constraints - Scotland	53.7	112.7	58.9	
	Constraints - Ancillary	1.2	0.2	(1.0)	
	ROCOF	8.9	10.4	1.5	
	Constraints Sterilised HR	35.3	44.6	9.3	
Totals	Non-Constraint Costs - TOTAL	78.9	120.4	41.5	
	Constraint Costs - TOTAL	147.5	211.4	63.9	
	Total Balancing Costs	**226.4**	**331.8**	**105.3**	

Breakdown of costs vs previous month

As shown in the total rows from the table above, both non-constraint & constraint costs increased by £41.5m & £63.9m respectively, resulting in an overall increase of £105.3m compared to September 2023.

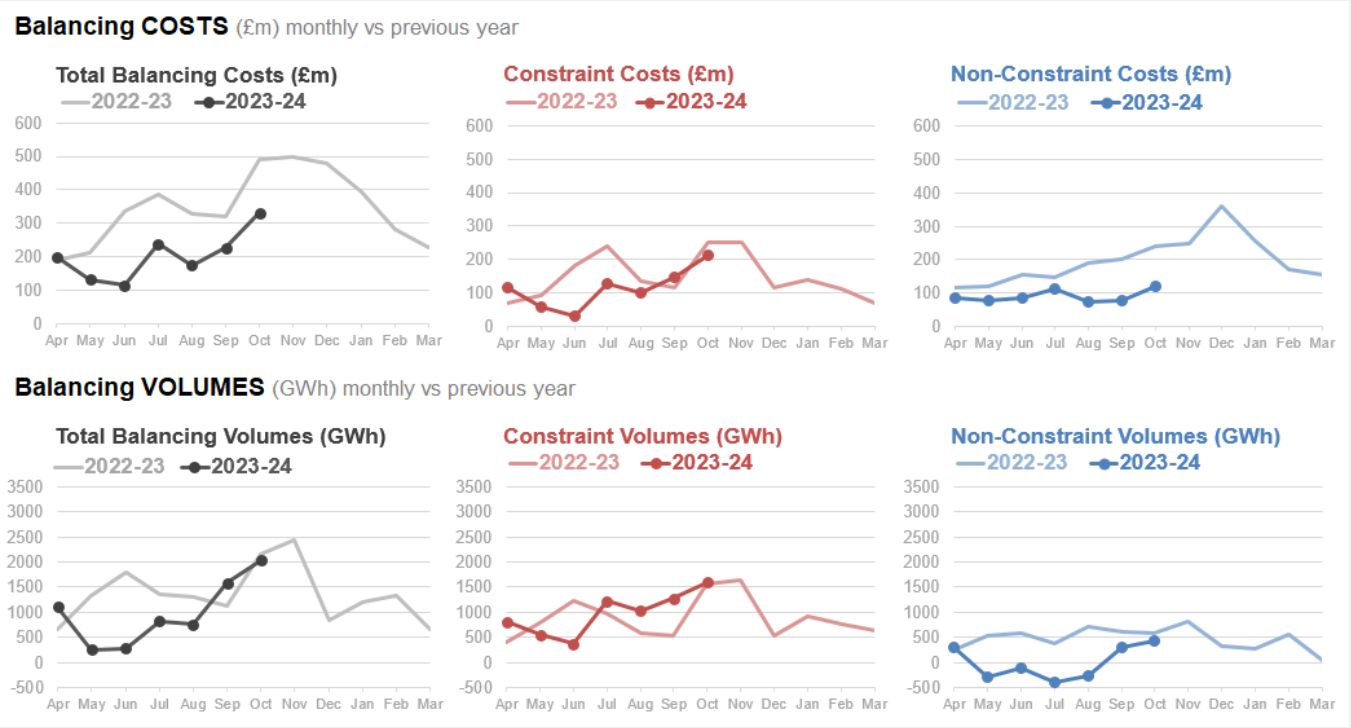
Constraint costs: The main driver of the variances this month are detailed below:

- **Constraint-Scotland & Cheviot**: £59.7m increase, around 300GWh more than the previous month as high wind generation resulted in a higher volume of constraint actions.
- **Constraints Sterilised Headroom**: £9.3m increase. Cost increase is in line with the increasing of constraint actions because more headroom had to be replaced using Balancing Mechanism (BM) outside the constraint.

Non-constraint costs: The main driver of the biggest difference this month is:

- **Energy Imbalance**: £13.6m increase, due to 117GWh more from the absolute amount of energy required to balance the system this month compared to the previous month.
- **Operating Reserve**: £8.4m increase due to ~133GWh more reserve required to secure the system.

Constraint vs non-constraint costs and volumes



Please note that a portion of the **Minor Components** spend contributing to non-constraint cost and volume is mainly Operating Reserve cost and volume. The narrative below discusses the broad themes of spend. The figures will be revised once the data issue is resolved.

Constraint costs

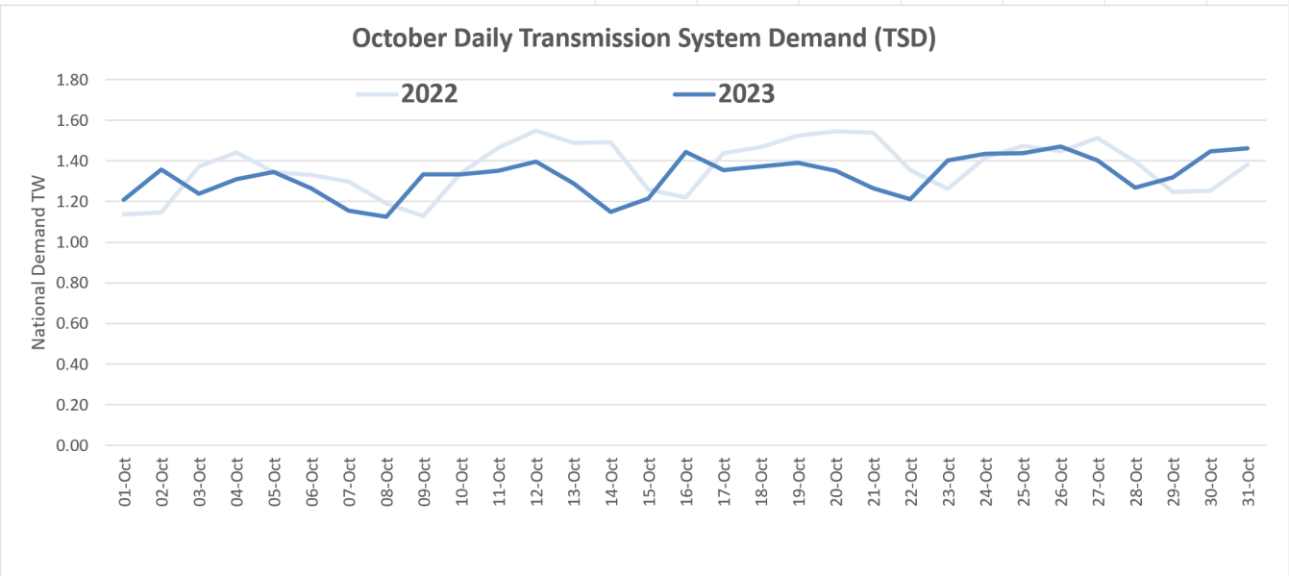
Compared with the same month of the previous year:	Constraint costs were £41.5m lower than in October 2022, despite the fact of higher volume of actions (36 GWh more) due to: • Lower average wholesale prices
Compared with last month:	Constraint costs were £63.9m higher than in September 2023 due to: • an increase in volume of actions - more than 324GWh were required to manage constraints

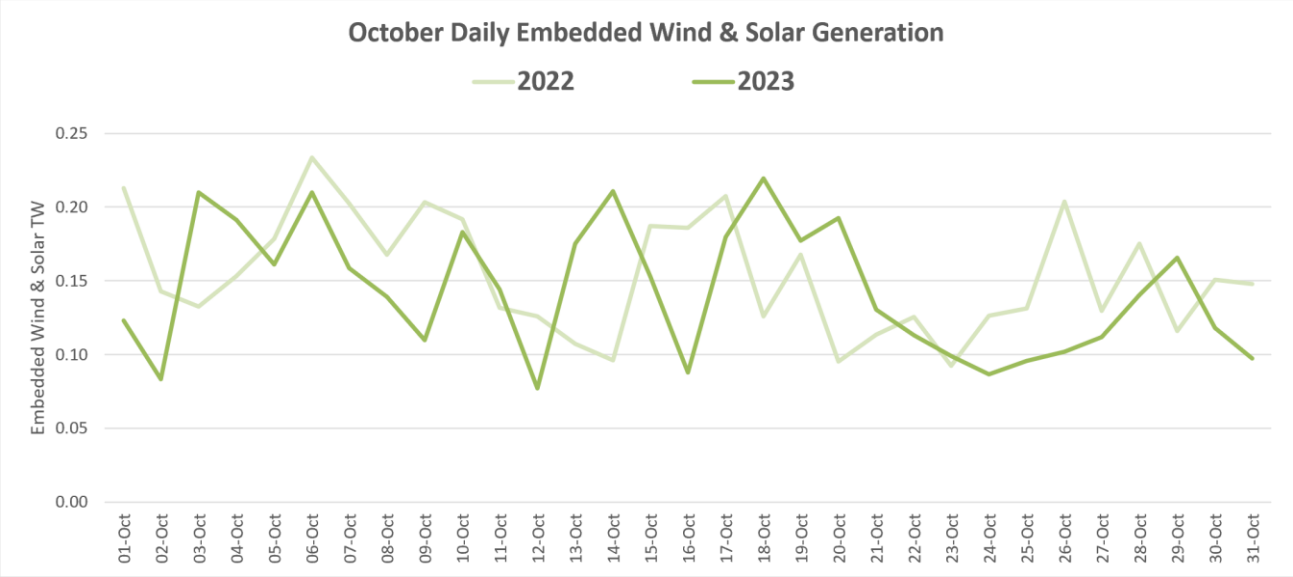
Non-constraint costs

Compared with the same month of the previous year:	Non-Constraint costs were £118.5m lower than in October 2022 due to: • Lower average wholesale prices* * Average wholesale price for October-23 is £89/MWh compared to £120/MWh for September-22.
Compared with last month:	Non-Constraint costs were £41.7m higher than in September 2023 due to: • 126 GWh higher** volume of actions ** The Non-Constraint category consists of several subcategories including imbalance, response, reserve and restoration.

October daily Transmission System Demand (TSD*), Embedded Wind and Solar Generation

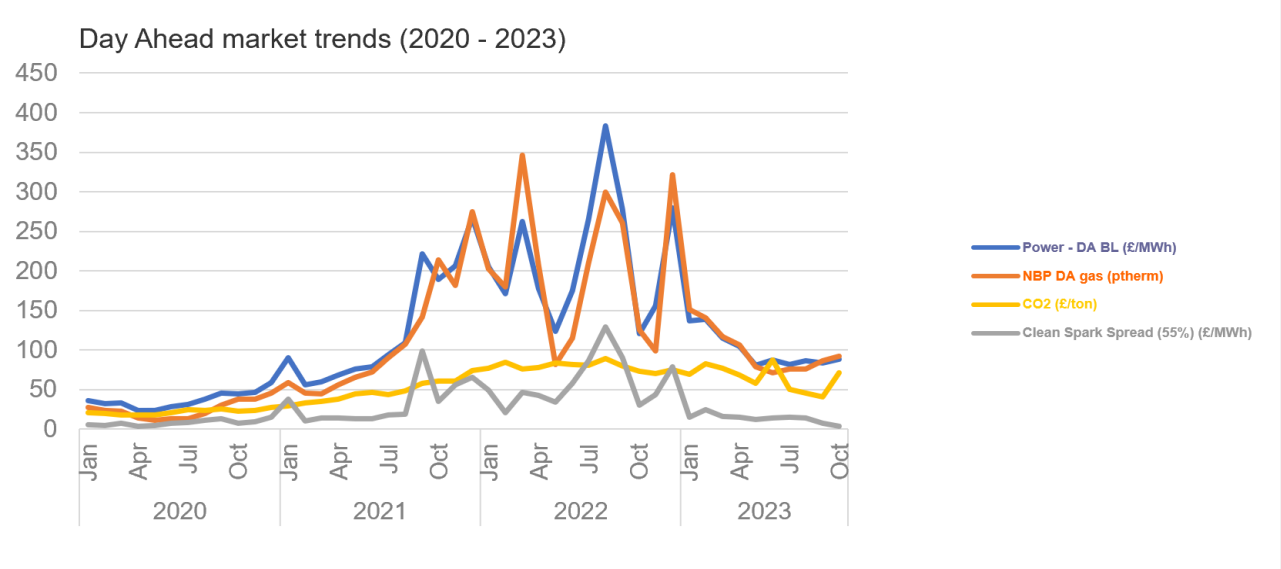
- **National Demand** (not shown below) was 1.2TW higher than the same period last year
- **Transmission System Demand*** was 1.36TW lower than October 2022.
- **Embedded wind & solar generation** was 310GW lower than the corresponding period last year.





* Transmission System Demand is equal to the National Demand (ND) plus the additional generation required to meet station load, pump storage pumping and interconnector exports. Transmission System Demand is calculated using National Grid ESO operational metering. Note that the Transmission System Demand includes an estimate of station load of 500MW in BST (British Summer Time) and 600MW in GMT (Greenwich Mean Time).

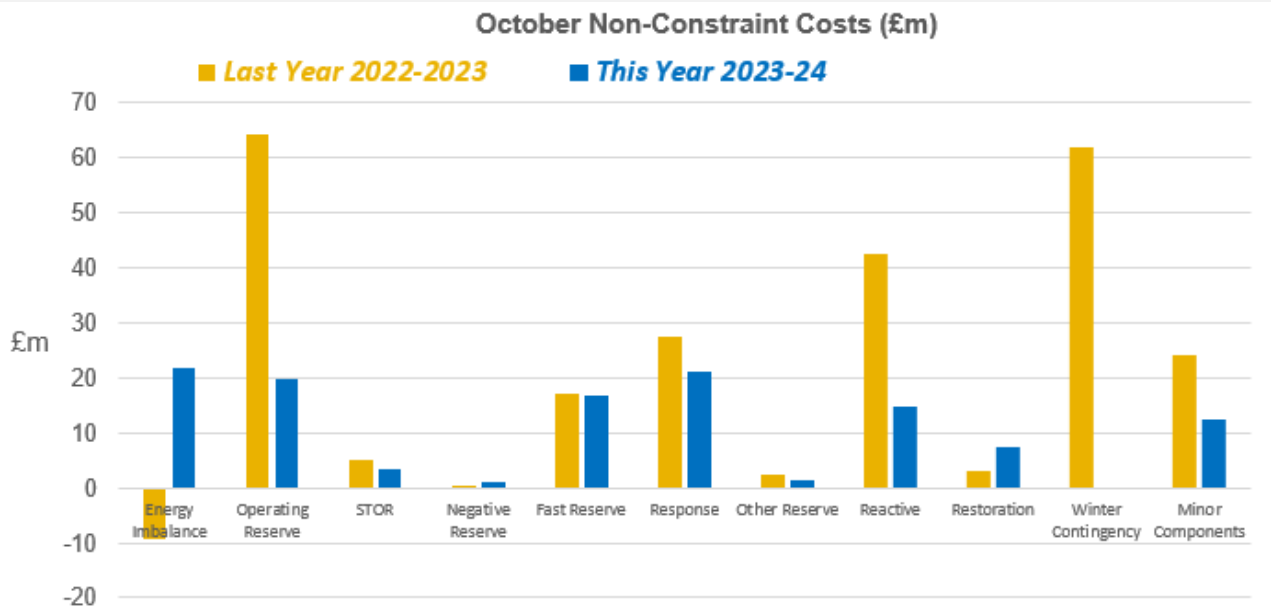
Changes in energy balancing costs



DA BL: Day Ahead Baseload **NBP DA:** National Balancing Point Day Ahead

Most of the trends had a small deviation from last month and remain lower compared to the previous year.

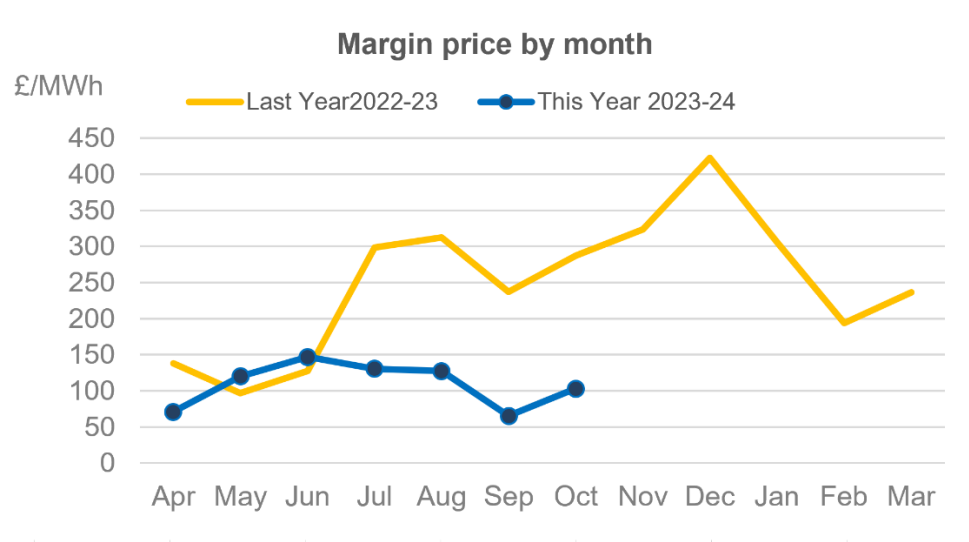
The CO2 had a significant increase as £71/t compared to the previous month (£41/t) and catching up with last year's average (£79/t).



Comparing the non-constraint costs of October 2023 with those of October 2022, most categories showed a decrease:

- **Operating Reserve** £44.2m decrease due to ~100GWh less volume of actions taken to balance the system and the lower average wholesale prices.
- **Reactive** £27.7m decrease despite the higher volume of MVAR required this October, due to a significant drop in the weighted average price (less than the half).
- **Response** decreased by £6.6m, due to lower average wholesale prices and a ~20GWh decrease in the absolute volume of actions.
- **Minor Components** decreased by £11.8m. Last year's excessive cost contained incorrectly allocated cost from operating reserve that we have identified in the last end of the year report.

Drivers for unexpected cost increases/decreases



Margin prices (the amount paid for one MWh) have increased compared to September 2023, but it is lower than the corresponding period of the previous year.

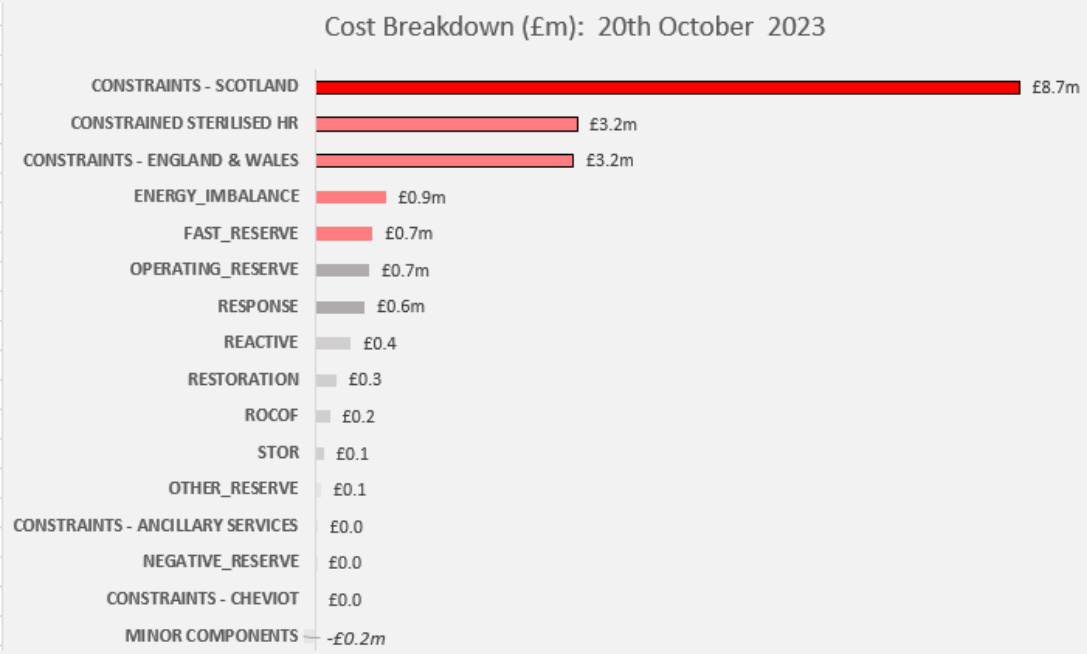
Daily Costs Trends

As stated above, October's balancing costs were £105.3m higher than the previous month.

At the date of publication, we have recorded 9 days with a spend of more than £15m (maximum £18.8m).

The highest total cost observed on the Friday 20 October when the total spend was £18.8m, the major cost components were the thermal constraints driven by high renewable generation. No individual action was expensive, but high volumes of wind curtailment resulted in high total balancing costs.

Cost breakdown for 20 October 2023



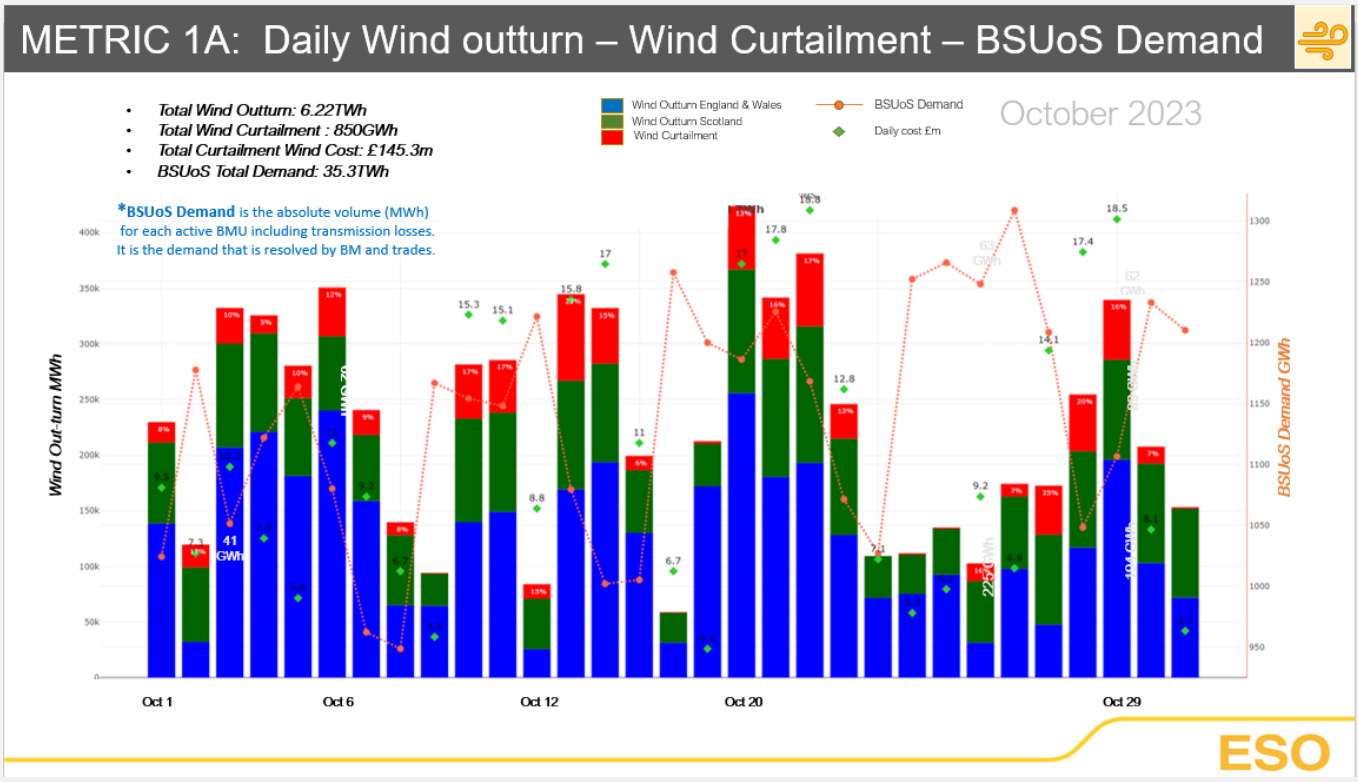
A minimum daily cost of £4.1m was observed on 17 October.

The average daily spend for the month was £10.7m, a £3.2m increase from the previous month.

October Daily Wind Outturn – Wind Curtailment, Daily Costs and BSUoS Demand

The chart below serves the purpose of supporting the transparency and the narrative above. It is the daily "tour" of wind performance (wind generation: **blue** & **green** bars, and wind curtailment: **red** bars), demand (resolved by the balancing mechanism and trades – **orange** dotted line) and daily cost (**green** diamonds).

With this graph one can trace for example the relationship that may exist in how wind performance and low demand affect the cost of each day.



High-cost days and balancing cost trends are discussed every week at the Operational Transparency Forum to give ongoing visibility of the operability challenges and the associated ESO control room action.

Metric 1B Demand forecasting accuracy

This metric measures the average absolute MW error between day-ahead forecast demand (taken from Balancing Mechanism Report Service (BMRS[2]) as the National Demand Forecast published between 09:00 and 10:00) and outturn demand (taken from BMRS as the Initial National Demand Outturn) for each half hour period. The benchmarks are drawn from analysis of historical errors for the five years preceding the performance year.

A 5% improvement in historical 5-year average performance is required to exceed expectations, whilst coming within ±5% of that value is required to meet expectations.

In settlement periods where Optional Downward Flexibility Management (ODFM) and/or Demand Flexibility Service (DFS) are instructed by the ESO, this will be retrospectively accounted for in the data used to calculate performance. The ESO shall publish the volume of instructed ODFM to enable this to be done.

Performance will be assessed against the annual benchmark, but monthly benchmarks are also provided as a guide. The ESO will report against these each month to provide transparency of its performance through the year.

October 2023-24 performance

Indicative benchmark figures for 2023-24: Please note that the benchmark figures used below are indicative only. We have calculated these in line with the method specified by Ofgem, but we have not yet received the confirmed figures from Ofgem. We will update previous performance figures in subsequent reports once the benchmarks have been finalised.

Figure 2: 2023-24 Monthly absolute MW error vs Indicative Benchmark

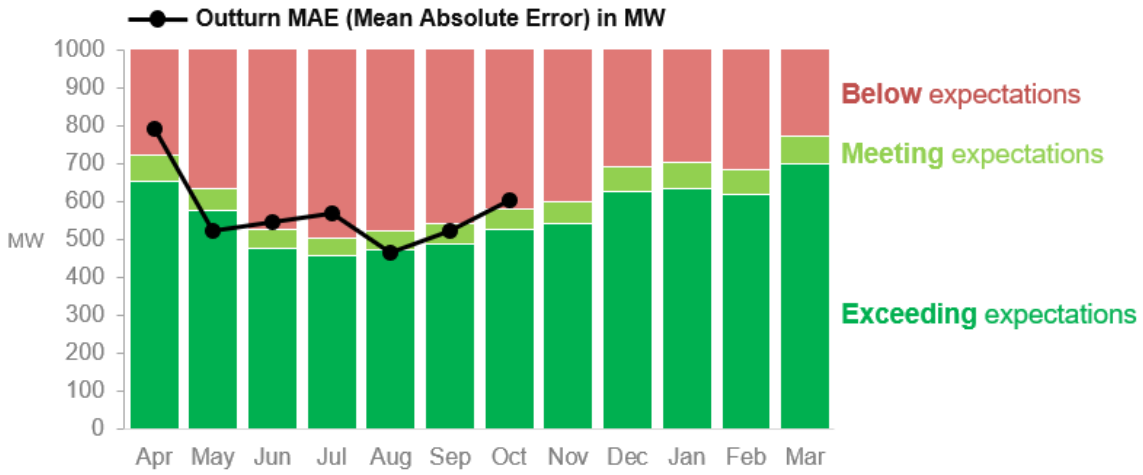


Table 2: 2023-24 Monthly absolute MW error vs Indicative Benchmark

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Indicative benchmark (MW)	687	606	503	481	497	516	554	571	659	669	651	738
Absolute error (MW)	**791**	**523**	**546**	**569**	**465**	**523**	**604**					
Status	●	●	●	●	●	●	●					

[2] Demand | BMRS (bmreports.com)

Performance benchmarks:

- **Exceeding expectations:** >5% lower than 95% of average value for previous 5 years
- **Meeting expectations:** ±5% window around 95% of average value for previous 5 years
- **Below expectations:** >5% higher than 95% of average value for previous 5 years

Supporting information

In October 2023, the mean absolute error (MAE) of our day ahead demand forecast was 604 MW which is more than 5% higher than the 'meeting expectations' benchmark of 554 MW, and therefore below expectations.

October brought a mixture of weathers – particularly warm and sunny weather early in the month, mixed with cold and wet weather later in the month. Solar errors contributed to the two largest error days in the first half of the month (8th, 9th), both reaching a peak of 2.1GW error. Embedded Wind errors related to storm *Babet* brought the two largest error days in the second half of Oct (18th, 20th), reaching a peak of 2.3GW error.

According to the Met Office:
"…a particularly warm and sunny spell of weather from 6th to 10th. Temperatures reached the low 20s °C widely across England and Wales with 25°C in the south-east on 7th, 8th, 9th and 10th, more than 8°C above average for the time of year"

This unusual solar activity caused errors in our embedded solar generation models, which affected the national demand forecasts.

"The second half of the month was unsettled and very wet at times. Widespread, prolonged and heavy rainfall from storm Babet from 18th to 21st caused brought serious flooding problems to many areas, with eastern Scotland worst affected. This, together with some very strong winds, brought atrocious weather conditions"

Storm Babet affected the demand profile through both changes to human behaviour (e.g. due to temperature, rain) and our embedded wind forecasts.

October also included clock change, which always brings a short period of forecasting uncertainty; until sufficient insights and history on the new models has been observed.

The distribution of settlement periods by error size is summarised in the table below:

Error greater than	Number of SPs	% out of the SPs in the month (1490)
1000 MW	288	19%
1500 MW	108	7%
2000 MW	32	2%
2500 MW	3	0%

The days with largest MAE were Oct 8, 9, 14, 18, 20.

Missed / late publications

There were 0 occasions of missed or late publications in October.

Triads

Triads only take place between November and February and therefore did not impact on forecasting performance during Q2.

Metric 1C Wind forecasting accuracy

This metric measures the average absolute percentage error (APE) between day-ahead forecast (between 09:00 and 10:00, as published on ESO Data Portal here) and outturn wind generation (settlement metering as calculated by Elexon) for each half hour period as a percentage of capacity for BM wind units only. The data will only be taken for sites that did not have a bid-offer acceptance (BOA) during the relevant settlement period.

We will publish this data on our Data Portal for transparency purposes. The benchmarks are drawn from analysis of historical errors of the five years preceding the performance year. 5% improvement in performance expected on the 5-year historical average, with range of ±5% used to set benchmark for meeting expectations.

October 2023-24 performance

Indicative benchmark figures for 2023-24: Please note that the benchmark figures used below are indicative only. We have calculated these in line with the method specified by Ofgem, but we have not yet received the confirmed figures from Ofgem. We will update previous performance figures in subsequent reports once the benchmarks have been finalised.

Figure 3: 2023-24 BMU Wind Generation Forecast APE vs Indicative Benchmark

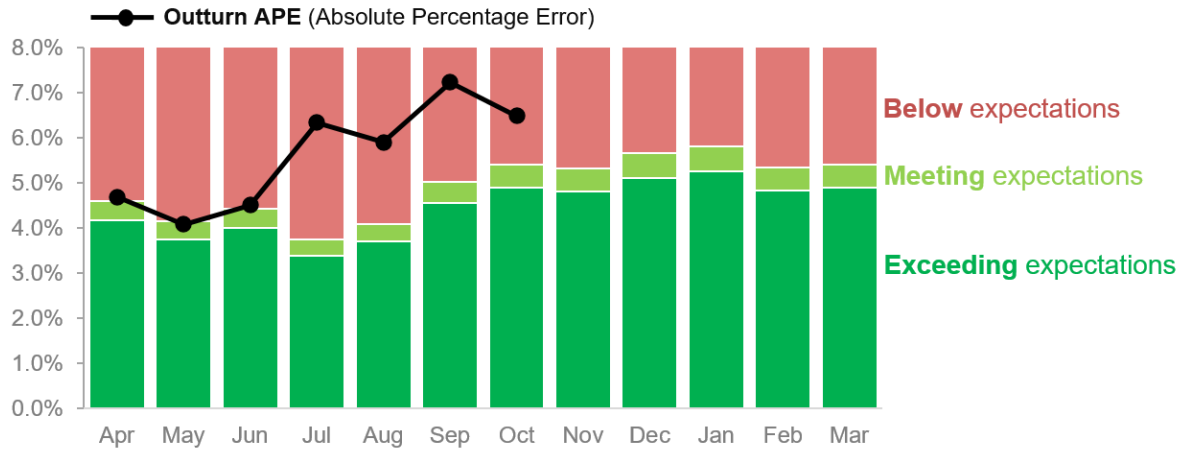


Table 3: 2023-24 BMU Wind Generation Forecast APE vs Indicative Benchmarks

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Indicative benchmark (%)	4.38	3.95	4.21	3.57	3.89	4.79	5.15	5.06	5.38	5.53	5.08	5.14
APE (%)	**4.69**	**4.08**	**4.50**	**6.34**	**5.90**	**7.23**	**6.48**					
Status	●	●	●	●	●	●	●					

Performance benchmarks:

- ● **Exceeding expectations:** < 5% lower than 95% of average value for previous 5 years
- ● **Meeting expectations:** ±5% window around 95% of average value for previous 5 years
- ● **Below expectations:** > 5% higher than 95% of average value for previous 5 years.

Supporting information

For the month of October the wind power forecast accuracy achieved was 6.48% with a target of 5.15%. The recent trend of poor performance has unfortunately continued and the monthly target was missed and therefore below expectations.

October 2023 had very unsettled weather and heavy rainfall, yet this month's performance was largely attributed to just three (1, 11 & 20) poor days and a day (16) credited to false Settlement Metering data on a single windfarm .i.e. beyond the control of ESO. Note: October 16 is the first evidence we have seen of Settlement data flaws which may mean we need to retrospectively rerun the monthly calculations, possibly dating back to April 2023, to capture all Settlement data corrections.

Storm Babet passed through between the 18 and 21 October, with some places receiving a month's worth of rain in 48 hours and windspeeds exceeding 32m/s. Large errors on 20 (6GW peak error) were mainly associated with cut-off (AKA High Speed Shutdown) and the track of the storm itself.

Other unsettled weather conditions occurred on the 11 and 16 of October that caused errors in excess of 10%.

Wind farms with CFD contractual arrangements switch off for commercial reasons while prices are negative for 6 hours or more. In October negative prices happened on these occasions.

- October 13/14 – for 7 consecutive hours
- October 29 – for 8 consecutive hours

We have made significant changes to the entire wind portfolio models, which will be rolled into production in early November. Moving forward, we will significantly improve cut-off modelling and the additional processing of outage-related data. Wind conditions to trigger windfarm cut-offs are rare and are usually associated with *named* storms, but they can have substantial effects on the daily error for that given day.

The electricity price used for this analysis is the Intermittent Market Reference Price. Market Price Data can be downloaded from here. https://www.emrsettlement.co.uk/settlement-data/settlement-data-roles/

Withdrawal of wind units

No units withdrew availability between time of forecast and time of metering.

Missed / late publications

In October there were no occasions of late or missing publications of the forecast.

Metric 1D Short Notice Changes to Planned Outages

This metric measures the number of short notice outages delayed by > 1 hour or cancelled, per 1000 outages, due to ESO process failure.

October 2023-24 performance

Figure 4: 2023/24 Number of outages delayed by > 1 hour, or cancelled, per 1000 outages

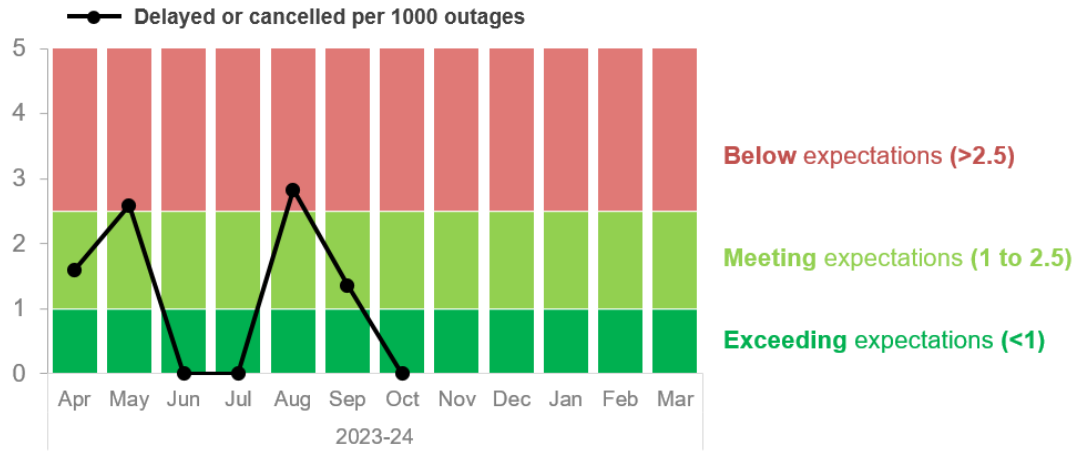


Table 4: Number of outages delayed by > 1 hour, or cancelled, per 1000 outages

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	YTD
Number of outages	624	739	645	644	706	734	704						4796
Outages delayed/cancelled due to ESO process failure	1	2	0	0	2	1	0						6
Number of outages delayed or cancelled per 1000 outages	1.6	2.6	0	0	2.8	1.4	0						1.25
Status	●	●	●	●	●	●	●						●

Performance benchmarks:

- ● **Exceeding expectations:** Fewer than 1 outage delayed or cancelled per 1000 outages
- ● **Meeting expectations:** 1-2.5 outages delayed or cancelled per 1000 outages
- ● **Below expectations:** More than 2.5 outages delayed or cancelled per 1000 outages

Supporting information

For October, we successfully released 704 outages and there ~~has~~ have been zero delays or cancellations that occurred due to an ESO process failure. The number of stoppages or delays per 1000 outages is 0, which is inside the 'Exceeds Expectations' target of less than 1 delays or cancellations per 1000 outages. The number of outages released in October 2022 was 684 and has increased in October 2023 to 704, this is due to an increased number of outage requests received from the TOs/DNOs for this period. Overall, we are continuing to liaise with the TOs and DNOs to effectively facilitate system access through weekly or monthly liaison meetings to maximize system access.

RRE 1E Transparency of operational decision making

This Regularly Reported Evidence (RRE) shows the percentage of balancing actions taken outside of the merit order in the Balancing Mechanism each month.

We publish the Dispatch Transparency dataset on our Data Portal every week on a Wednesday. This dataset details all the actions taken in the Balancing Mechanism (BM) for the previous week (Monday to Sunday). Categories and reason groups are allocated to each action to provide additional insight into why actions have been taken and ultimately derive the percentage of balancing actions taken outside of merit order in the BM.

Categories are applied to all actions where these are taken in merit order (Merit) or an electrical parameter drives that requirement. Reason groups are identified for any remaining actions where applicable. Additional information on these categories and reason groups can be found on our Data Portal in the Dispatch Transparency Methodology.

Categories include: System, Geometry, Loss Risk, Unit Commitment, Response, Merit

Reason groups include: Frequency, Flexibility, Incomplete, Zonal Management

The aim of this evidence is to highlight the efficient dispatch currently taking place within the BM while providing significant insight as to why actions are taken in the BM. Understanding the reasons behind actions being taken out of pure economic order allows us to focus our development and improvement work to ensure we are always making the best decisions and communicating this effectively to our customers and stakeholders.

We have been publishing the Dispatch Transparency dataset since March 2021, and it has sparked many conversations amongst market participants. As we continue to publish this dataset for BP2 we will also be providing additional narrative to help build trust by explaining:

- actions we are taking to increase understanding of the ESO's operational decision making
- insight into the reasons why actions are taken outside of merit order in the Balancing Mechanism
- activity planned and taken by the ESO to address and reduce the need for actions to be taken out of merit order.

October 2023-24 performance

Figure 5: 2023-24 Percentage of balancing actions taken in merit order to meet requirements in the Balancing Mechanism

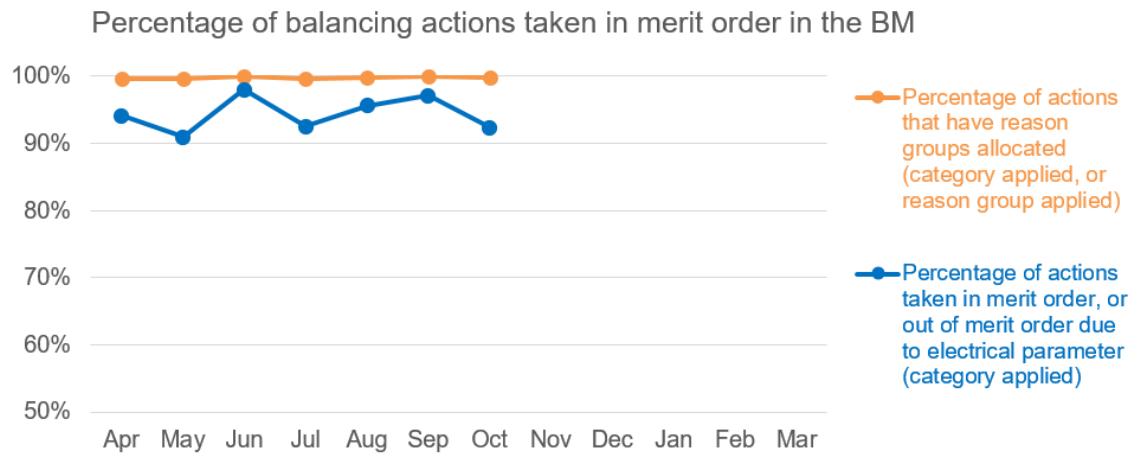


Table 5: Percentage of balancing actions taken outside of merit order in the BM

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Percentage of actions taken in merit order, or out of merit order due to electrical parameter (category applied)	94.1%	90.9%	98.0%	92.5%	95.6%	97.1%	92.3%					
Percentage of actions that have reason groups allocated (category applied, or reason group applied)	99.7%	99.6%	99.9%	99.7%	99.8%	99.9%	99.8%					
Percentage of actions with no category applied or reason group identified	0.3%	0.4%	0.1%	0.3%	0.2%	0.1%	0.2%					

Supporting information

October performance

This month 99.8% of actions were either taken in merit order or taken out of merit order due to an electrical parameter. For the remaining actions, where possible, we allocate actions to reason groups for the purposes of our analysis. During October 2023, there were 74,544 BOAs (Bid Offer Acceptances) and of these, only 176 remain with no category or reason group identified, which is 0.2% of the total.

Other activities

During October we have continued to provide data and support to LCP Delta (an independent expert) in their independent analysis of the dispatch transparency dataset. At the Enhancing Energy Storage in the Balancing Mechanism event on 16 October, LCP shared their overall approach and hosted a breakout session to capture attendee feedback on the current Dispatch Transparency dataset and the ESO approach to providing transparency of out dispatch decisions. Separately, LCP have engaged directly with a representative selection of stakeholders from the flexible storage sector.

At the event we shared our plan for next steps and our commitment for dispatch data transparency:

Using independent expert analysis, we will build an enhanced Dispatch Transparency Dataset to provide a deeper understanding of operational actions in the control room and drive improvement opportunities in collaboration with industry – analysis and methodology by December 2023

We have committed to update industry at the next Balancing Programme event on 28 November and then, in December, share our roadmap for improvements for Dispatch Transparency data at a follow-up storage event. This will include how we intend to engage with wider industry going forward and on an enduring basis.

More information about the event on 16 October is provided in the Notable Events section.

We have identified data gaps in the current Dispatch Transparency datasets which are the result of issues with the underlying process. We had already arranged for the tool to be moved to a more reliable and

supported server to minimise missing data. This transfer took place during the week of 30 October and is now providing a more stable environment for production of the dataset.

In addition, we are working to identify the missing data periods from the published dataset in order to retrieve or reconstruct these sections for a comprehensive dataset. We will also carry out a code review of the automated process and check reference data sources within the other ESO systems to identify and resolve additional root causes. We are committed to maintaining and improving the current Dispatch Transparency tool while we work with industry to build on LCP's recommendation and co-create a new Dispatch Transparency dataset. We will be sharing more details about the work on the existing and replacement datasets at the events later this year.

RRE 1G Carbon intensity of ESO actions

This Regularly Reported Evidence (RRE) measures the difference between the carbon intensity of the combined Final Physical Notification (FPN) of machines in the Balancing Mechanism (BM) and the equivalent profile with balancing actions applied.

This takes account of both transmission and distribution connected generation and each fuel type has a Carbon Intensity in gCO2/kWh associated with it. For full details of the methodology please refer to the Carbon Intensity Balancing Actions Methodology document. The monthly data can also be accessed on the Data Portal here. Note that the generation mix measured by RRE 1F and RRE 1G differs.

It is often the case that balancing actions taken by the ESO for operability reasons increase the carbon intensity of the generation mix. More information about the ESO's operability challenges is provided in the Operability Strategy Report.

October 2023-24 performance

Figure 6: 2023-24 Average monthly gCO2/kWh of actions taken by the ESO (vs 2022-23)

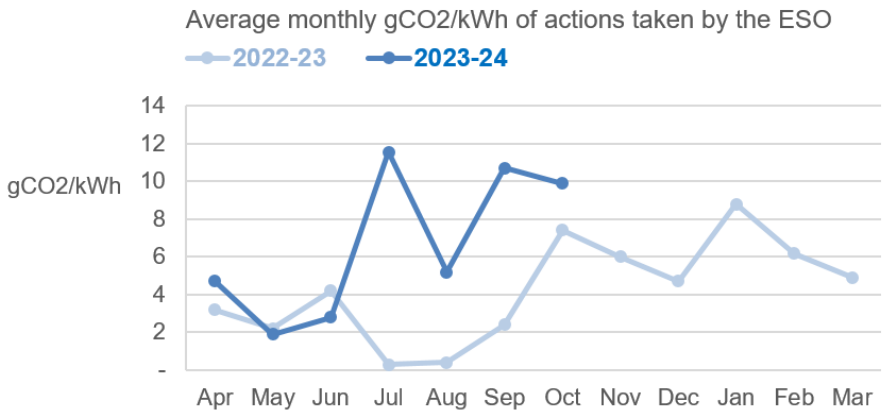


Table 6: Average monthly gCO2/kWh of actions taken by the ESO

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Carbon intensity (gCO2/kWh)	4.7	1.9	2.8	11.6	5.2	10.7	9.9					

Supporting information

Data issue: We are experiencing missing data issues for 5-8 and 26-31 Oct (incl.). Therefore, this month's narrative only covers the dates we do have. We are investigating the data issue to find the source of the problem.

In October 2023, the average carbon intensity of balancing actions was 9.9gCO2/kWh. This is 2.5g higher than Oct 2022 (which was 7.4gCO2/kWh).

Across the month, ESO actions reduced the carbon intensity in 26% of settlement periods.

The greatest impact of our actions on carbon intensity was seen on 14 October, raising the carbon intensity by 24g on average across the day (peaking at +36g in the late evening). Overnight from the 13 to 14 October, wind was curtailed to create downward margin on other units. Wind generation then dropped from 16GW to 10GW over the day. This required us to keep synchronous units on from the 13 October for voltage and stability needs. Synchronous generation was required from late afternoon to late evening to provide sufficient upward margin.

As the wind continued to reduce through the night into the 15 October, synchronous units were also required in advance of the overnight period for voltage and stability support.

The lowest carbon intensity provided by the market was on the 13 October 20:30-21:00 (~33gCO2/kWh) with high wind (~16.5GW) and other zero carbon sources providing around 86% of the generation mix (after ESO actions). Additional synchronous units were required to cover for ~2GW shortfall in wind generation raising the carbon intensity to ~49gCO2/kWh.

RRE 1l Security of Supply

This Regularly Reported Evidence (RRE) shows when the frequency of the electricity transmission system deviates more than ± 0.3Hz away from 50 Hz for more than 60 seconds, and where voltages are outside statutory limits. On a monthly basis we report instances where:

- The frequency is more than ± 0.5Hz away from 50 Hz for more than 60 seconds
- The frequency was 0.3Hz - 0.5Hz away from 50Hz for more than 60 seconds.
- There is a voltage excursion outside statutory limits. For nominal voltages of 132kV and above, a voltage excursion is defined as the voltage being more than 10% away from the nominal voltage for more than 15 minutes, although a stricter limit of 5% is applied for where voltages exceed 400kV.

For context, the **Frequency Risk and Control Report** defines the appropriate balance between cost and risk, and sets out tabulated risks of frequency deviation as below, where 'f' represents frequency:

Deviation (Hz)	Duration	Likelihood
f > 50.5	Any	1-in-1100 years
49.2 ≤ f < 49.5	up to 60 seconds	2 times per year
48.8 < f < 49.2	Any	1-in-22 years
47.75 < f ≤ 48.8	Any	1-in-270 years

At the end of the year, we will report on frequency deviations with respect to the above limits and communicate any plans for future changes to the methodology.

October 2023-24 performance

Table 7: Frequency and voltage excursions (2023-24)

	2023-24											
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Frequency excursions (more than 0.5 Hz away from 50 Hz for over 60 seconds)	0	0	0	0	0	0	0					
Instances where frequency was 0.3 – 0.5 Hz away from 50Hz for over 60 seconds	0	0	1	0	0	0	0					
Voltage Excursions defined as per Transmission Performance Report[3]	0	0	0	0	0	0	0					

Supporting information

October performance

There were no reportable voltage or frequency excursions in October.

[3] https://www.nationalgrideso.com/research-publications/transmission-performance-reports

RRE 1J CNI Outages

This Regularly Reported Evidence (RRE) shows the number and length of planned and unplanned outages to Critical National Infrastructure (CNI) IT systems.

The term ‘outage’ is defined as the total loss of a system, which means the entire operational system is unavailable to all internal and external users.

October 2023-24 performance

Table 8: 2023-24 Unplanned CNI System Outages (Number and length of each outage)

Unplanned	2023-24											
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Balancing Mechanism (BM)	0	0	0	0	0	0	0					
Integrated Energy Management System (IEMS)	0	0	0	0	0	0	0					

Table 9: 2023-24 Planned CNI System Outages (Number and length of each outage)

Planned	2023-24											
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Balancing Mechanism (BM)	0	0	1 outage (185 mins)	0	0	1 outage (265 mins)	1 outage (145 mins)					
Integrated Energy Management System (IEMS)	0	0	0	0	0	0	0					

Supporting information

October performance

In October 2023 there was one planned CNI system outage. The outage was planned to address a functional issue with the one of the BM Suite components. The source issue impacted internal ESO users only, and had no impact upon external stakeholders.

There were no other planned outages during October.

There were no unplanned outages during October.

Notable events during October 2023

Enhancing Energy Storage in the Balancing Mechanism (London Event)

On 16 October, we welcomed over 75 stakeholders from across the energy industry to our 'Enhancing Energy Storage in the Balancing Mechanism' event where we outlined our plan to enhance the use of storage assets in our balancing activities and the timelines to achieve this.

We outlined what is next for the Balancing Mechanism as well as our continued collaboration with industry stakeholders. A key focus of the event was to explore, in strong collaboration with industry, how to co-create and develop the capabilities and future market design solutions that will enable efficient dispatch of all assets in the Balancing Mechanism, in line with our net-zero ambitions and to manage balancing costs.

We also discussed the need for enhanced dispatch transparency and to achieve a 'common language' with industry in this regard. To support the creation of this, we've commissioned LCP Delta, an independent expert, to help us build an enhanced dispatch transparency dataset that will provide a deeper understanding of operational actions in the control room and drive improvement opportunities.

We received the following stakeholder feedback from the event:

Overall score for day (on a scale of 1-10): 7.86

Agenda items (on a scale of 1-5) were as follows:

Dispatch Transparency – 4.3

LCP Data Transparency – 3.5

ESO Workstreams – 3.9

Storage Parameters – 4.0

Roadmap and Trials – 3.4

LCP Deep Dive – 3.1

Q and A – 3.8

Positive comments included:

"Very informative session overall - clear and glad to see transparency from the ESO and industry. We appreciate these events are optional for the ESO to host so thank you."

"Open environment and sounds like ESO and industry are aligning on priorities of this topic."

"Important to get everyone into one room and to marry up the control room difficulties with those wanting to solve them."

We plan to provide further updates, including the output of the analysis with a follow-up webinar in December.

World-First trial on network restart with renewables

In October 2023, we published a report that details the methodology, results, and findings from the Distributed Restart Redhouse live trial, undertaken in June 2023. This world-first live trial, used distributed energy resources to build, maintain and optimise power islands isolated from the main grid – with a view to driving down the time it would take to restore the network following the extremely unlikely event of total shutdown of Great Britain's electricity grid.

Distributed ReStart launched in 2019 as a partnership between the ESO, SP Energy Networks (SPEN) and TNEI (a specialist energy consultancy), with funding from Ofgem's Network Innovation Competition (NIC) and Network Innovation Allowance (NIA).

This world-first project successfully tackled significant technical, organisational, and commercial challenges in delivering restoration from DERs like wind, solar, hydro and battery. With the use of ground-breaking live trials, desk-top exercises and mock tenders, we demonstrated how 'bottom up' restoration of power networks (from lower voltage distribution networks to the higher voltage transmission network) requires a complex but feasible combination of technologies and processes.

The project went much further than originally scoped, including a live trial at Redhouse in June 2023 using a battery as an anchor generator (a world first) and the development of a Distribution Restoration Zone Controller (DRZC) prototype that allows for automation (with control engineer direction) of the creation and stabilisation of a local power island.

The project has successfully transitioned to business as usual (BAU) with the ESO now including DERs in tenders for new electricity system restoration services. The project's innovations will enhance our ability to recover from a full or partial loss of power and support faster restoration.

The Distributed ReStart project was awarded silver place in the Power & Energy category at the Institution of Engineering and Technology (IET) of Engineering and Technology awards, on 15 November.

Role 2 (Market developments and transactions)

ESO

RRE 2E Accuracy of Forecasts for Charge Setting – BSUoS

This Regularly Reported Evidence (RRE) shows the accuracy of Balancing Services Use of System (BSUoS) forecasts used to set industry charges against the actual outturn charges.

The BSUoS charge (£/MWh) is now based upon a fixed tariff that was published in January 2023. Daily balancing costs (and other costs that ultimately make up the costs recovered through the BSUoS charge) were forecast for the year ahead, and two 6-month tariffs were set to cover the 2023/24 charging year.

We continue to forecast balancing costs monthly and measure our performance against this forecast as it remains an important metric to support the fixed tariff methodology, by being the main component of the fixed BSUoS tariff. The BSUoS cost forecast (costs rather than what is charged against the fixed tariff) is probabilistic and therefore produces percentile values. The published forecast for each month is based on the central value of the BSUoS cost forecast (50th percentile). If the outturn BSUoS costs are below the 50th percentile of the cost forecast, then the actual costs for that month would be lower than the forecast predicted, provided the actual volume is at or above the estimate (and vice versa).

October 2023-24 performance

Figure 7: 2023-24 Monthly BSUoS forecasting performance (Absolute Percentage Error)

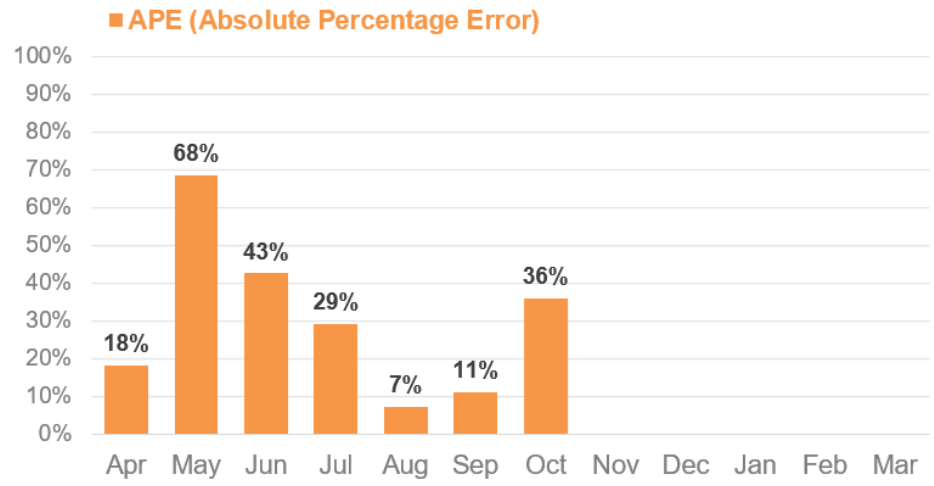


Table 10: Month ahead forecast vs. outturn BSUoS (£/MWh) Performance[4] - one-year view

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Actual (£ / MWh)	10.8	8.2	7.5	13.7	10.4	12.8	16.5					
Month-ahead forecast (£ / MWh)	12.7	13.8	10.8	9.7	9.7	11.4	10.6					
APE (Absolute Percentage Error)[5]	**18.0**	**68.4**	**42.5**	**29.1**	**7.2**	**11.0**	**36.0**					

[5] Monthly APE% figures may change with updated settlements data at the end of each month. Therefore, subsequent settlement runs may impact the end of year outturn.

Supporting information

October Performance:

Actuals out-turned above forecast in October 2023, with an increase in the Absolute Percentage Error from 11% in September to 36% in October. The main driver was the increase in constraint costs.

Costs:

October outturn costs were above the 95th percentile of the forecast produced at the beginning of September.

The average wholesale electricity price increased by 2% between the September forecast for October (£82/MWh) and October outturn (£84/MWh). However, the main driver was the increase in constraint costs, which increased by 80% (£118m in September forecast and £211m for October outturn).

Volumes:

October actual volume was slightly below the September forecast.

Forecast for October made at the start of September: 22.7TWh

Outturn volume for October: 22.4TWh

Notable events during October 2023

Demand Flexibility Service (DFS) approved for 2023/24 winter

On 27 October, Ofgem granted approval for our Demand Flexibility Service (DFS) which was available from 30 October 2023.

DFS incentivises households with smart meters, as well as industrial and commercial users, to voluntarily flex the time they use their electricity to help manage the system this winter during periods where margins are tightest.

Last winter, DFS successfully saved over 3,300MWh across 22 events, enough to power nearly 10 million homes. This year, we're committed to developing the service even further and are keen for more consumers and businesses, large and small, to take advantage of this opportunity to reduce their energy bills and carbon footprint.

Alongside potential live uses of the service to balance the network this winter, we will endeavour to run 12 test events that consumers can participate in. Electricity suppliers, aggregators and businesses who directly contract with us will receive a guaranteed acceptance price of £3/kWh for at least six of the test events.

The tests will begin in November as DFS delivers for its second year. Further details on how test events have performed will be made public following delivery.

As set out our Winter Outlook for 2023/24, the broad European energy situation has improved since last year, and margins are forecast to be slightly higher than last year, broadly in line with recent winters. If needed, the DFS 'live events' will incentivise customers to reduce electricity consumption at periods when margins are tightest.

2023 Revenue and Charging forum - October 12th & 17th

On the 12 and 17 October, we hosted our annual Revenue and Charging Forum. This was an in-person and online event to provide an introduction to our various charges; how they're forecast, calculated, billed, and imminent industry modifications that will impact them. Topics included Transmission Network Use of System (TNUoS) charges, Balancing Services Use of System (BSUoS) charges, Connection charges, and an update on the STAR billing system, with question-and-answer sessions throughout the day.

Feedback showed the event was well received across the two days, with an average satisfaction score of 8.7/10.

Enduring Auction Capability (EAC) - Industry Launch

The Enduring Auction Capability (EAC) platform launched on the 19 October 2023, with the platform becoming open for bid submissions. The first live auction on the EAC platform took place on 2 November with offers received on a total of 109 units from 23 participants utilising the new market design features available to them on the EAC platform.

The EAC is a RIIO-2 deliverable, designed to deliver co-optimised procurement for our day-ahead frequency response and reserve products. The EAC platform enables us to procure Dynamic Containment, Dynamic Regulation, and Dynamic Moderation response services. This method of procurement will meet our needs in the most efficient way and offer the most valuable option to providers who wish to participate in multiple markets.

We partnered with N-SIDE and SOOPs to facilitate the design, build and implementation of the new EAC platform. It includes several new features such as, co-optimisation, splitting/stacking, a new sell order design, an advanced clearing algorithm, over holding and the capability for market participants to offer negative pricing.

The launch of the platform followed the regulators publication of its Decision to approve the Enduring Auction Capability . Prior to the launch of the EAC platform, market participants participated in a series of trials from September to mid-October. This helped ensure a smooth transition and allowed providers to test new features such as co-optimisation and stacking.

Interested parties can create an account on our Data Portal to access EAC and see the auction results. More information on EAC can also be found on our website.

Contracts for Difference Allocation Round 5 Customer Satisfaction Survey

Contracts for Difference (CfD) is the government's main mechanism for supporting new low-carbon electricity generation projects in Great Britain. Appointed by the government, we, the ESO, are responsible for running the prequalification, disputes and auction processes for the CfD regime. Last month, we reported the success of completing the Allocation Round 5. Since then, we have conducted a customer satisfaction survey with the CfD AR5 participants in order to gather feedback for our continuous improvement.

44 customers completed the survey and gave us an overall **8.64/10**, a record high score and a significant increase from last year's 8.1. This fantastic survey outcome is a result of strong partnership with key stakeholders, in particular DENSZ to implement regulatory changes smoothly, clearer guidance and effective communications to customers and timely management of customer queries and disputes throughout the process.

This survey also helped gain insight from customers to feed into our planning for the next round of CfD. We will maintain our strengths and enhance our services further in line with the survey feedback.

Role 3
(System insight, planning and network development)

ESO

Metrics and RREs: Please note there are no metrics or monthly RREs for Role 3

Notable events during October 2023

ESO Connections Seminar 2023

The workload of the connections team continues to expand significantly, with the queue now in excess of over 400GW of generation projects, made up over a 1000 connection contracts looking to connect between now and the end of 2040.

There is an unprecedented challenge to connect renewables and storage to the electricity transmission and distribution networks in a timely manner, while also facilitating growing electrification of vectors such as transportation and heat and connecting new major demand sites. Our tactical 5 point plan and longer term connections reform are working together to improve processes and reduce the timescales in which customers can connect to the network.

On Monday 9 October 2023 the ESO Connections team held their biggest event to date with nearly 300 customers attending the seminar in person in London.

The agenda for the event included:

- Updates on the ESO's 5 Point Plan tactical initiatives, the Connections Portal, Offshore Co-ordination, and the new organisational structure.
- Presentation from the ENA on the technical limits project that has helped the ESO release 30GW capacity, accelerating connections for over 800 customers.
- Break-out sessions on ESO Connections Reform and Ofgem & DESNZ Connections Action Plan
- Industry Panel Q&A session on 'Accelerating the Connection Journey' with representatives from Ofgem, DESNZ, SSEN-T, UKPN, NGET, ENA and the ESO.

Feedback on the seminar indicated an average satisfaction rating of 8.45, with 91% saying the day met their expectations in terms of format and content. 166 of the attendees participated in slido online polls and Q&A.

Positive feedback was received on event organisation, representation from industry, the panel Q&A session and the opportunity to network and meet the ESO team.

The new organisational structure in Connections that was announced at the seminar has been introduced to effectively respond and deal with the challenges ahead, which included four senior leadership roles.

David Wildash - Head of Customer Connections

- Overall accountability for all activities within Connections, covering business as usual, delivering change to connection processes, and developing enduring reform.

Nicola Bruce - Head of Connection Operations

- This role has a huge customer focus, and will look to drive forward greater customer service by delivering on our existing processes, helping build stronger relationships with our TO delivery partners and meeting existing licence obligations.

Robyn Jenkins – Head of Connections Change Delivery

- Accountability for delivery of the Connections Portal Project and managing the coordination and delivery of all reform activities and creating new processes for the Connections Operations team. This will include delivering on the 5 point plan commitments.

James Norman – Head of Connections Strategy

- Delivering the next level of design of the reform, while thinking about the longer term strategic direction of the connections process and related policy development and how it interacts with other major reform programmes across the ESO. Accountable for whole system connection design and policy, including thinking on connection competition.