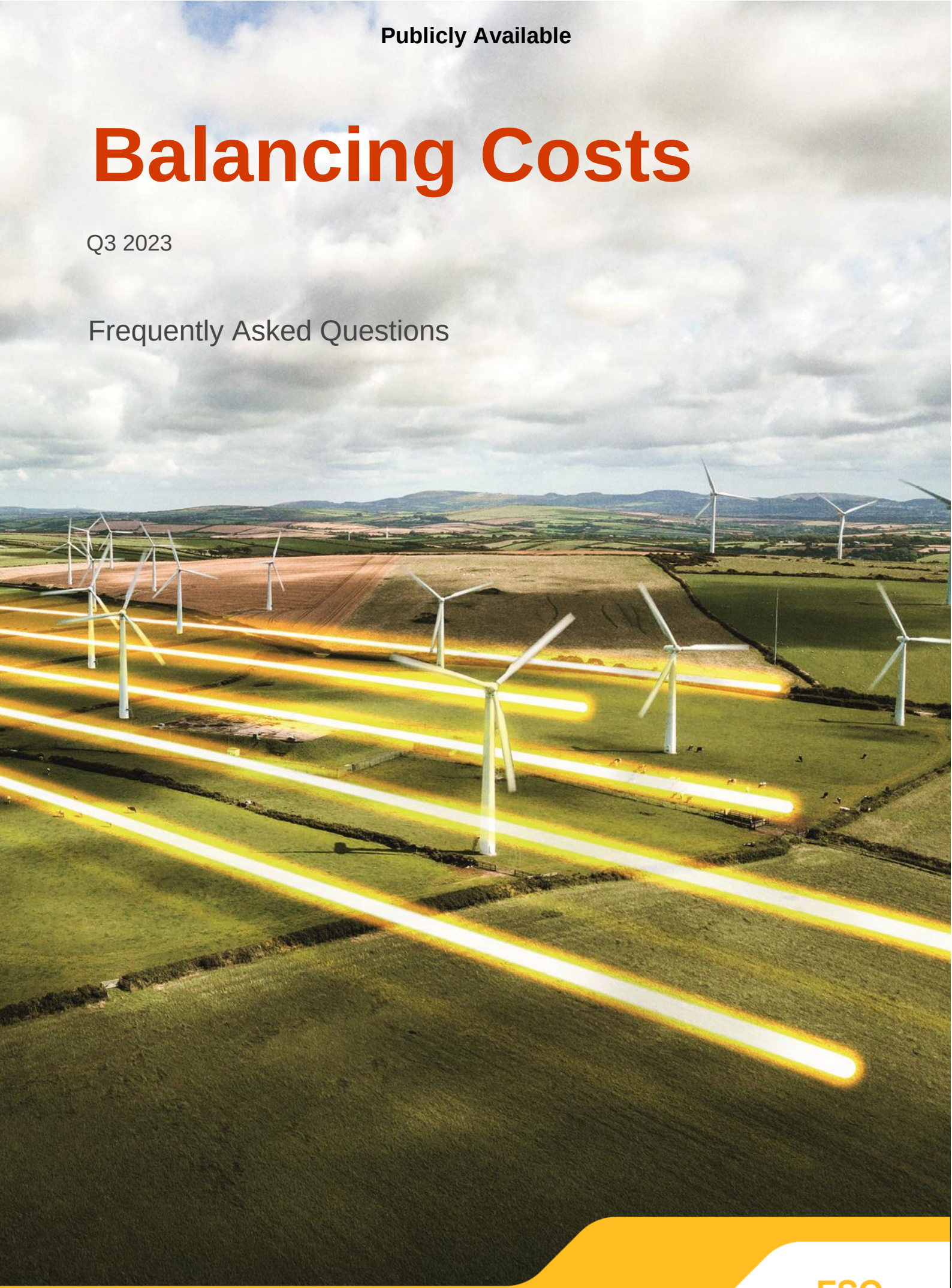
Publicly Available

Balancing Costs

Q3 2023

Frequently Asked Questions



ESO

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Background & General Questions

What is the Balancing Mechanism?

The Balancing Mechanism (BM) is the ESO's primary tool to balance supply and demand on GB's network. In the Electricity National Control Centre (ENCC), we use the BM to buy and procure the right amount of electricity required to balance the system. We do this minute by minute, second by second, to balance supply and demand in real time.

Why does the ESO need a Balancing Mechanism?

The role of the ESO is to ensure electricity supply meets demand second by second, which is what we mean by 'balancing' the grid.

And when you think about how demand rises and falls throughout the day, how it is affected by weather and seasons and then about supply too, how that's unpredictable and can change at a moment's notice, it's clear we need a lot of tools at our disposal.

Electricity is transported to all corners of Great Britain. And properties like voltage and frequency must be carefully regulated across the whole network to ensure power generated at scale in industrial power stations can be safely used by domestic appliances plugged into wall sockets.

We see to it this happens smoothly and efficiently, working with industry partners to provide 'ancillary services' that keep our electricity supply reliable, affordable and safe.

The ESO needs to balance inertia, frequency, voltage, thermal, and constraints to name a few of the factors that go into the highly complex process of balancing the grid. The Balancing Mechanism is a market where participants can submit "bids" or "offers" into the BM. A bid is the price they've calculated to generate less electricity; an offer is the price to generate more. What the ENCC needs at any point in time will depend on the current system frequency. The market exists to ensure that the most economically efficient generators are dispatched to provide the balancing service.

What are Balancing Costs?

Balancing Costs are those costs associated with operating the Balancing Mechanism. Due to the complex nature of balancing the grid, there are many different segments that contribute to the overall Balancing Costs. Balancing Costs can be comprised of costs associated with the ESO's actions in the following:

1) Restoring **energy imbalances** by dispatching generators to reduce generation and consumers to increase consumption during periods of oversupply, or to dispatch generators to increase generation and consumers to decrease consumption during periods of undersupply.
2) Restoring **system imbalances** include actions that are associated with grid constraints to ease congestion along certain parts of the grid, minute-to-minute and second-to-second variations between demand and supply, and any other costs associated with dispatching generators to balance the system's voltage, inertia, thermal, and frequency parameters on an immediate time-scale.

The prices at which these services to balance the grid will depend on the submitted bids and offers into the Balancing Mechanism. These bids and offers are submitted by the market participants. The ESO dispatches in merit order to ensure system security is always maintained. The BSUoS charge recovers the cost of balancing the electricity transmission system.

Who pays for Balancing Costs?

Balancing Costs are recovered through the Balancing Services Use of System (BSUoS) charge. BSUoS charges are recovered solely from Final Demand and are fixed ex-ante for a 6-month period by the BSUoS tariff. You can find out more on BSUoS here.

Who gets paid for Balancing?

To decide on which bids and offers to accept, we review the technical parameters of all participants to see what they're physically capable of providing. From those that can deliver what we need, we instruct the ones that are the most efficient regarding both their ability and cost. Generally, we go with the most competitively priced bids and offers, but sometimes we consider other operational and locational factors in our selection.

Once we accept a bid or offer, we issue Bid Offer Acceptances (BOAs), which are an instruction to the participant that we want them to change their output. When participants receive the BOA, they then agree to act on these instructions and adjust their output accordingly. These agreements keep the system in balance.

Those participants that deliver against their BOAs, will be paid for balancing.

Balancing Cost Trends

What is the historic outlook on Balancing Costs?

Balancing Costs have always varied from interval-to-interval, day-to-day, month-to-month, and year-to-year. However, before September 2018, Balancing Costs had never exceeded more than £100 million per month. Seasonal effects on generation and demand, and system constraints have always affected the need for greater Balancing Costs at various times of the year.

How have Balancing Costs trended recently?

Generally, when there is greater volatility in the electricity market, there is a greater need for balancing. Over the last two years, energy markets have been increasingly volatile due to the pandemic, global gas crisis, tight system conditions, and higher levels of intermittent generation. This volatility has manifested itself in higher Balancing Costs.

We have seen a steady increase in the actions to manage both energy balancing and thermal and stability constraints. The costs of these actions have increased significantly due to high gas prices. Another key driver for energy balancing was procurement of reserves to maintain adequate margins. Since implementing the Frequency Risk and Control Report (FRCR) in 2021 and our new, fast-acting Dynamic Containment products in 2020/21, the volume of actions taken by ESO via trades to reduce the size of the largest loss has decreased significantly.

What are Balancing Costs forecast to do in the future?

Predicting future Balancing Costs is a difficult task to do, as there are many influences and moving parts. To compound the difficulty of forecasting Balancing Costs, it is not clear how participants in the Balancing Mechanism will behave should there be changes to policy and market dynamics in the future.

With those caveats in mind, some work has still to be done on identifying the trajectory of Balancing Costs, which is outlined in several documents that the ESO has published; including the Markets Roadmap and the ESO's End of Scheme Report.

The ESO is working hard to minimise Balancing Costs through four essential levers:

1) Network Planning & Optimisation;
2) Commercial Mechanisms;
3) Control Room Actions; and
4) Innovation & Technology.

Through the ESO's actions, we have estimated up to £5.6 billion in net benefit to the consumer throughout our BP12 period. However, Balancing Costs are still forecast to increase of the coming years due to increased network congestion and increased variability in supply and demand. Both of these factors require greater balancing, and the ESO is predicting up to £3 billion per year in constraint costs alone by 2028.

Influences & Impacts

How is my energy bill impacted by Balancing Costs?

Balancing Costs are recovered through part of the (Balancing System Use of Services) BSUoS charge that is allocated to Generators and Suppliers based on a market share of total generation and consumption in each interval. Generators would recover these costs through their revenue streams of their business. Suppliers would recover these costs through their charges to consumers. The everyday household will therefore have a proportion of their electricity bill that recovers the Balancing Costs charged to their Supplier. Balancing Costs contribute to less than 5% of a household's electricity bill. Without the recovery of this cost, there would be no market balancing of the electricity system.

How much does the ESO rely on renewable energy for balancing the system?

The ESO have been set the challenging target of being able to operate GB's electricity grid on 100% renewable energy by 2025. The ESO publishes regular insights on how we are tracking to meet this goal, which can be found here. This dashboard shows the carbon intensity of the Balancing Mechanism and compares how this is tracking to past intervals of balancing the system. In the last week of 2022, the ESO operated the grid with an average of just 73g of CO_2/KWh. This stands in stark contrast to the 11th week of 2012, where the grid required an average of 632g of CO_2/KWh for its balancing. This shows the progress that GB has made in decarbonising its electricity system. It has required much more sophisticated systems, and much more sophisticated decision making to progress towards this vision for a cleaner electricity system for all.

The ESO's Initiatives

What is the ESO doing to minimise Balancing Costs?

The ESO's objectives as a leading electricity system operator are to operate a secure and reliable grid, ensure fair competition and market participation, facilitate the energy transition, and to keep costs down in the electricity system. This final objective is an important one for NGESO, and that is why we have developed a strategy to minimise Balancing Costs. The ESO is working hard to minimise Balancing Costs through four essential levers:

1) Network Planning & Optimisation;
2) Commercial Mechanisms;
3) Control Room Actions; and
4) Innovation & Technology.

These levers manifest in projects such as our Acceleration of Strategic Transmission Investment, which has delivered options for accelerating network investment and approving more than 26 onshore transmission projects. This has provided an estimated net benefit of £2.1 billion in reducing Balancing Costs by alleviating congestion. So far, the ESO has managed to reduce Balancing Costs by an estimated £5.6 billion through these levers.

What will the ESO be doing in the future to further minimise Balancing Costs?

The ESO's strategy is to continue to use these levers to continue to minimise any Balancing Cost increases. Where the Balancing Mechanism may be affected, Cost-Benefit-Analyses are done for all our pipelined projects in order to identify the net benefit to the Balancing Mechanism. We are continuing to engage with industry leaders and academia to identify new ways of minimising costs, we are continuing to improve our control room actions, we are continuing to optimise the network, and we are continuing to implement and influence commercial mechanisms to structure a more competitive and cost-efficient market for all. As NGESO transitions into its new role as the Future System Operator (FSO), we will be in a better position and more empowered to drive government policy and provide expert advice on network planning. This opens further opportunities for us to reduce balancing costs through Network planning and Optimisation initiatives, which we are acting on already.

Calculating Balancing Costs and Savings

How are Balancing Costs calculated?

The ESO calculates the volumes of Balancing Energy dispatched for each interval. Elexon own and operate the Balancing and Settlement Code (BSC), which is used to calculate the settlement for the Balancing Mechanism. Elexon have many training courses publicly available to better understand settlement in the Balancing Mechanism.

In essence, Balancing Mechanism Units (BMUs) have submitted Bids and Offers to indicate prices at which they are willing to deviate from their Final Physical Notification (FPN). Where generators have been dispatched by the ESO for balancing, Elexon will calculate the Imbalance Volume based on Metered Volumes, Contracted Volumes, and Accepted Balancing Actions. An Imbalance Price is multiplied to the Imbalance Volumes to calculate an Imbalance Cost.

How much has been saved by the ESO in their efforts to minimise Balancing Costs?

The financial benefit for the activities outlined in the strategy will be approximately c£12.5bn 23/24-25/26. This is a projection of benefits of the activities outlined in BP2. These savings are driven by savings across the ESO with the largest savings over the 3 years coming from outage optimisation (£5.6bn), Pathfinders (£1.8bn), our 5-point plan to manage constraints (£1.4 bn) and the balancing programme (£870m).

How is the figure of Balancing Costs savings calculated?

The ESO is continually taking finding new ways to minimise balancing costs through four primary levers:

1) Network Planning & Optimisation;

2) Commercial Mechanisms;

3) Control Room Behaviour; and

4) Innovation & Technology

Each of these levers have numerous initiatives associated with them and NGESO perform a cost-benefit analysis for each initiative to quantify the impact they have on Balancing Costs. The £5.6 bn figure is the accumulation of the net benefit in Balancing Costs associated with the projects NGESO have delivered over the period of BP1.

A list of other initiatives that NGESO have delivered to reduce Balancing Costs can be found on page 35 of NGESO's Incentive End of Scheme Report published in May 2023 with a breakdown of the £5.6 bn on page 37.

Does that mean that without these actions by the ESO, then Balancing Costs would have been their current value plus the savings outlined above?

Possibly but providing a counter factual as to what the Balancing Costs would have been should these initiatives have not been implemented is difficult to estimate. The electricity system is a physical network with markets and market principles designed to enable the efficient transmission and pricing of electricity. When the NGESO implement new initiatives, the market responds and adapts to these changes. It is difficult to say for certain how the market would have performed should none, or some of these initiatives have been implemented.

How much of the Balancing Cost savings is considered 'Business-As-Usual' (BAU)?

NGESO's role is to operate the GB electricity system. Part of operating this system involves efficient network planning, identifying inefficiencies in the market structures, and ensuring that our control room is making the optimum decisions for system security, reliability, and economical efficiency. While being a prudent system operator is always BAU, the world leading role we are taking to create an operable net zero transmission network by 2035 creates new engineering challenges every day. We continue to be proactive and go above and beyond to pre-empt these challenges as we adapt to find new ways to minimise costs to consumers.

Data, Reports, and Contacts

Where can I find data on Balancing Costs?

The ESO publishes a suite of data related to the operation of the electricity system, which can be found here. One of these 'data groups' is Balancing Costs, which has 13 different datasets related to historic and forecast balancing costs, including BSUoS and Balancing services charging reports.

Where can I find ESO reports on Balancing Costs?

The ESO's main repository for Balancing Cost publications and reports can be found on the Balancing Costs webpage.

Minimising Balancing Costs are a high priority for the ESO as it directly aligns with our objectives of operating a secure, reliable, and economically efficient power system. Balancing Costs are therefore reported through a variety of different channels. From the ESO, this includes our Incentive End of Scheme Report, the System balancing reports, the ESO's RIIO-2 Business Plan 2021-23, and the RIIO-2 Business Plan 2023-25.

External reports and documents include a cost benefit analysis that was commission by the ESO to LCPDelta for a proposed new product, Balancing Reserve. Ofgem, the GB regulator for the electricity system also publish reports and open letters addressing Balancing Costs, which can be found here.

Who should I contact if I have more questions on Balancing Costs?

If you have any further questions, queries, or comments regarding Balancing Costs, the ESO has a dedicated team that will be more than happy to respond to them. You can reach the Balancing Costs team through the following email address: box.Balancing.Costs@nationalgrideso.com

Please allow up to two business days for a response.