

May 2021

Forward Plan 2020-21

# End of Year Performance Report

# Welcome

## Welcome to our End of Year incentives report for 2020-21.



## Foreword

2020-21 has been characterised by the COVID-19 pandemic, which has impacted on every aspect of life in the UK. For the ESO, this has meant lower demand for electricity, which brings a particular set of operability challenges. I'm really proud of the way our teams have collaborated with stakeholders across the industry to quickly implement solutions.

We prioritised keeping our teams safe during this period, introducing social distancing in our control rooms and enabling other colleagues to work from home. We also recognised that it was important to keep our stakeholders informed, introducing weekly webinars which have since become part of our business-as-usual activities. The experience of operating the system during the COVID-19 lockdowns has provided valuable learning points, not just for business continuity but also for system operation. This has provided useful insight as we prepare to be able to operate the system with a higher proportion of renewable generation as we progress towards Net Zero.

The challenges brought by the COVID-19 pandemic have resulted in a range of additional activities to manage summer operability caused by the unprecedented low demands during lockdown periods, many of which were implemented in record time. It has been necessary to continue to re-prioritise our activities throughout the year. However, despite this, we have still successfully delivered over three-quarters of the activities set out in the Forward Plan Addendum for 2020-21. Notably, we have made it possible for more parties

to access the Balancing Mechanism, progressed market reforms including introducing the Dynamic Containment product, made good progress on our Pathfinder projects, and provided increased transparency around our activities.

We would like to acknowledge the collaboration and co-creation we have enjoyed with our customers and stakeholders during this year, and hope to continue working closely together in the future.

This is the last incentives report of the RIIO-1 price control, and I'm proud of the ESO's achievements during this period. We have developed our identity as a more independent electricity system operator, facilitated the growth in renewable generation, and promoted increased competition and whole system working. Going into the new RIIO-2 price control, we look forward to progressing our ambitious Business Plan and continuing the journey towards Net Zero.

**Fintan Siye**

**Director, Electricity System  
Operator**

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For further information, please see our [Evidence Chapters document](#)

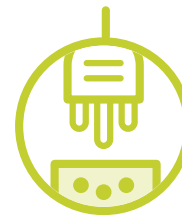
# Performance Highlights

**Our performance is scored using four key inputs to evaluate the ESO's performance for each role. Highlights include:**



## Evidence of consumer benefits

- We ensured that the system remained secure and operable during the period of unprecedented low demand experienced during the initial COVID-19 lockdown.
- We have established a new methodology to allow engagement with stakeholders to take place in determining the value of security of supply, assessing the impact of risks and cost-effectiveness of their mitigation on a societal basis. This forms part of the new Frequency Risk and Control Report process. As a result of the new methodology, Dynamic Containment product and Loss of Mains changes, we now anticipate spending £244m on frequency control in 2021-22, compared to £275m-£360m in previous years without noticeably impacting reliability, by better targeting of risks.
- We have continued to improve access to the Balancing Mechanism, by improving existing routes to market, developing new cost-effective routes to market (such as the Virtual Lead Party (VLP) route), and enhancing IT systems.
- We worked closely with all three Transmission Owners on the Northern England and Scotland Operability Study (NESOS) 2020 project to assess the operational and security impacts from the earlier closures of Northern power stations
- We have trialled a new tool, the Transmission Network Topology Optimisation tool, which will optimise our transmission network to relieve constraints, using the recommendations from an algorithm to reconfigure our network (approximate consumer saving £21.8m - £65.5m per year)



## Plan delivery

- We went live with Dynamic Containment, and have since made improvements (such as stacking) in response to stakeholder feedback
- We reached key milestones for our Pathfinder projects: we invited expressions of interest for the Constraint Management and Stability Phase 2 Pathfinders, and launched a tender for the Pennines voltage Pathfinder. Lessons learned are regularly captured and fed into future Pathfinders.
- We have made good progress on the Loss of Mains programme, with over 16 GW of distributed generation now engaged in the programme, and we are now on track to deliver savings this summer - more than 12 months before the programme's compliance deadline in August 2022.
- In addition to the activities set out in the original Forward Plan, we also acted quickly to manage the unprecedented low demands experienced during the first COVID-19 lockdown. This included implementing new products and code changes to ensure that the system remained operable, whilst also protecting our customers from unexpected charges.
- We published a wide range of insights documents, including the Future Energy Scenarios (FES), Electricity Ten Year Statement (ETYS), Network Options Assessment (NOA) and Operability Strategy Report.

# Performance Highlights



## Stakeholder views

We work closely with our stakeholders and have listened to their views. A few examples are:

- We “joined the dots” between different market reforms in response to stakeholder feedback, publishing the ESO Markets Roadmap to 2025 and hosting a week-long stakeholder event
- We are co-creating reforms alongside market participants, making good progress on Reserve and Reactive reform
- We have provided increased transparency of our actions, hosting a weekly ESO transparency forum and publishing numerous data sets on the Data Portal
- We have improved our communication and engagement on the Trans-European Replacement Reserve Exchange (TERRE) project, forming the GB TERRE implementation group and providing regular updates on our website
- We have worked closely with DNOs to progress the Regional Development Programmes, and via the Open Networks Programme
- We engaged extensively with stakeholders as part of the Early Competition and Offshore Co-ordination projects
- We are a founding partner of the Global Power System Transformation (G-PST) consortium, collaborating with Transmission System Operators and research and academic institutes from around the world, to research solutions to integrate increasing volumes of renewables onto the world’s power systems.



## Outturn performance metrics and justifications

11 out of our 19 metrics were either meeting or exceeding expectations. The Performance Panel’s Mid-Year feedback placed particular importance on the following metrics:

- Balancing costs: Balancing costs were significantly above the benchmark. Consultants DNV found that we had acted “efficiently and effectively”, noting the challenges caused by low demands during the initial COVID-19 lockdown
- Wind forecasting: Our performance for the year is “exceeding expectations”, and we are continually seeking to improve our processes and models
- Code Admin stakeholder satisfaction: Our 2020 Code Administrator stakeholder satisfaction survey shows a 25 percentage point increase in satisfaction compared to 2019 and we are now “exceeding expectations” for this metric
- BSUoS forecasting: Our performance improved during the second half of the year, although is still “below expectations” overall

More information about our metrics is provided later in this document.

**Our Mission is to enable the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers. Our progress towards our 2025 ambitions is set out in the annex to this document.**

# Spotlight on COVID-19

## Electricity system operation during COVID-19

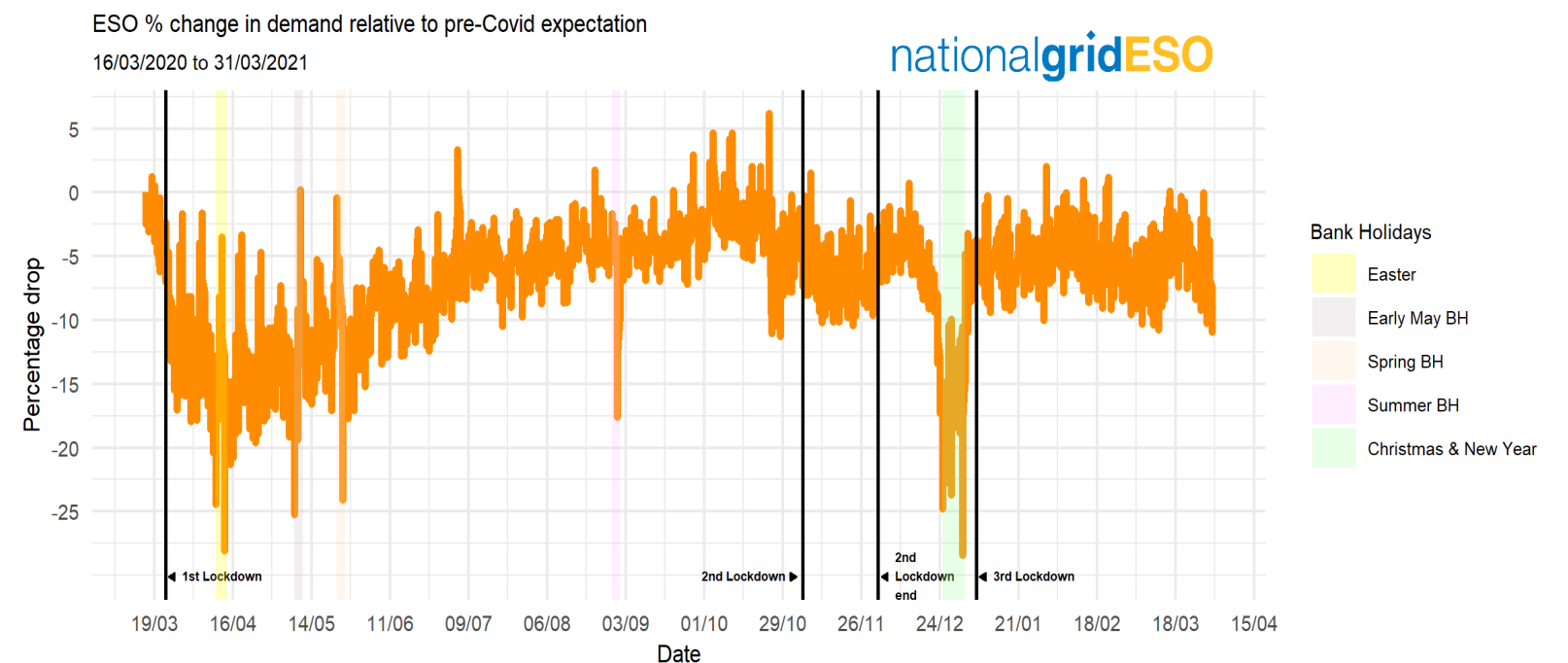
### Changing energy usage

The three national lockdowns introduced to manage the COVID-19 pandemic have each impacted on energy usage, with the first lockdown introduced in March 2020 having the greatest impact due to the larger number of businesses being closed. This lockdown coincided with lower energy usage due to the time of year, which meant that a new record low national demand of 13.4 GW was observed over this period. The unprecedented low demands created a number of challenges to system operability, which the ESO acted quickly to address.

### Addressing operability challenges

We developed several new products and services to ensure that the system remained operable during periods of low demand. This included the Optional Downward Flexibility Management (ODFM) service, a contract with Sizewell power station, Super Stable Export Limit (SEL) contracts, a trial of the use of Reserve from Storage, fast tracking the Accelerated Loss of Mains Change Programme (ALoMCP), code modifications for emergency disconnection of embedded generation and deferring Balancing Services Use of System (BSUoS) charges, and updating the Future Energy Scenarios (FES) analysis to support the Capacity Market auctions.

We also introduced weekly webinars to ensure a shared understanding across the industry of the operability challenges caused by COVID-19.



# Spotlight on COVID-19

## Impact on balancing costs

The low demands during summer 2020, and the deployment of additional tools required to manage them, led to balancing costs being significantly higher than the benchmark. Although these new services kept costs lower than they would have otherwise been, we recognised that these additional costs would impact on our customers. We therefore implemented code modifications to defer the additional costs, protecting market participants from unexpectedly high charges.

## Learning points for future system operation

The experience of operating the system during COVID-19 has provided valuable learning points both in terms of business continuity and operating a future low carbon system. This will assist the ESO in the delivery of its zero carbon operability ambition by 2025. Key observations and learnings are:

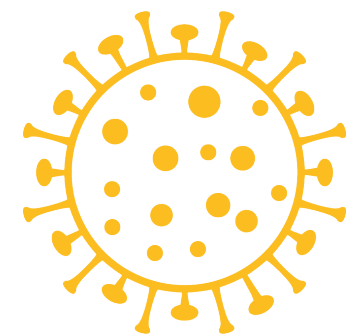
- Business Continuity assumptions around pandemic requirements, and low electricity demand periods have been revised and validated.
- We recognised the need to provide greater operational transparency and introduced weekly webinars to ensure a shared understanding across the industry of the operability challenges caused by COVID-19.

- We have learned valuable lessons in the development of Dynamic Containment (DC) and Optional Downward Flexibility Management (ODFM) regarding the role these products can play in low carbon operation. These will be factored into the future development of new response and reserve reform products
- Progressing the Loss of Mains and Pathfinder projects is generating learnings which will reduce future requirements and operational interventions across our five key operability challenge areas of frequency, Stability, Voltage, Restoration and Thermal. We provide further details on our operability challenges and learnings in our [Operability Strategy Report](#) published in December 2020.

## Learning points for future business continuity planning

We already had in place a set of processes and procedures to address events such as the COVID-19 pandemic. Implementing these procedures, combined with an agile approach, contributed to no disruption in the operation of the electricity system, and very low absenteeism.

We have taken several learning points from this experience, such as the importance of strong stakeholder engagement, removing barriers to IT systems to allow remote working, taking a flexible approach to working hours, and setting up “COVID bubbles” and testing for critical staff.



## Prioritising our projects

We published the Forward Plan Addendum in July 2020 to show how we had re-prioritised our activities during the first COVID-19 lockdown. During the remainder of the year it has been necessary to regularly re-prioritise our activities. We have also continually challenged ourselves and engaged with our customers and stakeholders to consider whether we were focussing on the activities which would deliver the greatest benefit for consumers.

### Forward Plan Addendum

We published our Forward Plan in March 2020, setting out our plans for the 2020-21 financial year. At the time, we knew that COVID-19 would impact on our plans, but the extent of this impact was not yet known. Over the next few months, we re-prioritised our projects to take into account the impact of COVID-19, for example delaying some long-term operability projects to enable us to prioritise work to address the immediate and urgent operability challenges of summer 2020. Ofgem provided a framework of regulatory flexibility during this period, and noted the opportunity provided by an evaluative incentive scheme to take account of circumstances when assessing performance.

In order to provide transparency to our stakeholders, in July we published the Forward Plan Addendum which set out our revised view of what we would deliver during 2020-21. This also allowed us to take into account the feedback provided by Ofgem in its Formal Opinion in May 2020.

However, throughout the remainder of the year it has been necessary to regularly re-prioritise our activities to adapt to the challenges we have faced through COVID-19 as well as focussing on the activities that deliver the greatest benefit for consumers.

### Regular review of priorities

On a quarterly basis the ESO reviews its plans, major programmes and IT portfolio to support business planning, prioritisation, financial management and decision-making. This is complemented by a regular review of our business priorities in line with the Forward Plan and RIIO-2 Business Plan, taking into consideration the impact of internal and external events such as the effects of the COVID-19 lockdown.



# Prioritising our projects

## Key changes resulting from re-prioritisation

It has been necessary to continue to re-prioritise our activities throughout this challenging period. This regular re-prioritisation has resulted in several notable changes to ensure that the ESO focusses its resources on those areas where it can drive the greatest consumer benefit. These changes have included:

- **Managing constraints:** the ESO foresees a rise in constraint costs due to the increased connection of renewables ahead of network reinforcements being completed. We recognise that significant consumer value could be delivered by proactively tackling this, and we therefore set out a 5-point plan for managing network constraints in the years ahead.
- **Pennines Pathfinder:** We delayed the Pennines pathfinder tender by approximately 4 months, to optimise our requirements. We prioritised the additional work required to optimise our requirements ahead of other deliverables relating to the exchange of reactive power, as our analysis had indicated that it was unlikely that a generic conclusion on an optimal exchange of reactive power could be drawn. We are focusing instead on market-based solutions using cost-benefit analysis, such as the ongoing voltage Pathfinder projects and wider reactive power market reforms, to explore a better way of managing future voltage issues.
- **Power Available Phase 2, and Project TERRE:** Project TERRE was delayed due to the impacts of COVID-19, as well as IT issues. Subsequently, the uncertainty associated with leaving the EU meant that the consumer benefit of Project TERRE was uncertain. Industry stakeholders also felt that Project TERRE should not be a priority for the ESO, due to this uncertainty. We therefore focussed our resources to ensure the timely delivery of Power Available Phase 2, which we delivered in March 2021. This meant we were prioritising work that we were confident would deliver consumer benefit (which we estimate to be at least £1.5m per year), whereas the uncertain legal situation and older data from the Project TERRE cost-benefit analysis meant the benefit case was less certain.
- **Response and reserve:** We prioritised new response services such as faster acting frequency response, which would enable us to accommodate larger losses and more renewables. We also focussed on bringing on faster reserve services.
- **Northern England and Scotland Operability Study (NESOS) 2020:** following insights from the market relating to early closure of significant generation in Scotland and the North of England, we rapidly established an ESO-led cross Transmission Owner working group to assess the operational impacts of these closures.



# Progress towards our ESO mission



**Our Mission is to enable the transformation to a sustainable energy system and ensure the delivery of reliable, affordable energy for all consumers.**

Success in 2025 looks like:

- An electricity system that can operate carbon free
- A whole system strategy that supports net zero by 2050
- Competition everywhere
- The ESO is a trusted partner

The Forward plan is a stepping stone towards our wider 2025 ambitions and beyond to net zero. For each of the above ambitions, we summarise our recent activities, and how we will continue to progress our mission during the RIIO-2 period (2021-26).

ESO ambition for 2025	Activities completed during 2020-21	Key activities planned for the Business Plan 1 period of RIIO-2 (2021-23) Reference numbers relate to the <a href="#">RIIO-2 Delivery Schedule</a>
<p>An electricity system that can operate carbon free</p> 	<p><b>New tools:</b> Improving Forecasting Accuracy, Support access for Intermittent Generation, Expand dispatch facility to handle a large number of small Balancing Mechanism Units (BMUs)</p> <p><b>New market-based approaches:</b> Product Roadmap for Response and Reserve implementation, Pathfinder projects</p> <p><b>Whole system operability:</b> inertia measurement, Loss of Mains changes</p> <p><b>Mitigating constraints:</b> 5-point plan</p>	<p><b>New tools:</b> Enhanced balancing capabilities, Inertia monitoring capabilities and other tools as recommended in Operability Strategy Reports (A1.2), New real-time situational awareness tool (A1.3), Enhanced network modelling capabilities (A1.3)</p> <p><b>New market-based approaches:</b> Development of competitive approaches to procurement of stability and reactive power (A4.6), Pathfinder rollout and enhancing tendering models (A8.1 and A8.2)</p> <p><b>Whole system operability:</b> Increased operational liaison with DNOs (A1.3), System Operability Framework (A15.1), Innovation projects developing new operability solutions (A15.1)</p>
<p>Competition Everywhere</p> 	<p><b>Market reforms:</b> Product roadmaps for Restoration, Reserve and Response, and Reactive</p> <p><b>Platforms for market access:</b> Auction trials, Wider access to the Balancing Mechanism</p> <p><b>Competition in networks:</b> Pathfinder projects, Early Competition</p> <p><b>Industry governance:</b> BSUoS task force, Targeted Charging Review (TCR), Removing barriers to code change (see our Streamlining Code Governance case study in role 2 for more information)</p>	<p><b>Market reforms:</b> fully competitive Black Start procurement process (A3.1), building the future balancing services markets (A4), transforming access to the Capacity Market (A5)</p> <p><b>Platforms for market access:</b> Single Markets Platform (A4.4), Enhanced Auction Capability (A4.3)</p> <p><b>Competition in networks:</b> Enable all solution types to compete to meet transmission needs (A8), Extend NOA approach to end of life asset replacement decisions and connections wider works (A9)</p> <p><b>Industry governance:</b> Develop code and charging arrangements that are fit for the future (A6)</p>

ESO ambition for 2025	Activities completed during 2020-21	Key activities planned for the Business Plan 1 period of RIIO-2 (2021-23) Reference numbers relate to the <u>RIIO-2 Delivery Schedule</u>
<p>A whole system strategy that supports net zero by 2050</p> 	<p><b>Working with DNOs:</b> Regional Development Programmes, Open Networks, active engagement in the development of DSO</p> <p><b>Leading the debate:</b> Insights documents such as Future Energy Scenarios, Bridging the Gap and the Operability Strategy Report</p> <p><b>Ensuring operability:</b> Loss of Mains changes, Pathfinders</p>	<p><b>Working with DNOs and DSOs:</b> Regional Development Programmes (A15.5), Supporting DNOs to develop their own Distribution Future Energy Scenarios (DFES) processes (A13.5), Deeper outage planning (A15.6), Open Networks (A15.8 and others),</p> <p><b>Leading the debate:</b> DSO Strategy publication</p> <p><b>Market reforms:</b> Alignment of ESO-DSO flexibility markets (A4.5), Deliver a single day-ahead response and reserve market (A4.3)</p> <p><b>Ensuring operability:</b> Whole System Grid Code (A6.5), modelling and data management capability (A15.6), Network Planning Review</p>
<p>The Electricity System Operator (ESO) is a trusted partner</p> 	<p><b>Greater transparency of operational decision making:</b> Increased the openness of our activities and decision making via the ESO transparency forum, Data Portal, and machine-readable System Operating Plans. Launched our Dispatch Transparency dataset.</p> <p><b>Co-creation:</b> continued engagement via the RIIO, Technology Advisory Council, Electricity Networks and Engineering Advisory Council stakeholder engagement groups. Website transformed to make it more accessible and user friendly. Weekly ESO summary newsletter introduced bringing together each week's publications, consultations, and key information</p> <p><b>Leading the debate:</b> founding partner of the Global Power System Transformation (G-PST) consortium. Established a policy team to articulate ESO positions to policy makers and help them in their decision making.</p> <p><b>Fixing the pain points:</b> we have focussed on understanding customer and stakeholder pain points and acting on feedback. The top issue has historically been query management and response times, which we have successfully addressed by putting in place query monitoring systems and a 5-day response time.</p>	<p><b>Transparency:</b> transparency roadmap, transparency of operational decision making, trading transparency, ESO transparency forum, ESO data portal (A17)</p> <p><b>Co-creation:</b> new service market development (A4.6), rollout of Pathfinder approach incorporating lessons learned (A8.1), Technology Advisory Council (A1)</p> <p><b>Leading the debate:</b> Future Energy Scenarios to integrate with other networks (A13.5), Bridging the Gap to Net Zero publication (A13.4)</p> <p><b>Process improvements:</b> we have recently developed an ESO 'customer journey atlas' which will enable us to prioritise our review, simplification and improvement of the ESO's customer journeys. This work will be aligned with our digital strategy to ensure that our systems and processes are set up to make it easy for our customers and stakeholders to work with us.</p>
<p><b>Continued focus on improving satisfaction;</b> The overall satisfaction score, as measured by our Customer Satisfaction (CSAT) survey (which is managed by an independent third party) was 7.51 out of 10 this year. It should be noted that we changed our approach to satisfaction surveys this year, including a change to the questions asked, and the recipients of the surveys. This makes direct comparisons to last year's result (7.61 out of 10) a little unreliable; however we do recognise that we have some key issues we need to tackle if we are to meet our Trusted Partner goal by 2025. We are confident that this new approach has enabled us to identify the top themes we need to focus on for the next phase of our customer and stakeholder strategy.</p>		

# Role 1:

## Control centre operations



### Isabelle Haigh, Head of National Control

The unprecedented low demands associated with the COVID-19 pandemic required us to act quickly to ensure security of supply. In the following months, I'm really proud of how we learned from this experience, both operationally as we work towards net zero, and in the increased transparency we now provide to our stakeholders.

During the first half of 2020-21, the ESO reacted quickly to the COVID-19 pandemic, ensuring the safety of our colleagues as well as security of supply. We implemented a range of new tools in record time, which we used to manage the operational challenges caused by low demands over the summer period. Recognising that these tools came at a cost to consumers, we raised code modifications to defer the additional charges (to mitigate the financial impact on our customers), and have subsequently engaged DNV to conduct an independent review of whether this represented good consumer value. This report found that we acted efficiently and effectively to address the system need, noting the high degree of uncertainty. We provide more detail on our balancing costs, and the actions we are taking to address high costs, in the Deep Dive section later in this report.

The experience of operating the system during COVID-19 has provided a number of valuable learning points, in relation to business continuity, dealing with low demands, and operating the system with an increasing proportion of zero carbon generation. We elaborate on this in the spotlight on COVID-19 section earlier in this report.

We recognised that stakeholders would value additional updates during this uncertain time, so introduced weekly webinars, which were very well received by the industry. These evolved into the ESO transparency forum, where we have provided greater transparency on topics such as balancing costs, our control room's decision making process, and trading. Transparency has been a key area of focus this year, and we've met all of the commitments to date within our Electricity National Control Centre (ENCC) Transparency Roadmap, including publishing machine-readable System Operating Plans and dispatch transparency data on our Data Portal.

We have also delivered the second phase of Power Available, integrating the Power Available signal into Control Room systems to enable greater use of wind for mandatory frequency response. We have taken actions to improve our wind forecasting, for example updating our models to take account of the effect of storms on large offshore windfarms: our overall wind forecasting metric performance for the year is "exceeding expectations". Our Demand Forecasting metric performance is in line with expectations, despite the challenges caused by COVID-19. Further information is provided in the metric section of our Evidence Chapters document.

We have continued to explore new approaches to addressing operational issues, for example the Storage Trial, competitive tenders for Restoration, and new ways of working to accommodate our stakeholders' needs (such as during the commissioning of the IFA2 interconnector).

## Control centre operations

Although last summer's challenge related to the risks associated with extremely low demand, this winter saw the converse of this- with six Electricity Margin Notices (EMNs) issued to notify the market of the risk of insufficient generation being available to meet our normal reserve requirements. The rise in EMNs is due to two key reasons: the supply margin being tighter than the previous three years, and elements of the generation portfolio underperforming. Each EMN was met by an appropriate response: prices rose, generation made itself available, and interconnectors flowed into GB. Although prices rose, the market was able to cover demand, frequency response and reserve in each case. We were transparent about the challenges we faced, keeping stakeholders informed of the latest position.

Another challenge we faced related to an Operational, Engineering and Safety Bulletin (OESB) which was issued in February 2021 following the catastrophic failure of a current transformer (CT) at Harker 400kV substation. This resulted in hazard zone restrictions at over 50 substations preventing access whilst the equipment was live. We worked closely with the Transmission Owners to provide urgent access to switch out equipment at impacted substations to ensure public safety and enable delivery of the Transmission Owners' work.

We recognise and share the frustrations of stakeholders in the delay to the Trans-European Replacement Reserve Exchange (TERRE) project, as further set out in the open letter from Ofgem in November 2020. Reacting to this feedback we formed the GB TERRE implementation group, chairing the dialogue between 20 organisations from across the energy sector. We developed scenarios to manage the uncertainty associated with Brexit, prior to the publication of the Trade and Co-operation Agreement. Once the situation was known, we committed to produce a cost benefit analysis of introducing the replacement reserve product in GB only, which we will undertake in the coming months and either factor into our plans for frequency reform, or use to inform future technical agreements with the EU in the future.

We've also undertaken activities to set ourselves up for RIIO-2, including drafting the Data and Digitalisation strategy, scoping the Data and Analytics Platform, undertaking the foundation work to transform our Balancing capability, and forming the Technology Advisory Council (TAC) which has met twice so far. We're now in a great place to deliver on our RIIO-2 commitments, and ensure that we are ready for the journey to net zero.

**Isabelle Haigh, Head of National Control**



**“Our assessment finds that NGENSO has acted efficiently and effectively to address the system need within the boundaries of information and tools that were available to it, given the high degree of uncertainty at times when actions were taken” - DNV report**

# Highlights



## Evidence of consumer benefits

- We went live with Power Available phase 2, optimising our systems to enable wind power to be used for response services (approximate consumer saving £1.5m per year)
- We have continued to enable BM participation from smaller parties, increasing competition in the Balancing Mechanism which should lower prices
- We have trialled a new tool, the Transmission Network Topology Optimisation tool, which will optimise our transmission network to relieve constraints, using the recommendations from an algorithm to reconfigure our network (approximate consumer saving £21.8m - £65.5m per year)



## Stakeholder views

We work closely with our stakeholders and have listened to their views. A few examples are:

- Weekly webinars introduced during initial COVID-19 lockdown, and subsequently evolved to provide greater transparency on key topics
- Shared our 5-point plan for managing constraint costs via a webinar and sought feedback
- Acted on stakeholder feedback to improve our engagement for project TERRE, forming the GB TERRE implementation group
- Worked closely with interconnector stakeholders for IFA2 commissioning
- Transparent coverage of winter margin challenges
- Technology Advisory Council (TAC) formed to guide digital, data and technological transformation



## Plan delivery

- Reacted quickly to the COVID-19 pandemic: ensuring colleague safety, and security of supply, and deferring charges to protect our customers
- Delivered Wider Access to the API, and expanded dispatch facility to accommodate a large number of small BMUs
- Completed phases 1 and 2 of Power Available
- Improved transparency via weekly ESO transparency forum and meeting commitments in our transparency roadmap
- Delivered all Platform for Energy Forecasting deliverables



## Outturn performance metrics and justifications

- 1A. Balancing cost management: below expectations
- 1B. Energy forecasting accuracy: meeting expectations (demand) and exceeding expectations (wind)
- 1C Security of supply: Exceeding expectations
- 1D System Access Management: Meeting expectations
- 1E Customer Value Opportunities: Exceeding expectations
- 1F CNI system reliability: during 2020-21, the BM experienced 7 minutes of unplanned outages, and the IEMS experienced 100 minutes of unplanned outages

# Role 2:

## Market development and transactions

Role 2 teams focussed on urgent priorities associated with the COVID-19 pandemic during the first half of the year. In the second half of this year, we prioritised the delivery of our original commitments, and providing more clarity on the timelines for future developments.

The unprecedented low demands associated with the COVID-19 lockdown meant that during 2020 the ESO was faced with system characteristics that had not been expected until several years in the future. Despite having actively progressed long-term projects to address system operability (such as the Pathfinders and Loss of Mains changes), the ESO had to act quickly to develop additional products to ensure system operability during the low demand periods of summer 2020. For Role 2, these activities included developing the Optional Downward Flexibility Management (ODFM) product, a cost-reflective contract to reduce output at Sizewell B nuclear power station and progressing urgent code modifications associated with managing low demands. I'm incredibly proud that we reacted at short notice to implement these necessary products and then refocused our efforts during the second half of the year to deliver on big high value long term commitments.



Kayte O'Neill, Head of Markets

### Addressing operability challenges through reforms

The ESO has been actively collaborating with stakeholders to develop and implement solutions to operability challenges. Many of these operability challenges are associated with a trend of decreasing minimum demands and an increasing percentage of renewable generation. During the second half of the year we have continued to prioritise the implementation of those reforms which will deliver the most consumer benefit, working closely with market participants to co-create a suite of products:

- For **Frequency Response**, we did a “soft launch” of the Dynamic Containment (DC) product in October 2020, and have evolved this product in response to stakeholder feedback to include features such as the ability to stack revenue streams from DC alongside those from the Balancing Mechanism (BM). We have now begun our industry engagement and set out an indicative timeline on further frequency response product design and delivery such as Dynamic Moderation (DM) and Dynamic Regulation (DR).
- We have also acted on feedback asking us to accelerate **reserve reform** in the second half of this year, whilst ensuring that we co-created the new products with our stakeholders. We understood that the suspension of the Day-Ahead Short Term Operating Reserve (STOR) market as a result of the Clean Energy Package was frustrating for stakeholders, and we have therefore consulted with industry on a new pay-as-cleared day ahead market.
- We've been working closely with the industry on **reactive reform**. We heard that the market wanted to see more development in this area, and we therefore held a kick-off workshop in December, and followed this up with a webinar in March detailing the plan and approach, and launched a Request for Information to develop our understanding of the market. We have delivered the Power Potential technical trials, collaborating with UKPN on this world-first project which explores new opportunities for distributed providers to contribute to solving system challenges. The learning from this project will also be factored into wider reactive reform.

## Market development and transactions

### Continuous improvement and thought leadership

Another area of focus this year has been Code Administration, and we included several deliverables within the Forward Plan to demonstrate how we would seek to improve this. Having completed the majority of these deliverables, our 2020 survey shows a step change in overall satisfaction. Our case study on streamlining code governance demonstrates that many of the improvements we have made will remove barriers to the reforms which will be needed to progress towards Net Zero.

We have continued to improve on existing processes such as our annual C16 consultation, where bringing co-creation to the core of this has transformed the process and received excellent feedback from customers on the transparency and efficiency of the process.

We have provided thought leadership on a variety of charging issues including leading the Second Balancing Services Task Force, as well as delivering the code changes needed to enact the Targeted Charging Review.

### Clarifying how our reforms fit together

The Performance Panel's Mid-Year Review indicated to us that it would be helpful to clearly set out a realistic plan, and provide clarity to industry of how the various reforms fit together. Taking this feedback on board in March we held an interactive multi-day stakeholder event, "The Road to Net Zero Electricity

Markets", covering topics such as zero carbon operation, and ancillary service reform. We have also published our ESO Markets roadmap to 2025, which "joins the dots" to provide strategic oversight of planned market reforms, and more clarity on the interaction between developments across Roles 2 and 3.

### Metric performance

Looking more closely at our metrics, over the year we have made great steps forward in increasing the competitive procurement of balancing services, for example introducing Dynamic Containment and running competitive tenders for Restoration. These improvements will result in longer term consumer benefits which are not yet captured by the within year metrics, either because a competitive approach results in reduced spend (so a lower percentage of spend is competitive), or because the reforms relate to services for future years. We are therefore meeting expectations for frequency response and constraints, but below expectations for reserve, reactive and black start.

Our BSUoS forecasting performance has been impacted by the effects of COVID-19, which have led to changes in both electricity usage and the cost of balancing services. Our year-ahead and month-ahead BSUoS performance is therefore below expectations.

### Impact of COVID on our deliverables

There are some areas where we have not achieved all of our deliverables to our original timelines. For example, COVID-19 led to a set of challenges which impacted on the delivery of strategic goals such as Reserve Reform and Dynamic Containment in the first half of the year, we have therefore stepped up our focus and accelerated delivery in both areas in the second half of the year. We also recognise that the set of complex and interlinked reforms can be unclear to market participants and there is more we can do on an enduring basis to provide this clarity. We have sought to

address this in the first instance with our ESO Markets Roadmap to 2025 supported by a series of highly interactive stakeholder engagement sessions; we will continue to engage with stakeholders regularly going forward.

Looking back over the year, I believe our activities lay a solid foundation for the ambitious set of activities in our RII0-2 plans and we have responded strongly to your feedback. I look forward to continuing to work with our stakeholders to co-create the reforms which will take us towards Net Zero.

**Kayte O'Neill, Head of Markets**



**"These were very complex topics to get through within a week ... this was a very good event to join the dots between markets"**

**- stakeholder event attendee**



# Market development and transactions



## Evidence of consumer benefits

- We set out in our first ever Frequency Risk and Control Report (FRCR) clear and objective criteria to balance cost and risk to ensure the end consumer receives efficient security of supply, and reduced security of supply risks via the Dynamic Containment project and Accelerated Loss of Mains change programme. We now anticipate spending £244m on frequency control in 2021-22, compared to £275m-£360m in previous years. The FRCR work sits across all 3 role areas.
- We raised Grid Code modification GC0131 to streamline code governance, improving the efficiency of the code modification process and removing blockers to the energy transition
- We trialled the use of Reserve from Storage, with a potential value of £0.7m (during the trial) and significant future savings from the experience gained



## Stakeholder views

We work closely with our stakeholders and have listened to their views. A few examples are:

- Our stakeholders were unclear on how our market initiatives and wider reforms linked together. We published our ESO Markets roadmap to 2025 and held a stakeholder event to “join the dots” between different market reforms in response to stakeholder feedback.
- Stakeholder feedback informed the evolution of the Dynamic Containment product
- We’re working closely with industry on reactive reform, and collaborated with UKPN for the Power Potential technical trials
- We’re co-creating new products for reserve reform, which we’ve accelerated in response to industry feedback
- Worked closely with stakeholders to develop and implement solutions to the operability challenges experienced during the first COVID-19 lockdown
- Improved stakeholder satisfaction with code administration



## Plan delivery

- Delivered new Dynamic Containment product, and introduced day-ahead procurement ahead of schedule
- Published Frequency Response auction trial report
- Progressed reforms for Reactive Power and Reserve
- Progressed urgent activities as a result of the low demands associated with the COVID-19 lockdown, such as new services and urgent code modifications
- Provided thought leadership on significant charging reforms and technical understanding of the transmission system and charging methodologies to provide qualitative and quantitative policy inputs
- Improved our code administration activities, resulting in a step change in overall satisfaction



## Outturn performance metrics and justifications

- 2A Reform of balancing services markets: meeting expectations for frequency response and constraints, below expectations for reserve, reactive and black start
- 2B Code admin stakeholder satisfaction: exceeding expectations
- 2C Charging futures: exceeding expectations
- 2D Year ahead BSUoS vs outturn annual BSUoS: below expectations
- 2E Month ahead forecast vs outturn monthly BSUoS: below expectations

# Role 3:

## System insight, planning and network development

Looking back over the past year, I feel that we have made great progress on our key transformational activities, which will bring us closer to our ambition of being able to operate a zero-carbon system by 2025. These activities include the Pathfinders, setting out our 5-point plan for managing constraints, and the first Frequency Risk and Control Report.

We've also taken a whole-system approach with our Regional Development Programmes (RDPs), and moved closer to Competition Everywhere with our work on Early Competition and introducing the 'Interested Persons' process into the Network Options Assessment (NOA) methodology. We've adapted our ways of working as a result of COVID-19, and as well as delivering increased volumes of business-as-usual activities (such as assessing connection applications and NOA options), we've also led some additional activities which will deliver significant value to the end consumer.



### Julian Leslie, Head of Networks

The Pathfinders are a key enabler of our net zero ambition. This year, we have achieved tangible milestones on the various Pathfinder projects, including inviting expressions of interest for the Constraint Management and Stability Phase 2 pathfinders, and launching a tender for the Pennines voltage Pathfinder.

A key principle of the Pathfinder approach is to learn by doing, and this has featured significantly in the decisions we have made during recent months. We delayed the Pennines Pathfinder to maximise the benefits to consumers, we're reviewing our approach to connection applications, we have been transparent about timelines, and we're sharing our learnings with stakeholders as well as using them to inform future Pathfinders and the NOA methodology.

Another transformational deliverable relates to the management of frequency risks. The Frequency Risk and Control Report was submitted to Ofgem for approval, and recommends a new way of managing system risks. This transparent process allows industry to verify our approach, and highlights the benefits of Dynamic Containment and the Loss of Mains changes.

Our Operability Strategy Report explains the challenges we face in operating the electricity system. To support our net zero ambition, we have also set out our long-term vision for tackling constraint costs in our new 5-point plan.

It has become increasingly important to consider a whole-system perspective. We became an official member of the Energy Networks Association (ENA) in March, have launched our Distribution System Operator (DSO) strategy, and hold regular meetings with Distribution stakeholders, showing our commitment to work collaboratively and adopt a whole system view. This has resulted in good progress on our Regional Development Programme (RDP) deliverables.

Our Network Options Assessment (NOA) process has continued to evolve. The ESO options put forward into this year's NOA will deliver over £2bn of consumer benefit. In the NOA process we are seeing that to gain system access to build the new reinforcements was creating barriers and delays. Working in collaboration with the TOs, we were able to optimise the plan such that we have created up to £5bn of consumer benefit. This was a great example of cross-team working and using our tools and processes to enable a more efficient solution. We are further enhancing the NOA: as well as introducing the Interested Persons process, we have invested significant effort in improving our technical assessment tools, allowing us to carry out year-round probabilistic assessments as part of the NOA process, and assess more submitted options for the Pathfinders.

## System insight, planning and network development

continued

Activities such as the Pathfinders and Early Competition will introduce competition into network development and bring us closer to our ambition of Competition Everywhere. In order to progress these projects, we have required collaboration from the Transmission Owners (TOs), whilst noting that the direction of travel of these projects may not be consistent with these stakeholders' strategic objectives. We recognise that this has created some tension, and we will endeavour to take the learning points from issues which have arisen, for example around the connection process in Scotland for Pathfinders.

Our Future Energy Scenarios (FES) work has continued to play an important role in stimulating debate and helping to shape the energy system of the future. This year, we built upon the FES work with two publications: FES: Bridging the Gap to Net Zero as well as a new publication, 2020 Future Energy Scenarios: Costing the Energy Sector.

We've also delivered some additional activities, beyond those set out in the

Forward Plan Addendum, which will drive real benefit for consumers. This includes the Northern England and Scotland Operability Study (NESOS) which assesses the impact of significant generation closures, and the Offshore Co-ordination work (which is funded separately, and not covered by the incentive scheme). Since April 2020, work has progressed at pace to assess the costs and benefits of a coordinated offshore network compared to the current approach, the technical considerations to achieve that, and how the offshore connections regime could change to drive greater coordination.

All of these activities are underpinned by engineering, and I'm proud to have been appointed ESO Chief Engineer. As well as promoting engineering, in this role I've created a new forum called the Engineering Advisory Council, which will improve transparency and use external experts to provide an additional level of assurance.

The COVID-19 restrictions have led to some challenges for the ESO. The ability to attend site has impacted on projects such as the N-3 RDP, Loss of Mains change programme, and Power Potential. However, in each of these cases, we have worked with our partners to find a better way, ensuring that milestones could still be met, and achieving efficiency savings in some cases.

We have also seen benefits from COVID-19 forcing us to change how we engaged with stakeholders, for example virtual workshops have been more accessible, resulting in great levels of engagement. We also acted quickly to ensure that processes which typically rely on on-site IT hardware could be carried out remotely, including moving our modelling for the

NOA process to cloud-based architecture.

I'm proud that our activities this year have prepared us for RIIO-2, where our plans for Network Development will see us make significant steps towards our ambition for Competition Everywhere, and we will ensure that we are set up for zero carbon system operation.

**Julian Leslie, Head of Networks**



“I thoroughly enjoyed reading [the Operability Strategy Report] this morning and thought it was excellent – a real step up from previous ones (which I also thought were good!).

- provider

# System insight, planning and network development



## Evidence of consumer benefits

- We delayed the Pennines pathfinder tender by 4 months, allowing us to optimise the regions and re-evaluate the required reactive power volume, and allowing the Transmission Owner (TO) time to conduct site-specific studies so that the information could be provided to industry at the start of the tender
- Our Northern England and Scotland Operability Study (NESOS) work assessing the impact of significant generation closures led to a number of recommendations, one of which has the potential to save consumers £11.7m-£32.4m per year
- We have built on the Future Energy Scenarios with our Bridging the Gap and Costing work, identifying only a 7% cost difference across the different scenarios, and signposting short term actions to help the UK reach its net zero target



## Stakeholder views

We work closely with our stakeholders and have listened to their views. A few examples are:

- We set out clear timelines for our Pathfinder projects, and demonstrated how they interact with market developments
- We have worked closely with DNOs on the RDPs and as part of the ENA, including on the Open Networks project
- We promoted the Loss of Mains programme, and worked with Ofgem to engage those stakeholders who are more difficult to reach
- We have engaged extensively on Early Competition, working closely with the ESO Networks Stakeholder Group
- New interactive ETYS publication in response to stakeholder feedback was well received and attracted an increased number of views
- We engaged with over 220 individual stakeholders, from over 100 organisations, when producing our Bridging the Gap report



## Plan delivery

- We have made good progress on the Loss of Mains programme, with over 16 GW of distributed generation now engaged in the programme
- Several Pathfinder milestones: invited expressions of interest for Constraint Management and Stability Phase 2 Pathfinders, launched tender for Pennines voltage pathfinder. Lessons learned are regularly captured and fed into future Pathfinders.
- We set out a 5-point plan for managing constraints
- Network Options Assessment opened to interested persons, one year ahead of the requirement to do so
- Progressed the Regional Development Programmes, working closely with DNOs
- Connection applications throughout the second half of the year continued at a high level and by the end of 2020-21 the ESO recorded a 22% increase in the level of customer applications on 2019-20 levels.



## Outturn performance metrics and justifications

- 3A Right first time connection offers: meeting expectations
- 3B NOA consumer value: consumer benefit of ESO options is exceeding expectations, number of ESO options is below expectations
- 3C Customer connections- customer satisfaction: below expectations
- 3D Whole system unlocking cross boundary solutions: 532.3MW of Distributed Energy Resource (DER) within WPD network and 401.2MW within UKPN network accepted for 2020-21.
- 3E Future balancing costs saved by operability solutions: We successfully released commercial service contracts under Stability Pathfinder phase 1 and the Mersey Voltage Pathfinder over 2020-21. Overall, we expect to save £29.4m in future balancing costs.
- 3F Capacity saved through operability solutions: We have successfully delivered the N-3 capability with UKPN and are now working to complete this project with WPD and SSEN. We are stepping up RDP developments and undertaking commercial design workshops with DNOs on the south coast, in addition to completing the high-level requirements for GEMS with SPT

# ESO delivery milestones

2020-21

April

May

June

July

August

September

October

November

December

January

February

March

Role 1

		Integrated Power Available signal integrated into control room systems		Go-Live of the Wider Access API		Competitive Black Start contracts awarded	First Technology Advisory Council was known as Design Authority	IFA2 interconnector goes live	Power Available Phase 2 implemented
Bagan hosting weekly COVID-19 webinars			Began Automated Constraint Optimisation trial service						TOGA replacement eGAMA went live
Trial of storage BMUs for reserve service	Began publishing the System Operating Plan			Phase 3 Flexibility trial	ESO Operational Forum		ENCC Transparency Roadmap	Balancing Mechanism (BM) Reserve from Storage Trial	

Role 2

First transaction through the BM Wider access	Implemented ODFM Service	Implemented CUSC mod CMP345 for BSUoS Support Scheme	Published five year view for TNUoS charging	Power Potential technical trials		GSR027: Review of the NETS SQSS Criteria for Frequency Control		ODFM 2021 consultation	ESO Markets Roadmap to 2025
	Grid Code change GC0143: Last Resort Disconnection of Embedded Generation	Hosted Power Responsive Summer Insights podcast series	Dynamic Containment soft launch			Dynamic Containment and STOR EBGL consultation	Unlocking BM Stacking in Dynamic Containment	Code Admin Survey 2020	Launch of daily STOR auctions
					C16 statements consultation and forum				Road to net zero electricity Markets Week

Role 3

Publication of operability benefits of VSM and related technologies	Held Early Competition workshops	Stability Pathfinder Phase 2 RFI published	Introduced NOA third party options		FES 2020 costing report		NOA document published	Constraints five-point plan webinar	Published tender for Pennine Pathfinder
	Published the ESO's first standalone Winter Review & Consultation	Future Energy Scenarios (FES) document published		Published EOI for Reactive Power in the Mersey region	N-3 intertripping goes live with UKPN		Early Competition Plan – Phase 3 consultation	NESOS project	DSO Strategy launch
			Winter outlook report published		Electricity Ten Year Statement (ETYS) published		Constraints Management Pathfinder tender	ESO becomes member of Energy Networks Association	

# **Annex: further context**



# The ESO Incentive Scheme

The End of Year Performance Report sets out the ESO's performance against its 2020-21 Forward Plan.

We have structured the evidence chapters of this report according to the three roles defined by Ofgem for the 2020-21 year, which correspond to our [Forward Plan for 2020-21](#):

- **Role 1 Control centre operations**
- **Role 2 Market development and transactions**
- **Role 3 System insight, planning and network development**

As set out in Ofgem's [Electricity System Operator Reporting and Incentive Arrangements \(ESORI\) guidance document](#), the Performance Panel will use four key inputs to evaluate the ESO's performance for each role.

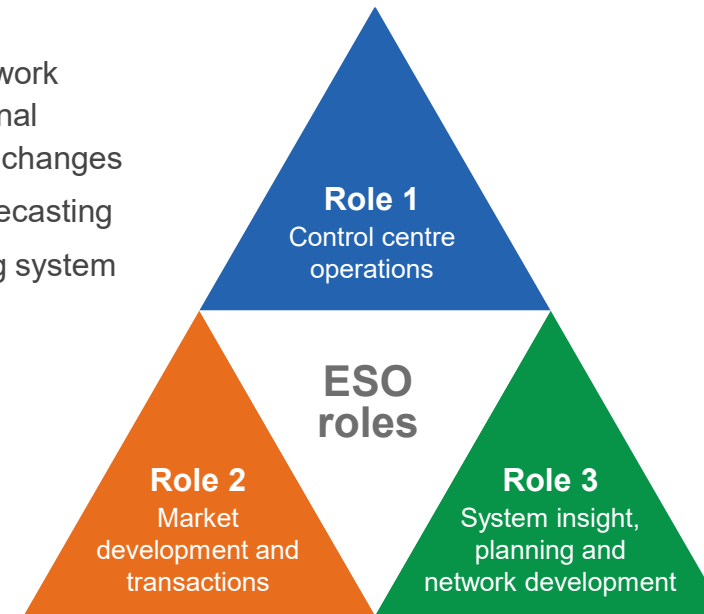
We have therefore sub-divided each role chapter to present our performance according to each of the following four categories:

- **Evidence of consumer benefits**
- **Stakeholder views**
- **Plan delivery**
- **Outturn performance metrics and justifications**

If you are not familiar with the ESO incentive scheme and Forward Plan, we recommend starting with the "Plan delivery" sections which give an overview of the projects which have been delivered.

### Role 1 activities:

- Operating the system (monitoring and dispatch)
- Coordinating with network operators on operational decisions and outage changes
- Short term energy forecasting
- Managing and sharing system data and information
- Restoration and emergency response



### Role 2 activities:

- Balancing and ancillary service market design
- Service procurement and settlement
- Revenue collection
- Policy advice and delivery of market framework changes
- Code administrator

### Role 3 activities:

- Long term forecasting, energy scenarios and identification of network needs
- Network Options Assessment
- Delivering competitive system solutions and early network competition
- Managing connections and generator access the network
- Whole system process development

# The ESO Incentive Scheme

For each role, the Performance Panel will assign the ESO a score on a scale of 1 to 5. Each role will then be assigned an incentive reward or penalty within the range of  $\pm£10m$ . The total incentive reward available to the ESO for 2020-21 therefore falls within the range of  $\pm£30m$ .

Our original Forward Plan was published in March 2020<sup>1</sup>. Although lockdown measures were already in place at the time, our plan did not reflect the impact that COVID-19 would have on our short-term priorities or ability to deliver against these commitments. Once we had more clarity on the impact of COVID-19, we hosted an industry webinar, and published the [Forward Plan Addendum](#) in July 2020.

The Forward Plan Addendum sets out a revised view of what the ESO plans to deliver during the course of 2020-21, taking into account the impact of COVID-19. We also took the opportunity to address the feedback provided by Ofgem in its [Formal Opinion](#), providing additional detail regarding our deliverables and making some of our metric benchmarks more ambitious. This report details our progress against the deliverables

and metrics set out in the Forward Plan Addendum. Please note that the Forward Plan Addendum does not completely replace the Forward Plan: the Forward Plan still sets out our ESO mission, our priorities for 2020-21, and how our activities benefit consumers: our progress in these areas is also covered in this report.

Although Value for Money does not form part of the incentive scheme for 2020-21, our Evidence Chapters document also provides a forecast of our outturn costs for 2020-21. The Regulatory Reporting Pack (RRP) remains the formal cost report for the ESO.





# Acting on feedback from Mid Year

Following the publication of our Mid Year report, we received feedback from Ofgem and the Performance Panel: both in a written report from the Performance Panel, and in subsequent discussions with both the Panel and Ofgem. We have welcomed the opportunity to discuss this feedback, and summarise below how we have acted on it.

Role	Feedback	Action taken	Relevant section of this report
All	Refocus on delivering all commitments in a timely manner, with a focus on identifying and delivering the highest value deliverables by the end of 2020-21.	We have delivered over three-quarters of the deliverables for 2020-21 set out in the Forward Plan Addendum. We frequently prioritise our projects to maximise consumer value.	Executive summary: Prioritising our Projects Evidence chapters: Plan delivery section
All	The ESO should link its activities to its RIIO-2 deliverables and long term vision	The Plan Delivery sections of the Evidence Chapters link this year's deliverables to RIIO-2 deliverables, and the Executive Summary shows how we are working towards our long term vision across both the Forward Plan and RIIO-2.	Executive summary: progress towards our ESO mission Evidence chapters: Plan delivery section
All	The Panel would like to see greater explanation of what the ESO has learnt from the COVID-19 pandemic (especially dealing with low demand) and particularly what this means for the ESO's delivery of its zero carbon operability ambition by 2025.	We have undertaken a lessons learned exercise: the outputs of this are summarised within the End of Year Report. Our <u>Operability Strategy Report</u> considers how this relates to the ESO's delivery of its zero carbon operability ambition.	Executive summary: spotlight on COVID-19 Evidence chapters: operating the electricity system through the COVID-19 pandemic
1	The Panel expects the ESO to do all that it can to minimise further increases in balancing costs over the final six months of the year and provide evidence of how it has done this at the end of year stage.	We have continued to optimise constraints, working with transmission owners to minimise the impact of planned outages, and continue to build our strategy. The DNV report <sup>1</sup> provides an independent view of our performance.	Executive summary: Deep Dive: Balancing Costs Evidence chapters: metric 1A
1	Stakeholders noted a need, in particular, for greater transparency on balancing costs and the ESO's control room decision making process.	We have provided increased transparency of balancing costs and control room decision making via the weekly ESO Operational Transparency Forum. We continue to find new ways of engaging with the market to describe the actions we are taking to minimise balancing costs.	Evidence chapters: role 1 stakeholder evidence

1. The full DNV report will be shared separately with Ofgem, as its contents are commercially sensitive.

# Acting on feedback from Mid Year

Role	Feedback	Action taken	Relevant section of this report
1	The Panel also expected greater justification for the ESO’s relatively poor wind forecasting performance and to understand what actions the ESO will take over the next six months to improve this.	We have undertaken a range of activities to improve our wind forecasting performance: these are detailed in our evidence chapters. Our overall performance for the year is “exceeding expectations”.	Evidence chapters: metric 1B
1	The Panel noted that the ESO was granted temporary regulatory flexibility for TERRE, however the delays have extended beyond this period. New timelines for deliverables that were reasonably delayed by COVID-19 reprioritisation have not been well communicated with stakeholders.	We formed the GB TERRE implementation group, developed scenarios to manage Brexit uncertainty, and following industry feedback have committed to focus on reserve and response reforms, and carry out a cost-benefit analysis of a GB-only replacement reserve product	Evidence chapters: role 1 stakeholder evidence and plan delivery, role 2 stakeholder evidence and plan delivery
2	The Panel strongly welcomed the ESO’s commitment to a forthcoming piece of work that will ‘join the dots’ to provide strategic oversight of how the various planned market reforms will come together and more clarity on the interaction between developments across Roles 2 and 3.	We have published the ESO Markets Roadmap to 2025, which we launched in March as part of an interactive multi-day stakeholder event, “the road to net zero electricity markets”	Executive summary: Deep Dive: Joining up our market reforms Evidence chapters: role 2 stakeholder evidence
2	The Panel would like to see more pace in delivering market reforms, whilst accepting the recognised challenges of implementing reforms, and would like the ESO to prioritise its focus to where it can deliver most consumer benefit.	We delivered Dynamic Containment, as well as Day Ahead procurement of DC and STOR. We consulted on the new Reserve Product Design, and kicked off industry co-creation on Reactive Power.	Executive summary: prioritising our projects Evidence chapters: role 2 stakeholder evidence and plan delivery
2	The Panel would like the ESO to move beyond simply communicating progress to stakeholders and do more co-creation with stakeholders on the market design of new products, building on the experience during the pandemic, in order to address market issues and create a level playing field.	We hosted an initial workshop for Reserve Reform in December, and followed this up with an initial Consultation which closed at the beginning of April.  We also held an initial webinar to kick off our Reactive Reform work, and then a follow up webinar detailing the plan for the year ahead, and development of the RFI to begin market research. Following the soft launch of DC, we held a consultation, responded to stakeholder feedback and enabled BM stacking with DC.	Evidence chapters: role 2 stakeholder evidence

Role	Feedback	Action taken	Relevant section of this report
2	On metrics, the Panel noted the poor overall performance on competitive procurement of balancing services. The Panel acknowledged the challenges faced in forecasting BSUoS during the COVID-19 pandemic but expects to see improvements over the final six months of the year.	<p>We have made good progress in increasing the competitive procurement of balancing services, but due to the design of the metric this has not resulted in significantly improved metric performance, either because a competitive approach results in reduced spend (so a lower percentage of spend is competitive), or because the reforms relate to services for future years.</p> <p>Our BSUoS forecasting performance improved during the second half of the year, and we have committed to clearer BSUoS forecasts as part of our 5-point plan for managing network constraints.</p>	Evidence chapters: metric 2A, metric 2E
3	The slow progress of the loss of mains work was also a noted concern for the Panel. Given the large consumer benefits associated with this work the Panel expects the ESO to treat this as a high priority and sees it as a critical deliverable for the end of year incentives outcome. The Panel understood that COVID-19 had impacted this work due to the need for on-site verification but expects to see the ESO step up its leadership of this work to make progress in engaging harder-to-reach generators.	Over 16GW of distributed generation is now engaged in the programme following a period of enhanced engagement over the winter. Over 12,000 sites have been contacted directly by DNOs and harder to reach stakeholders have been engaged through industry wide communications and energy supplier outreach via Energy UK and through Ofgem's Feed-in Tariffs (FiT) register contacts. Ofgem also assisted with direct contact with Renewables Obligation (RO) sites. The result has been an increase in engagement in the programme (with 1.7GW approved in window 6 compared to 1GW in window 5) and we are now on track to deliver savings this summer - more than 12 months before the programme's compliance deadline in August 2022.	Evidence chapters: role 3 stakeholder evidence and plan delivery
3	Feedback from TOs, particularly on the pathfinders and early competition, was poor. The Panel recognised that the TOs are involved in putting forward projects for consideration in these processes, but as licenced network operators, TOs also have a role to play in working with the ESO to ensure these processes are well designed and run effectively	We have engaged with directly with the Transmission Owners (TOs) and via the Energy Networks Association (ENA). We will continue to seek to develop solutions which are in the best interest of consumers, although we acknowledge that this may not always be consistent with the Transmission Owners' preferred approach.	Executive summary: Deep Dive: NOA Pathfinder Projects Evidence chapters: role 3 stakeholder evidence
3	As the pathfinders are based on 'learning by doing', the Panel also expects to see evidence that learning gained so far is shaping the future direction in order to maximise benefit.	We have published a "lessons learned" document for the Mersey Pathfinder. Lessons learned from the voltage and stability pathfinders have been factored into the NOA methodology.	Executive summary: Deep Dive: NOA Pathfinder Projects
3	The Panel would like to see the ESO set out a clear plan to manage constraint costs.	We have put together a 5 point plan for managing constraints, which we have shared with industry in a webinar and blog.	Executive summary: Deep Dive: Balancing Costs Evidence chapters: role 3 stakeholder evidence

# Deep Dive: Balancing Costs during 2020-21

During 2020-21 our outturn balancing costs have been significantly higher than the benchmark. We explain here the drivers behind the high costs, and the actions we have taken during the year. These drivers are also explained in our [Operability Strategy Report](#).



Consultants DNV carried out an independent review of the costs we incurred over the year. Their report, which we have shared with Ofgem but cannot publish for commercial reasons, states:

“We have analysed the commercial features (price, competitiveness, market depth) of the Balancing Mechanism (BM) and Trade mechanisms which NGENSO actively used and do not identify any material issues.”

Challenge	Explanation of challenge during 2020-21	Actions taken during 2020-21
<b>Voltage</b> issues exacerbated by unprecedented low demand	<p>The effect of the Pandemic has suppressed demand throughout the year, but particularly so during the summer, where traditionally lower demands were greatly suppressed to reach unprecedented levels.</p> <p>The structure of the market means generation should approximately equal demand following the Day Ahead auction. However this position may not be operable. During low demand periods, less synchronous generation will self-dispatch due to price signals. There were many periods over the Summer when the only synchronous generation self-dispatching was the nuclear and biomass units.</p> <p>The voltage support required, which in specific locations is provided by synchronous generation, required additional intervention due to the lack of self-dispatching generation.</p>	<p>The Short Term Mersey Pathfinder provided a 1 year service from April 2020 to manage the specific voltage requirement in the Mersey region. Contracting for this service allowed cost efficiencies over trading actions or use of the Balancing Mechanism due to the persistent nature of the requirement.</p> <p>Trading actions are taken where cost-efficient to take advantage of the more certain nature of the requirement in the hours ahead of real time.</p>

# Deep Dive: Balancing Costs during 2020-21

End of Year Performance Report / Deep Dive: Balancing Costs during 2020-21

Challenge	Explanation of challenge during 2020-21	Actions taken during 2020-21
Inertia requirement exacerbated by unprecedented low demand ( <b>stability</b> )	Our ability to maintain inertia levels at 140GVA.s was impacted by the lack of self-dispatching synchronous generation. This meant that additional intervention was required to ensure sufficient synchronous generation. In addition to managing the RoCoF risks on the system, the Vector Shift risk was also active on many occasions, particularly during periods of high solar PV output. This further increased the actions required.	When considering what actions were required to meet the inertia requirement on the system, the operability of the whole system was considered. This meant that decisions made about which units to synchronise for voltage were taken in line with decisions about which units should be used to meet the inertia requirement. This resulted in the least total cost solution which met all the operational requirements.
Downward flexibility exacerbated by unprecedented low demand ( <b>frequency</b> )	Having identified the required volume of synchronous generation needed to meet the voltage and inertia requirement, the downwards requirement was then exacerbated. It was then necessary to take generation off the system to allow this additional generation to come on, whilst maintaining the ability to turn down further if demand drops (footroom). This generally involves turning off wind or selling across the interconnectors into low demand European markets at negative prices. This was a particular challenge during Summer 2020 due to the very low demand and large volume of inflexible generation on the system.	Once the actions required to meet the inertia and voltage requirements have been considered, the downwards requirement is also taken into account. Looking at these 3 separate requirements together enables an optimal solution to be reached at least cost and considering all the requirements.  Early in the pandemic, we identified a requirement for additional downward flexibility in order to operate at the very low demand levels forecast. We asked market participants to offer what they could and developed a new service. Optional Downward Flexibility Management (ODFM) was a rapidly developed service which allowed us to reduce the output of distributed energy resources (DER). This was used on a number of occasions where it was assessed to be required. We also entered into a contract with EDF to de-load a unit at Sizewell to reduce the inflexible generation on the system.
Wind output and constraints ( <b>thermal</b> )	Large volumes of wind provide energy without contributing inertia or voltage support. In many cases, they are connected to areas of the system requiring additional reinforcement or infrastructure. The system is further depleted during the reinforcement works. The subsidies paid to encourage renewable generation need to be recouped by the generators if they are not allowed to generate, this can lead to highly negative bid prices and subsequently high costs to manage constraints on the system due to the large volumes of actions required to be taken at highly negative prices.	Improvements to wind forecasting, as described in the metric 1B narrative in the Evidence Chapters, allowed optimisation of short term outages to avoid constraining wind where possible.  Many examples of cost saving actions related to constraint costs are captured as part of the Customer Value Opportunities metric (1E) which include network reconfigurations, enhanced ratings and adjustments to outage durations.
Tight margins and subsequent high accepted offer prices ( <b>frequency</b> )	The increased penetration of renewables and lower demands before and during the COVID-19 period have tightened margins as traditional generators have closed down. With wind reaching 17.5GW in February and solar over 9.5GW last April some older, less efficient generators have closed down or mothballed. However wind and solar are volatile, and when these are low margins have grown increasingly tight, resulting in a lack of options provided by the market and subsequent high prices.	The Operational Transparency Forum has been used to communicate about operational challenges since the start of the COVID-19 period. Following the very low demand periods of the Summer, the situation quickly switched to high demands and tight margins periods. We regularly discussed the ongoing challenges with market participants at the Operational Transparency Forum, and also formed internal market meetings to discuss and agree strategy at the earliest opportunity and to track actions taken. We identified outages driving constraints which were sterilising headroom, and worked with the Transmission Owners to re-plan these outages where possible.

# Deep Dive: Deliverables impacting Balancing Costs

Many of the drivers of high balancing costs will be addressed by the deliverables we are progressing.

Challenge	Longer term deliverables which address this challenge
Voltage issues exacerbated by unprecedented low demand	<p><b>Long term Mersey pathfinder:</b> we awarded a 9-year contract for reactive power services in the Mersey region from April 2022, which we expect to save the consumer approximately £1m (10%) over the 9-year contract term.</p> <p><b>Pennines Pathfinder:</b> The next NOA voltage Pathfinder seeks to find the most economic way of addressing future voltage issues in the Pennine and Northern England region. Please see our role 3 case study for more detail.</p>
Inertia requirement exacerbated by unprecedented low demand	<p><b>Accelerated Loss of Mains change programme:</b> reducing the number of generators with inappropriate loss of mains protection settings will reduce the volume of generation at risk of disconnecting in response to a large loss. This change will alleviate Rate of Change of Frequency (RoCoF) and vector shift constraints, now the dominant factor when managing system inertia. Our Mid Year Report quoted that this would save consumers more than £170m per year from 2022-23. Our assessment of the vector shift risk has reduced from over 1000MW down to less than 700MW meaning we expect costs associated with vector shift to be zero for 2021-22, a saving of over £20m per year. RoCoF risk reduction benefits will be delivered progressively over 2021. To accelerate the rate at which generators make the changes, the Programme introduced a 'fast track scheme' (which pays generators that meet priority criteria additional remuneration if they are able to complete the work within four weeks of applying for funding) increased its direct engagement with high value generators and enhanced the general communications and engagement activity targeted at smaller players. Engagement rates have increased as a result.</p> <p><b>Stability Pathfinders:</b> the Stability Pathfinders procure inertia, which will mean that fewer actions will be needed in the Balancing Mechanism to address system stability. The Phase 1 stability pathfinder secured 12.5GVAs of inertia until March 2026, which is expected to save consumers between £52m-£128m over this period.</p> <p><b>Inertia measurement:</b> real time inertia monitoring capability will come online in summer 2021, enabling our control room to optimise the actions taken for stability.</p> <p><b>Frequency Risk and Control Report (FRCR):</b> this establishes a process for assessing reliability vs cost in frequency response and inertia holding to ensure the best outcome for consumers. It allows the ESO to identify improvements and deliver the full value of new products (e.g. Dynamic Containment) and risk reduction initiatives like the Accelerated Loss of Mains Change Programme</p>

## Deep Dive: Deliverables impacting Balancing Costs

Challenge	Longer term deliverables which address this challenge
Downward flexibility exacerbated by unprecedented low demand	<p><b>Optional Downward Flexibility Management (ODFM) for 2021-22:</b> as there are credible worst-case scenarios for summer 2021 where we may experience low demands requiring additional downwards flexibility which cannot be provided by our existing toolkit, we have brought forward a new ODFM service.</p> <p><b>Reserve Reform:</b> we are developing a new suite of reserve products and moving the procurement of reserve closer to real time which will facilitate participation of intermittent generation, amongst others. Improved products and increased competition will reduce costs for end consumers.</p>
Wind output and constraints	<p><b>ESO-led commercial solutions in NOA:</b> we are identifying new commercial solutions which flexibly deliver constraint boundary benefits, reducing balancing costs in the short to medium term. The flexible nature of commercial solutions allows us to recommend options over different durations, with relatively small capital investment, and can be used to bridge the gap between the recommendation and asset delivery which delivers the long term solution(s).</p> <p><b>Constraint Management Pathfinder:</b> we are seeking commercial solutions to reduce operational costs associated with constraint boundaries, such as the B6 boundary between Scotland and England, ahead of the delivery of the eastern HVDC link which will increase the capacity of this boundary.</p> <p><b>Our five-point plan for managing constraints</b> also includes improving our forecasts of BSUoS charges, working with regional networks on a whole-system approach, exploiting storage potential in a heavily constrained network, and continuing to improve our existing network by recommending improvements via our Network Options Assessment (NOA) process.</p>
Tight margins and subsequent high accepted offer prices	<p><b>Electricity Market Reform:</b> the ESO is aiming to maintain security of supply whilst minimising cost to the end consumer. The Delivery Body's analysis determines how much capacity is needed in future years to maintain security of supply, and then a competitive auction process is run.</p> <p><b>Future Energy Scenarios:</b> the ESO sets out four credible scenarios for generation and demand patterns, over the coming years. This plays a role in stimulating debate and helping to shape the energy system of the future.</p> <p><b>Learning from previous experience:</b> the ESO will review the period of winter 2020-21, including a review of the winter outlook analysis, Market Notices, and the performance of the generation portfolio.</p>

# Deep Dive: Joining up our market reforms

The ESO published a brand new document, [Markets Roadmap to 2025](#) in March 2021. The roadmap sets out an overview of our transformational plans from today to 2025 for those markets in which we play a key role.

- The Markets Roadmap to 2025 was developed in order to provide clarity and transparency on the ESO's plans to reform markets through to 2025. The scale of change across the industry means that it is important that we provide information about how our work will be co-ordinated with other reforms going on elsewhere across the industry.
- Decarbonisation targets in the power sector require a fundamental shift in how market participants interact with the electricity system. These changes require enhanced market arrangements, and we believe that the Markets Roadmap to 2025 publication would enable us to enhance the transparency around our plans and decisions in order to provide reliable and cost-effective market outcomes. As part of this process, we are aiming to continue to build trust and our partnership with our stakeholders in order to jointly remove market barriers.
- We published this roadmap during our [Road to Net Zero Electricity Markets week](#), when we presented a series of interactive online events helped attendees learn about the ESO's plan around developing existing and emerging markets to enable the transition to Net Zero. As sets out in the roadmap, ESO's ambition is to design market arrangements in order to facilitate security of supply at the lowest cost for consumers while meeting our carbon emission targets. Within only three weeks from publishing the roadmap we experienced over 500 unique downloads.
- In the roadmap we clearly defined four design principles in order to achieve our ambition:
  - Markets should be **competitive** and **accessible**
  - Markets should be **transparent**
  - Markets should operate **fairly**
  - Markets should be **coherent** and **interoperable**



## Deep Dive: Joining up our market reforms

- For the first time, we explored our roadmaps from today to 2025 for different markets that we own and administer including: Frequency Response, Reserve, Thermal, Reactive Power, Restoration, Stability, Balancing Mechanism, and Capacity Market. For each deep dive we set out a breakdown of information:

Breakdown of Information	Why
Our clear visions for specific markets in 2025	Illustrating a clear vision of the future where the electricity system can operate carbon free with competition everywhere and we act as a trusted partner
Key drivers for reform	Listing tangible reasons for future market developments across the industry
How operational needs are changing	Painting a clear pathway between the status-quo and 2025 time horizon focusing on operational requirements
The value of the market	Sharing new information for the first time with the wider industry in order to enhance transparency and assist them with shaping their business case
Stakeholder involvement in those markets	Capturing upcoming events and useful links relevant to each market in order to enhance market participants' involvement
A roadmap of related activities through to 2025	Providing a single version of truth and holistic overview of the future activities and milestones for each market through to 2025

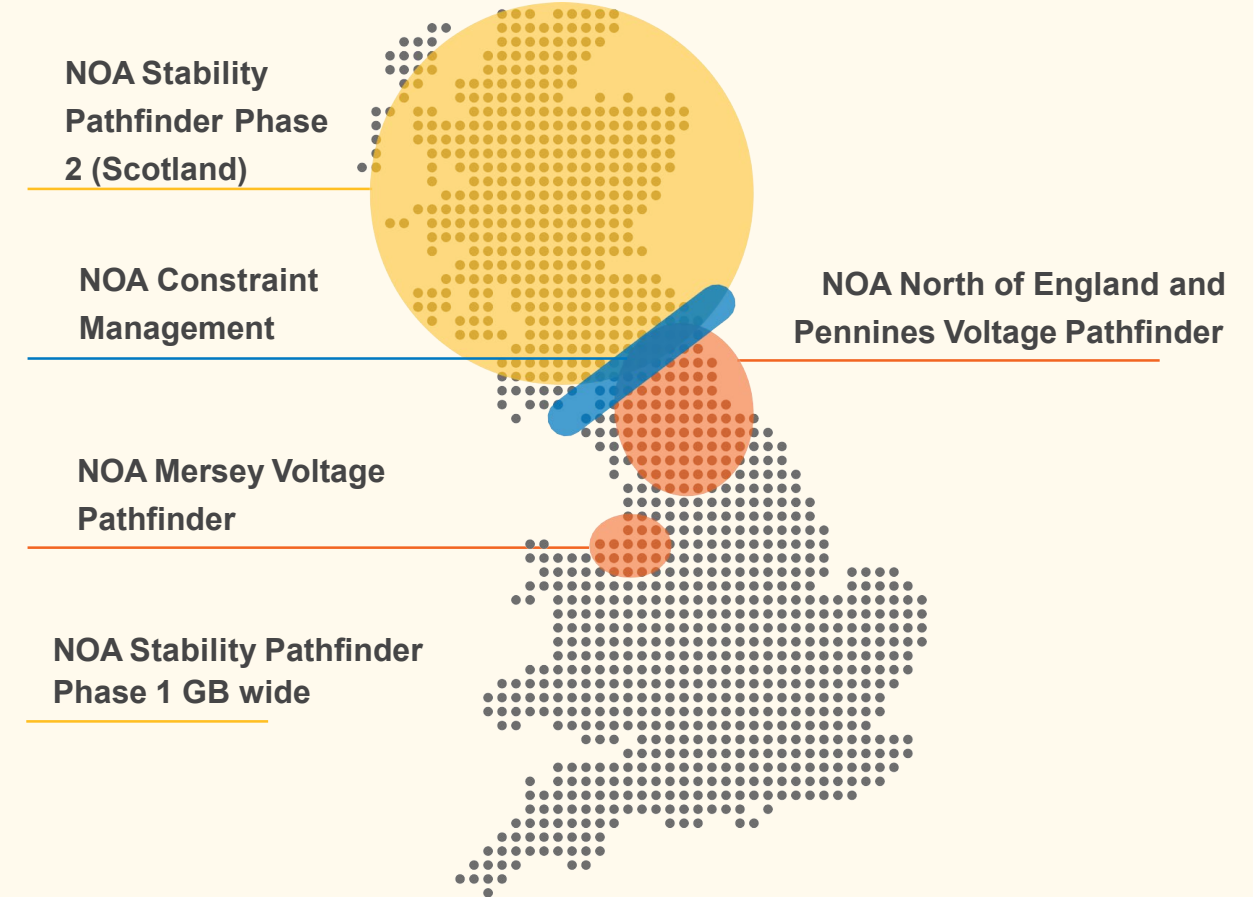
- For the first time, we started exploring some key interactions between ESO electricity markets and those in the wider industry. In line with our “coherency” principle, we believe having a coordinated and interoperable markets would bring added value to consumers. In this case, we are committed to build government and wider industry strategies for energy into our long-term planning and market development activities. Additionally, we recognise the benefits digitalisation can bring to enhance transparency across our markets.
- We also launched our Markets Roadmap to 2025 [webpage](#), a home for engaging with the wider industry including upcoming surveys and co-creation activities around market development. We are also committing to regular updates on our plans as part of a more extensive engagement programme in 2021.

## Deep Dive: NOA Pathfinder projects

The ESO has undertaken 6 NOA Pathfinder projects so far. These projects take an approach of “learning by doing”, and we are continually evolving our processes to ensure that we deliver the best solution for the end consumer.

### Milestones and long term aims

- The purpose of the Pathfinders is to procure the services we need from non-traditional sources. They have the benefits of reducing costs for consumers, and not bringing additional carbon onto the system for operability reasons. In certain areas, it has been necessary to act quickly for compliance reasons.
- The Pathfinder projects are seeking to introduce competition into services that traditionally may have been provided by the Transmission Owners (TOs). Each Pathfinder has a specific aim, and the relationship between the short-term deliverables and long-term aims is set out in the timeline on page 37, which also shows the progress we have made on each Pathfinder.
- Our Pathfinder projects interact with the market reforms we are pursuing under role 2. The relationship between the different pieces of work is set out in our ESO roadmap to 2025, which is covered earlier in this report. The Pathfinders seek solutions to operability issues in the medium term, and the reforms seek to develop new markets (e.g. for stability) to address these issues in the longer term.
- The Constraint Management Pathfinder has the primary objective of reducing costs to consumers. In seeking to address these issues and ensure that we would be able to operate the power system securely and economically, we pursued an ambitious timetable, accepting that challenges would arise as we progressed, and that our approach would evolve as we learned.
- We are continuing to develop our tools, which will help us to identify future network needs. We have recently achieved milestones in the development of probabilistic modelling, benchmarking our new tools with existing tools. We are also working with Strathclyde university on voltage modelling processes, and in the next year we will be starting to develop and code these tools to improve our ability to understand where voltage issues are likely to arise in the future. These activities will inform the choice of future Pathfinder projects.



## Deep Dive: NOA Pathfinder projects

### Experience gained

- Codes and frameworks: The Stability Pathfinder was the first tender of its kind in the world. We needed to act quickly to ensure the system remained operable, but the industry frameworks were not yet able to accommodate the new solution we had proposed. We were therefore faced with the challenge of developing our ideas in parallel with considering how the industry frameworks would need to adapt to accommodate them.
- Volume of applications: the Pathfinders will drive consumer value by introducing competition to new areas. We were therefore pleasantly surprised that over 1500 solutions were submitted for our recent Phase 2 Stability Pathfinder. This indicates considerable liquidity in the market, which should result in a cost-effective solution for the end consumer. However, there is significant workload associated with assessing this volume of applications, both for the ESO and the Transmission Owners. This has meant that we have had to review the scope and timeline of the Transmission Owner connections review stage of the tender which has an impact on the overall tender timescales. We are working hard with Transmission Owners to streamline the scope of the connection review to minimise this impact and will update the industry as soon as possible.
- We also recognise that the locational element of these tenders, coupled with the high likelihood that these services will be provided by new build solutions, means that there is inherent pressure on the connection process for all parties. We will therefore work with the Transmission Owners to investigate proposals for any rule changes that might better meet the needs of connectees and Transmission Owners when tendering for Pathfinder solutions.
- Complexity: The original Pennines Pathfinder was evaluated using a complex method that would mean the final requirement was evaluated as being greater than the actual need. We therefore simplified and reduced levels of interactivity across the Pennine and North of England regions so that we would tender for two distinct sub-regions, simplifying what we will provide to the market, and what we will ask of providers. Further detail is provided in the case study in our Evidence Chapters document
- Sharing our lessons learned: we shared our learnings with the industry for the Long Term Mersey Pathfinder. The learnings from Phase 1 of the Stability Pathfinder fed into the RFI for phase 2. The July 2020 NOA methodology incorporated lessons learned from Stability Phase 1, and the next update to the NOA methodology will incorporate lessons learned from Stability Phase 2. Learnings from Phase 2 will also feed into Phase 3.

## Deep Dive: NOA Pathfinder projects

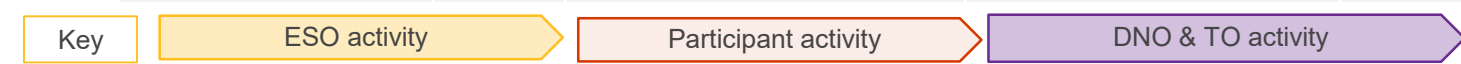
### Stakeholder interactions

- We recognise that the Pathfinders have a significant impact on Transmission Owners: each tender brings additional workload in assessing the options. The projects also introduce competition to areas of operability need which may traditionally have been met by Transmission Owner assets. We recognise that there is room for improvement in the process of assessing tender submissions, and are keen to take on board Transmission Owners' feedback.
- The issues generated through the learning by doing approach have affected stakeholders and customers. In the ESO we have continuously sought to raise issues with Ofgem, offering our view on potential ways forward: for example on removal of TNUoS charges for third party reactive asset provision, levelling the playing field. Other issues remain, and we are working closely with the Transmission Owners on connection assessment related issues and maintain a regular senior leadership dialogue in this area. Please see the Role 3 stakeholder evidence section for more detail of our stakeholder interactions

### Maximising consumer benefit

- Throughout the Pathfinder process, the ESO has focussed on the highest priority issues in order to deliver the greatest benefit to consumers. The key type of consumer benefit here relates to Security of Supply: the Stability, Pennines and Mersey Pathfinders all primarily address compliance requirements to ensure that the system remains operable. Due to the competitive nature of the tender process, we expect each of these projects to result in a lower spend than would have been incurred by seeking to address these issues in the short term market, and in some situations the short term market may not have been able to meet the operability requirement.
- The Constraint Management Pathfinder seeks to achieve lower costs for consumers than would otherwise be the case. As high costs were already evident, the first year of this service focussed on deliverability of solutions, which used existing infrastructure including the intertripping scheme: this ensured that a solution could be implemented in a short timeframe to protect consumers from the high costs that would otherwise be incurred in the coming years. We recognise that this is a first step and for timescales further in the future, we will focus on opening the tender to all participants who can provide the service, creating a level playing field to increase liquidity and drive further consumer value.
- The case study in our Evidence Chapters provides more detail about how we have sought to maximise the consumer benefit delivered by the Pennines Pathfinder.

	Description	Mar 21	Q1 21/22	Q2 21/22	Q3 21/22	H1 - 22	Size	Eligibility	Status						
Stability Phase 1	Procurement of stability contracts which can be delivered in shorter timescales to support national inertia		Contracts were due to start between April 2020 and April 2021, but there were delays due to COVID					12.5GVAs £328m for up to 6yr contracts	GB wide stability tender open to anyone available from April 2020 to April 2021. Limited to mature technology only (TRL=9)	Tender closed and contracts awarded. Delays in service delivery linked to COVID-19					
Stability Phase 2	Procurement of stability contracts to meet our short circuit requirement in Scotland. Comparison of commercial and asset solutions.		Participant feasibility study	Feasibility assessment	An update to the remaining process timeline is currently being agreed with the TOs due to the impact on workload of the very high level of applications received during the Expressions of Interest stage			Up to 8.4GVA Up to 8yr contracts	Available to solutions connected in Scotland Open to transmission connected solutions (132kV and above) Targeting short circuit levels (SCL), dynamic voltage and inertia at regional level	Open to wider set of technologies than Phase 1 Expressions of interest closed 8 January 2021 (29 participants) Solutions to be delivered from April 2022 Open to service providers and network owners					
Stability Phase 3	Procurement of stability contracts to meet our short circuit and inertia requirement in England and Wales. Comparison of commercial providers and regulated assets.		Tech spec consultation	Finalise tech spec	Publish final tech spec	Publish tender	Create tender pack	Technical and commercial tender submission	Tender assessment	Tender award	Contract award	Approx 8 year contract Size TBC	Analysis is being completed to confirm where and when we forecast stability needs in England and Wales  Targeting short circuit levels (SCL), and inertia at regional level	The procurement approach will be based on the output of the analysis and will build on learning from previous pathfinders.  As this Pathfinder is in the preparation stages please note this timeline is subject to change.	
LT Mersey Voltage	Procurement of reactive power in Mersey region to meet SQSS compliance. Comparison of commercial providers and regulated assets.									Contracts start April 2022		240 MVA ~£10m for 9yr contract	Enduring solution for Mersey high voltage need Open to service providers and network owners Open to both distribution and transmission levels – solving a transmission system need Solution from April 2022	Tender closed – contracts awarded 22 May Service delivery could be delayed – short-term tender from April 2021 aims to cover the uncertainty	
LT Pennines Voltage	Procurement of reactive power in North East to meet SQSS compliance and economic benefit.		Publish tender	Technical submission	Technical assessments	TO connection review	Commercial submission	Commercial assessments	Connection review	Contract award	Contracts start April 2024		700+ MVA 10yr contracts	Enduring solution for 2 regions in North East for high voltage need Open to service providers and network owners Open to both distribution and transmission levels – solving a transmission system need Solution from April 2024	Tender published 26 March 2021
Constraint Management	Procurement of post-fault constraint service in Scotland and Northern England to deliver economic benefit until delivery of Eastern HVDC		TO feasibility study	Technical submission	Draft contract terms consultation	Commercial submission	Commercial assessment	Sign contracts	Contract award	TOs connect units to tripping scheme	Contracts start Oct 22		Up to . 800MW Annual contracts	Thermal constraint management service open to anyone who can deliver the service in ~18 months time Creating a post-fault intertrip market Post-fault service for at least 800MW	No longer a dual location service Service from 2022 Annual tender





Thank you for reading our End of Year Report.  
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For further details on the ESO incentive scheme, please visit our website at <https://www.nationalgrideso.com/our-strategy/how-were-performing>  
You can also find our Forward Plans at <https://www.nationalgrideso.com/our-strategy/forward-plan>