October 2020

Forward Plan 2020-21

Mid Year Performance Report

nationalgridESO

Welcome

Welcome to our Mid Year incentives report for 2020-21.

Foreword

In this report, we look back over a challenging six months where we all saw the COVID-19 pandemic impact on every aspect of our lives. This resulted in a fundamental change to our ways of working, as a result of social distancing rules, as well as unprecedented changes to the usage of electricity requiring our teams to act quickly to resolve a set of complex engineering challenges to ensure that we could keep the lights on.

At the outset of the COVID-19 pandemic, we set out our priorities, the highest of which was to keep our people safe. We were proactive in introducing social distancing across all of our teams, and introduced additional measures to reduce risks for our operational staff.

Our next priority was to ensure that the electricity system remained secure and operable during this time: this constantly-evolving role was made more difficult by changing demand patterns, as well as record-breaking low demands with a high proportion of non-synchronous generation. However, our analysis of the expected changes in demand patterns enabled us to design and implement several tools to manage the low demands, many of which have been used over the summer period.

We have therefore delivered several large pieces of work which were not anticipated at the time of producing the Forward Plan, but which took priority due to their critical role in ensuring system security. However, we have also progressed many of the activities we defined in the Forward Plan as priorities for 2020-21, and hope to continue this progress during the second half of the year.

Despite the immediate challenges we have faced so far this year, we have not lost sight of our long term vision, and we have taken significant steps towards an electricity system that can operate carbon free. We outline our progress on this and our other 2025 ambitions (a whole system strategy that supports net zero by 2050, competition everywhere, and becoming a trusted partner) in the annex of this Executive Summary.

We hope that this report finds you well, and that we have provided you with the information and support that you have needed from us this year. We look forward to continuing to work with all our stakeholders as we overcome the complex challenges of 2020, and work towards engineering the energy system of the future.

Fintan Slye

Director, Electricity System Operator

Contents

For further information, please see our Evidence Chapters document

Executive summary

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

Evidence of consumer benefits

- Code modifications raised to defer additional BSUoS charges associated with additional services resulting from COVID-19, with £16m of support provided so far
- Short Term Mersey Voltage Pathfinder progressed for next year, with EOI published. The contract put in place this year has ensured SQSS compliance and saved £3m+ over the first 5 months of the contract
- New Optional Downward Flexibility Management (ODFM) service was instructed on 5 days, meeting a shortfall in downwards margin which would have otherwise required emergency actions to be taken

Plan delivery

- Operated the system safely and securely during the COVID-19 pandemic, prioritising work to address new operability challenges experienced due to low demands.
- Wider Access API went live with Tesla as the first industry partner
- New Dynamic Containment product developed (and launched on 1 October)
- Progressed Loss of Mains protection programme
- Progressed actions identified following power outage of 9 August 2019
- Handled an increased volume of connection applications despite challenges of COVID-19
- We have taken significant steps forward with our Pathfinder projects, addressing voltage issues in the Mersey region, seeking long-term solutions to stability issues in Scotland, and exploring the potential to introduce a long-term commercial product to manage network constraints.
- Delivered changes to industry frameworks to facilitate the energy transition, and provided thought leadership on charging issues

Stakeholder views

- We have expanded the range of data on our Data Portal in response to stakeholder feedback, including machine-readable System Operating Plans
- The Operational Transparency Forum has provided unprecedented levels of transparency of our data and decision making
- Dynamic Containment product developed and launched with significant support from industry
- Captured stakeholder feedback on design of ODFM service: this will be factored into our Reserve Reform activities.
- Code Administrator improvements completed and have been positively received
- Extensive engagement and consultation with industry on our Early Competition work

Outturn performance metrics and justifications

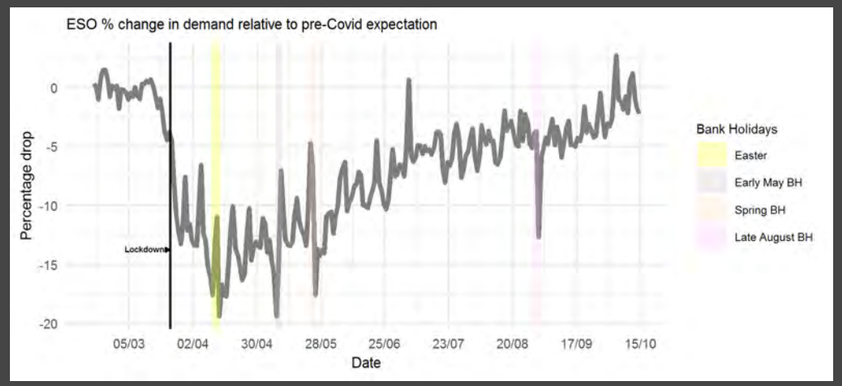
- Our Balancing Costs, Demand Forecasting and System Access Management metrics have been adversely impacted by COVID-19
- Future balancing costs saved by operability solutions: We successfully released commercial service contracts under Stability Pathfinder phase 1 and the Mersey Voltage Pathfinder over 2020-21, where we expect to save £21.3m in future balancing costs
- We are exceeding expectations for Code Administration Stakeholder Satisfaction and Charging Futures, providing a valuable service to our stakeholders
- Security of Supply and Customer Value Opportunities metrics are Exceeding Expectations, despite challenges associated with low demands due to COVID-19

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.

Impact of COVID-19

Electricity system operation during COVID-19

Record low demand: COVID-19 resulted in dramatic changes in electricity demand, with 15% reductions experienced during the first months of lockdown. An all time record low national electricity demand of 13.4 GW was seen on 28 June. Low demands and associated uncertainty meant that there was a risk that we could not operate the power system securely with our existing suite of tools.



Reacting to operational challenges: We acted quickly to develop a number of unplanned new commercial products to manage the operational challenges on the electricity system. This includes:

- A new commercial product designed, developed and implemented within a few weeks, bringing a time-limited product to market allowing the ESO additional flexibility to reduce demand.
- The development of a cost-reflective contract with EDF to reduce output at Sizewell B nuclear power station, creating space on the system and delivering financial and operational benefits.

Impact on Balancing Costs: balancing costs experienced during the 6-month period from April to September 2020 have been significantly higher than the benchmark, and significantly higher than the costs incurred in previous years.

We understood the impacts of higher costs, and to support the market we also led and implemented code modifications to defer additional BSUoS charges associated with additional services resulting from COVID-19, with £16m of support provided so far.

Our analysis has shown that our actions in procuring new services were effective in keeping balancing costs lower than they would otherwise have been.

In its independent review of the precautions and actions taken by the ESO to ensure security of supply during summer 2020, DNV GL stated that it…

"has found ESO well prepared to meet a probable extremely low demand scenario, in combination with a high level of renewable generation and reduced traditional synchronous generation. By building on existing approaches and ways of working and thinking around the operability challenges to tackle the unprecedented COVID-19 scenario, ESO has and is able to react in an agile fashion and bring about an approach to deliver analysis and requirements for this extreme situation."

Role 1:
Control centre operations

During the first half of 2020-21, we have operated the power system securely, efficiently and transparently through the unprecedented situation caused by the COVID-19 pandemic.

Roisin Quinn, Head of National Control

The COVID-19 pandemic has had a wide-ranging impact on system operations, leading to record-breaking low demands and changing patterns of energy usage, as well as changes to our control room operations to ensure that our colleagues have been kept safe.

During this time, our teams have worked tirelessly to ensure that the power system remains operable. This has included developing new services such as Optional Downward Flexibility Management (ODFM), setting up a contract with Sizewell power station, and revising our predictions of likely demand levels. Throughout this time, we have kept our stakeholders informed by hosting weekly webinars.

Although we have seen high balancing costs this summer, our analysis has shown that our actions in procuring new services such as ODFM were essential in maintaining security of supply, and other services such as the Sizewell contract were effective in keeping balancing costs lower than they would otherwise have been. Our Demand Forecasting team studied the effect of lockdowns across Europe on energy usage, and our initial estimates that demand levels could be as low as 80% of what otherwise would have been expected were proven to give a good view of conditions during the period where demands were at their lowest.

Despite the challenges we have faced due to COVID-19, I feel we have made great steps forward in improving the transparency of the decisions made in the Electricity National Control Centre (ENCC). We have focussed on decisions (looking at how we make choices at and approaching real time, and looking at details of specific decisions), data (putting more data and information onto the portal, starting with the areas that are most important to stakeholders), and discussion (cementing the additional engagement introduced at the start of the lockdown period, so that the weekly webinar and operational meetings with Distribution Network Operators became a regular part of our week).

We know that accurate information is the key to efficient operation of the power system, and important to our customers and stakeholders. We have published an updated roadmap for the Platform for Energy Forecasting programme, and are working towards delivering improved, more granular forecasts in line with this roadmap.

Control centre operations

Role 1:
Control centre operations

continued

Our IT programme was impacted by the actions taken to manage COVID-19, for example recalling expert control room users to work in the control room rather than supporting projects. Despite these challenges, we have successfully delivered a new IT interface to widen access to the Balancing Mechanism for small generators (introducing a web-based route for non-traditional participants), and delivered the first phase of Power Available, integrating signals from over 100 renewable generators into our control systems and processes to provide greater visibility to our control room engineers.

We also went live with Phase 2 of the Ancillary Services Dispatch Platform (ASDP), which is part of the Platform for Ancillary Services (PAS) programme.

However, changes to the IT programme impacted our delivery of project TERRE, of which more detail is set out under Role 2.

We have made great progress towards our ambitions this year. I'm really proud of our increased transparency, taking us closer to being a Trusted Partner. This has included more stakeholder engagement, more information (including the System Operating Plan (SOP)) being available on the Data Portal, officially launching our Carbon Intensity App, and progressing a tool to allow us to publish skip rates in the future.

This summer, we have been able to accommodate a high proportion of renewables on the system, operating the network at a peak value of 85.5% low carbon technology during August. This experience, along with trialling new services such as downwards regulation from batteries, has moved us closer to our ambition of being able to operate a carbon free system.

During the rest of the year, I look forward to seeing the completion of our remaining planned IT projects, as well as learning from the experience of balancing the system in challenging conditions this summer to ensure that we are able to operate a carbon-free system in the future.

Roisin Quinn, Head of National Control

"Opening of the BM to new participants through the new API is an exciting moment for renewable and zero carbon flexibility technologies." - provider

Control centre operations

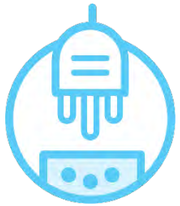
Role 1:
Highlights

Evidence of consumer benefits

- Wider Access API has removed barriers to market entry, making it easier for new parties to participate in the Balancing Mechanism
- New ODFM service was instructed on 5 days, meeting a shortfall in downwards margin which would have otherwise required emergency actions to be taken
- Power Available signal from 105 renewable generators integrated into our control systems and processes, improving situational awareness in the Control Room

Stakeholder views

- Wider Access API went live on 17 September in close collaboration with industry partners
- We have expanded the range of data on our Data Portal in response to stakeholder feedback, including machine-readable System Operating Plans
- We are developing a plan for increased transparency of dispatch and trading decisions
- The Operational Transparency Forum has provided unprecedented levels of transparency of our data and decision making



Plan delivery

- Operated the system safely and securely during the COVID-19 pandemic
- Wider Access API went live with Tesla as the first industry partner
- Increased transparency: weekly webinars, System Operating Plan (SOP) publication, progress towards “skip rate” tool
- Power Available signal integrated into Control Room systems and processes
- Updated Platform for Energy Forecasting (PEF) roadmap and improved our forecasting capability
- Three phases of flexibility trials for battery storage
- Second phase of Ancillary Services Dispatch Platform went live
- New release of Platform for Ancillary Services (PAS)
- 3 Virtual Lead Parties (VLPs) actively participating in the BM through the Wider Access arrangements, and in conversations with 19 participants who would like to use the VLP route.
- Disappointed in delays to TERRE due to IT issues, now considering the implications of recent update from European Commission

Outturn performance metrics and justifications

- 1A. Balancing cost management: Below expectations
- 1B. Energy forecasting accuracy: Meeting expectations
- 1C Security of supply: Exceeding expectations
- 1D System Access Management: Below expectations
- 1E Customer Value Opportunities: Exceeding expectations
- 1F CNI system reliability: In the first half of 2020-21, the BM experienced 7 minutes of unplanned outages, and the IEMS experienced 50 minutes of unplanned outages.

Control centre operations / Highlights

Role 2:
Market development and transactions

During 2020-21 so far, the ESO has acted quickly to ensure that we have the necessary arrangements in place to operate the system during the COVID-19 pandemic, as well as progressing charging reforms to facilitate the energy transition.

Kayte O’Neill, Head of Markets

The past six months have been defined by the COVID-19 pandemic, with teams enacting their business continuity plans and transitioning to remote working. The low demands which resulted from the lockdown have led to a range of engineering challenges, and Role 2 teams have been central to the development of solutions to many of these challenges. This has included establishing a contract with Sizewell power station, designing and procuring the new Optional Downward Flexibility Management (ODFM) service, and progressing urgent code modifications associated with the period of low demand caused by the COVID-19 pandemic (such as those relating to the last resort disconnection of embedded generation and deferring the additional Balancing Services Use of System (BSUoS) charges).

As well as carrying out these high-priority activities, we have also made good progress against the ambitious plan we set out at the start of the year. We launched the first new faster acting frequency response market, with the new Dynamic Containment product going live on 1 October. We acted on previous feedback to improve our Code Administration performance: this improvement is recognised in our stakeholder satisfaction scores. We have provided thought leadership across a range of charging issues, including publishing the second BSUoS Task Force report, providing significant input to the Access Significant Code Review, and our work as part of Charging Futures. We delivered the longer term enabling modifications for the Targeted Charging Review, and progressed code modifications to progress the energy transition, such as the Grid Code modification relating to GB Grid Forming capability. We have also sought to improve our communication around the impacts of the Clean Energy Package.

We re-planned our activities to ensure that we could engage with our stakeholders despite the restrictions imposed by COVID-19, including introducing the Power Responsive summer insights series, and adapting events such as the Charging Futures forum so that they could take place online.

However, the urgent activities required due to COVID-19 meant that we were not able to progress some of the balancing services reforms we had planned, and we will focus on these activities (including future frequency response and reserve products) during the remaining part of the year.

Market development and transactions

Role 2:
Market development and transactions

continued

We were disappointed that the rollout of the Trans-European Replacement Reserve Exchange (TERRE) project was delayed: this was initially due to prioritisation as a result of COVID-19, but was further exacerbated by IT issues experienced by a number of industry partners including the ESO. The ESO remains committed to delivery of the platform, however we are aware of the risk around how the TERRE platform will be able to be used in GB, due to uncertainty in the UK's EU Exit arrangements. This may cause further delay in realising the full consumer benefit of the project, even once the platform is able to go live. We understand the impact of this uncertainty on our stakeholders, and are committed to continue keeping industry updated as the situation progresses.

Despite the challenges associated with COVID-19, and delays to some of our deliverables, we have still made progress towards our ambitions. Delivering the new Dynamic Containment product is a key step towards our Competition Everywhere goal. Our work on industry frameworks, such as the Balancing Services Charging Task Force and Targeted Charging Review, and progress on code modifications which enable the energy transition (such as facilitating Virtual Synchronous Machines), have brought us closer to our ambition of being able to operate a zero-carbon system.

We have also shown ourselves to be a Trusted Partner, improving the service we provide as Code Administrator, and progressing modifications which protect suppliers and consumers from the financial impact of additional charges associated with managing the system during COVID-19.

During the rest of this year, I look forward to working with our stakeholders to deliver the industry changes needed to support the journey to net zero, as we enable code changes, update charging frameworks, and progress balancing services reforms.

Kayte O'Neill, Head of Markets

"I've been following the DC webinars and publications closely and I must say I think you're doing an outstanding job with the introduction of this new service."

– energy company

Market development and transactions

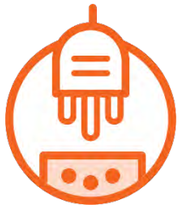
Role 2:
Highlights

Evidence of consumer benefits

- Code modifications raised to defer additional BSUoS charges associated with additional services resulting from COVID-19, with £16m of support provided so far
- Led second BSUoS task force and published a report of recommendations, which is expected to result in lower consumer bills due to lower risk premia and removal of wholesale price volatility
- Progressed Grid Code modification relating to GB Grid Forming capability, formerly referred to as Virtual Synchronous Machine (VSM) capability, which could save consumers tens of millions of pounds per annum.

Stakeholder views

- Dynamic Containment product developed and launched with significant support from industry
- Responded to stakeholder feedback to remove barriers to participation in weekly response auction trial
- Captured stakeholder feedback on design of ODFM service: this will be factored into our Reserve Reform activities.
- Worked collaboratively with stakeholders on second BSUoS taskforce and received positive feedback
- Charging Futures received a high score and good feedback
- Code Administrator improvements completed and have been well received



Plan delivery

- Acted quickly to ensure that system remained operable during periods of low demand due to COVID-19- including developing the new Optional Downward Flexibility Management (ODFM) product and progressing code changes GC 143 and CMP 345/350
- First new faster acting frequency response market: Dynamic Containment product developed (and launched on 1 October)
- Frequency Response Auction Trial evaluation report published
- Code Administration continued to improve and received positive feedback
- Progressed significant code changes to facilitate the energy transition
- Provided thought leadership across a range of charging issues (Targeted Charging Review, BSUoS task force report)
- Improved our communication around the impacts of the Clean Energy Package
- Disappointed in delays to TERRE due to IT issues, now considering the implications of recent update from European Commission
- Disappointed that new activities to manage COVID-19 have delayed aspects of reserve reforms

Outturn performance metrics and justifications

- 2A Reform of Balancing Services Markets: Below expectations
- 2B. Code Admin Stakeholder Satisfaction: Exceeding expectations
- 2C: Charging Futures: Exceeding expectations
- 2E. Month ahead forecast vs outturn monthly BSUoS: Meeting expectations

Market development and transactions/ Highlights

Role 3:

System insight, planning and network development

In role 3, I’m really proud of the progress the ESO has made towards the energy transition, facilitating an increasing volume of renewable generation as well as moving towards a world where more services are competitively procured.

Julian Leslie, Head of Networks

The COVID-19 pandemic has brought significant challenges to the ESO, not only in terms of the requirement to work remotely, but also due to the operability challenges which have arisen from the extremely low demands seen on the system. Over the past six months we have prioritised this short-term operability work, meaning that we were able to operate the system safely and securely over the summer period. However, this has had knock-on impacts to our resource availability, and we therefore considered the urgency and importance (from a security of supply perspective) of the other projects we had planned, and prioritised accordingly.

Despite the additional challenges caused by COVID-19, we have taken significant steps forward with our Pathfinder projects, addressing voltage issues in the Mersey region, seeking long-term solutions to stability issues in Scotland, and exploring the potential to introduce a long-term commercial product to manage network constraints. The Pathfinders represent a revolutionary new approach where competitive tenders are run to address system needs, and we have continually sought to use the lessons learned from each project to improve subsequent projects. We’ve also developed a process for third party options to be submitted to the Network Options Assessment, representing a significant step towards increased competition.

We’ve also made great progress on Early Competition, issuing our initial consultation and holding over 30 workshops virtually, ensuring that stakeholders had chance to shape our plans despite the challenges resulting from the COVID-19 restrictions.

We have worked closely with our distribution network colleagues to ensure that a Whole System view is taken, for example participating actively in Open Networks, leading the Accelerated Loss of Mains Change Programme, sharing Building Block data for the Future Energy Scenarios, encouraging DNOs to consider submitting options to the NOA, and working with DNOs to co-create aligned markets through the Regional Development Programmes (RDPs).

System insight, planning and network development

Role 3:

System insight, planning and network development

continued

We progressed the actions identified following the power outage of 9 August 2019, including raising Grid Code modifications (which are in progress), completing an internal audit, conducting a review of the current Limited Operational Notification (LON) and Grid Code derogation processes, and implementing the improvements identified by these reviews.

Whilst initially during this period we have been disappointed with the slow progress of our Regional Development Programme (RDP) commercial developments, this has really begun to take off recently and we now have a common approach with both UKPN and WPD that aligns with the work we're doing through Open Networks.

I feel that we have made great progress towards our ambitions. Our Pathfinders work, as well as the Loss of Mains Protection changes we are driving, will take us closer to being able to operate a zero carbon system. We have made significant strides towards Competition Everywhere, progressing several Pathfinder projects as well as work on Early Competition and making it possible for third parties to submit options into the Network Options Assessment.

We have also published information and insights to enable our stakeholders to make informed decisions. This has included the Future Energy Scenarios, the Winter Review and Consultation, and Summer Outlook reports.

During the remainder of 2020-21, I look forward to seeing further progress in the Pathfinder projects, Regional Development Programmes and Early Competition plan, as well as the second FES: Bridging the Gap publication.

Julian Leslie, Head of Networks

"We would like to thank the ESO for developing and running this process. Opening competition is a bold move which we think will ultimately lead to a more efficient and lower cost system. In any new process we expect there to be "teething troubles" but ultimately,
we think that this has been a very positive process."

– Pathfinder participant

System insight, planning and network development

Role 3:
Highlights

Evidence of consumer benefits

- Short Term Mersey Voltage Pathfinder progressed for next year, with EOI published.
  The contract put in place this year has ensured SQSS compliance and saved £3m+ over the first 5 months of the contract
- Loss of Mains settings changes progressed, allowing for operational changes to be progressed that will deliver over £10m savings per annum from September 2020 onwards, and £170m per annum from 2022-23 once the programme is complete
- Jointly leading ENA workstream to develop a whole system cost-benefit analysis tool, evaluating whole system options to help achieve net zero, and putting consumer benefit at the heart of industry decision making

Stakeholder views

- Worked closely with DNOs and service providers on the Regional Development Programmes
- Engaged extensively with stakeholders as part of our Pathfinder projects
- Extensive engagement and consultation with industry on our Early Competition work
- Continued to work with the DNOs via the ENA Open Networks project
- Introduced a new framework and design for the FES document in response to stakeholder feedback.
- Continued to progress the Loss of Mains work and engage stakeholders

Plan delivery

- Progressed our Pathfinder projects: RFI and EOI published for Stability Phase 2, EOI published for Short Term Mersey voltage pathfinder, contract awarded for Long Term Mersey Voltage Pathfinder, published decision to tender for Constraint Management Pathfinder
- Consulted on our initial model for Early Competition
- Established a process for non-TO options (Interested Persons) to submit options to the NOA
- Progressed Loss of Mains protection programme
- Agreed changes to the FES Building Block exchange process based on our joint experiences of the process this year, working more closely with DNOs to take a whole system view
- Progressed actions identified following power outage of 9 August 2019
- Handled an increased volume of connection applications despite challenges of COVID-19
- Prioritised work to address new operability challenges experienced due to low demands during COVID-19 pandemic
- Delivery work on N-3 intertripping continued despite COVID-19 restrictions and is now in final commissioning with UKPN

Outturn performance metrics and justifications

- 3A Right first-time connection offers: meeting expectations
- 3C Customer connections- customer satisfaction: Surveys paused due to COVID-19
- 3D Whole system unlocking cross boundary solutions: 155MW of Distributed Energy Resource (DER) within WPD network and 207.2MW within UKPN network accepted for the first half of this year.
- 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, where we expect to save £21.3m in future balancing costs.
- 3F Capacity saved through operability solutions: For 2020-21, the ESO will deliver N-3 intertripping capability with UKPN and will continue to monitor contracted DER volumes in the respective RDP areas against the delivery timelines for the other projects..

System insight, planning and network development/ Highlights

ESO delivery milestones

2020-21

April | May | June | July | August | September

Role 1

- Began hosting weekly COVID-19 webinars
- Power Available implementation
- Integrated Power Available signal into Control Room
- Began Automated Constraint Optimisation trial service
- Go-Live of the Wider Access API
- GB wind generation hits new record
- Officially launched Carbon Intensity App
- Trial of storage BMUs for reserve service
- Began publishing the System Operating Plan (SOP)
- Phase 3 of the flexibility trial in progress.

Role 2

- First transaction through the BM Wider access route to market
- Implemented Optional Downward Flexibility Management (ODFM) Service
- Implemented CUSC modification CMP345 for BSUoS Support Scheme
- Hosted Power Responsive Summer Insights podcast series
- Published five year view for TNUoS charging
- Sizewell generator contract
- Grid Code change GC0143: Last Resort Disconnection of Embedded Generation
- Issued BSUoS taskforce interim report for consultation
- Dynamic Containment soft launch

Role 3

- Publication of operability benefits of Virtual Synchronous Machines and related technologies
- Held Early Competition workshops
- Stability Pathfinder Phase 2 RFI published
- Published the Future Energy Scenarios (FES) document
- Introduced NOA third party options
- Published EOI for Reactive Power in the Mersey region
- Published the ESO's first standalone Winter Review & Consultation
- Launched Early Competition Phase 2 consultation
- Began FES Bridging the Gap to Net Zero engagement
- Published EOI for Stability Pathfinder Phase 2

How have the ESO's activities so far during 2020-21 benefitted consumers?

So far during 2020-21, the ESO has gone beyond its baseline role to deliver additional benefits for consumers. We acted quickly to protect consumers during the period of uncertainty caused by COVID-19, ensuring that the system could be operated reliably and securely, our customers and consumers were protected from unexpected cost increases, and our stakeholders were kept informed.

Today's consumers have felt the benefit of many actions we have taken this year, including the actions we took to be able to operate the system safely and securely during the low demands resulting from the COVID-19 lockdown. This included the new Optional Downward Flexibility Management (ODFM) service, a contract to reduce output at Sizewell B nuclear power station, a Grid Code modification to clarify the emergency disconnection of embedded generation, and a trial of reserve from batteries. We quickly progressed code changes to defer the additional charges which had resulted from COVID-19, providing predictability to our customers and protecting market liquidity by avoiding supplier defaults. We were also able to make use of the output of last year's Mersey Short Term Voltage Pathfinder to optimise the decisions made within the control room, and have further progressed the Loss of Mains changes which reduce the costs of managing low inertia.

Tomorrow's consumers will also benefit from this year's activities, with the go-live of the Wider Access API and Power Available removing barriers to entry for potential market participants, which should increase competition and lower prices. Our work on the BSUoS task force is expected to benefit consumers by reducing the risk premia applied by suppliers, and our code changes to facilitate Grid Forming technologies including Virtual Synchronous Machine capability will lead to future savings in balancing costs associated with inertia, fault current, and other stability requirements. Finally, our work with the ENA on a whole-system Cost Benefit Analysis tool will help to ensure that optimal solutions to whole-system issues can be found in the future.

Lower bills than would otherwise be the case

- Wider Access API makes it cheaper and easier for participants to enter the Balancing Mechanism, removing a barrier to entry and increasing competition
- BSUoS modifications relating to COVID-19 protected consumers and customers from unforeseen costs during the 2020-21 year, with over £16m of costs deferred as of 30 September.
- Utilisation of the Mersey short term voltage pathfinder has saved £3m+ for consumers over the first 5 months of the contract
- As a result of Loss of Mains setting changes at sites with Vector Shift, we have already implemented operational changes that will deliver over £10m savings per annum from September 2020 onwards. These savings will increase significantly as more relays have their settings changed in future

Benefits for society as a whole

- Second Balancing Services Charges Task Force promoted a fair distribution of the costs associated with system balancing
- We are jointly leading the ENA whole system cost benefit analysis work, which will help decision makers to evaluate whole system options to help achieve net-zero, and put consumer benefit at the heart of industry decision making
- Wider Access API and Power Available projects are encouraging wider participation in the Balancing Mechanism

Consumer benefits

How have the ESO’s activities so far during 2020-21 benefitted consumers?

continued

Improved safety and reliability

- We acted quickly to keep our people safe during the COVID-19 pandemic, ensuring that our Control Room could still be staffed by engineers with the correct authorisation in the event of sickness or an evacuation of one of the control rooms.
- ODFM service ensured that security of supply was maintained during periods of low demand due to COVID-19 restrictions
- Wider Access API opens the market to a diverse set of energy providers, providing increased resilience
- Mersey short term voltage pathfinder tenders have addressed the voltage compliance risk in the Mersey area
- Loss of Mains Protection changes will reduce the risk of inadvertent tripping of generators

Reduced environmental damage

- Integrating the Power Available signal into our control room processes allows the system to be operated with an increasing proportion of renewable generation
- The Grid Code modification relating to Grid Forming technologies including Virtual Synchronous machine capability will improve the ESO’s ability to operate the system with an increasing proportion of renewable generation.
- Loss of Mains Protection changes will allow the system to accommodate an ever-increasing proportion of renewable generation

Improved quality of service

- The ESO has chaired the second balancing services charges task force, working collaboratively with industry to shape the future of balancing charges
- The ESO is co-ordinating the programme of changes to Loss of Mains protection
- We have increased the transparency of our activities, including hosting a weekly webinar to keep stakeholders informed of actions taken to manage the effects of the COVID-19 pandemic
- Code changes to manage the impact of COVID-19 (deferring charges and clarifying the procedure for last resort disconnection of embedded generation) were progressed rapidly to meet stakeholders’ needs

Consumer benefits

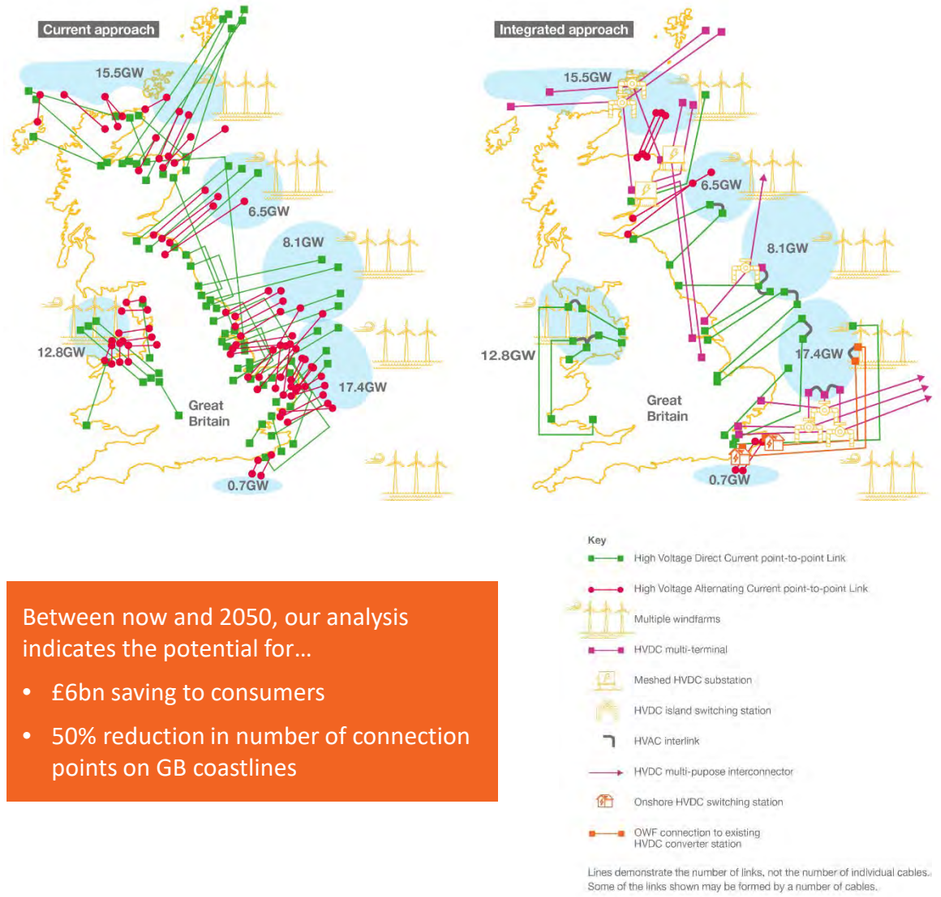
Spotlight: the ESO's role in offshore co-ordination

The Offshore Co-ordination Project has been set up by the ESO with support from Ofgem and the Department for Business, Energy & Industrial Strategy (BEIS).

The Offshore Co-ordination project is a new ESO activity we commenced in April 2020. Ofgem specified that this new activity be funded through a separate pass-through approach and not be included as a measure of performance towards the ESO incentive scheme. However, it is a key example of the ESO becoming a Trusted Partner by taking on a role on behalf of industry, and contributing to the government target of reaching net zero by 2050.

- Over the last six months we have established and progressed at pace the Offshore Coordination project. This is assessing 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 encourage and drive more coordination.
- We published a consultation on 30 September setting out the results of our analysis. This indicates that on the basis of the assumptions used, there is the potential to save consumers £6 billion between now and 2050, and the potential to reduce the impact on the environment and coastal communities through a 50% reduction in the number of connection points over that period, as can be seen in the diagram to the right.
- The consultation has been received very positively and we have been recognised for producing an impressive amount of high quality outputs during that time. We have worked closely with stakeholders throughout the development of the analysis, which has also been recognised in feedback and how the results have been received.
- The cost-benefit analysis and holistic approach to offshore planning reports are an important first step in the BEIS-led Offshore Transmission Network Review, providing a vision for policy, legislation and regulation to build on and are a good example of us demonstrating our thought leadership. We are a member of the Project Management Board and Working Group, providing our insight into the overall review. The final report, which we are aiming to publish by the end of 2020, will also fulfil the requirements of the ESO in Action 3 of Ofgem's Decarbonisation Action Plan; for us to develop an options assessment for offshore transmission.

GB implementation by 2050



Between now and 2050, our analysis indicates the potential for…

- £6bn saving to consumers
- 50% reduction in number of connection points on GB coastlines

Offshore co-ordination

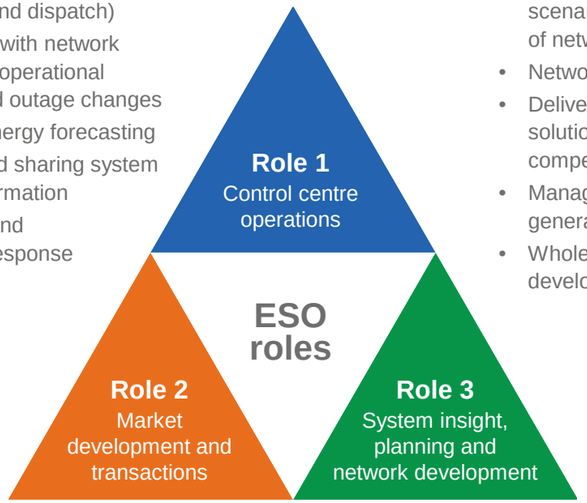
Annex: further context

The ESO Incentive Scheme

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

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 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 to the network
- Whole system process development

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

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[1]:

- **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[2], 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.

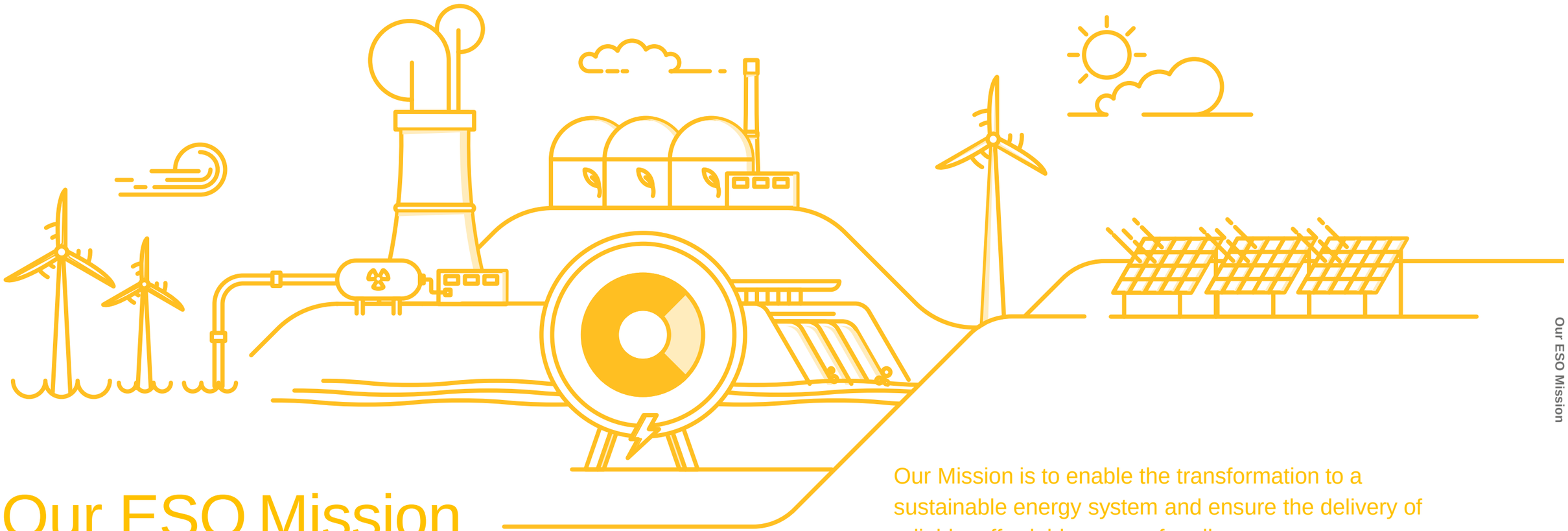
For each role, the Performance Panel will assign the ESO a score on a scale of 1 to 5. Each role will then be assigned an incentive reward or penalty within the range of ±£10m. The total incentive reward available to the ESO for 2020-21 therefore falls within the range of ±£30m.

Our original Forward Plan was published in March 2020[1]. 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[3] 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[4], 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.

1. https://www.nationalgrideso.com/document/166441/download
2. https://www.ofgem.gov.uk/system/files/docs/2020/03/esori_guidance_document_2020-2021_final.pdf
3. https://www.nationalgrideso.com/document/173131/download
4. https://www.ofgem.gov.uk/system/files/docs/2020/05/ofgem_formal_opinion_2020-21.pdf

The ESO Incentive Scheme



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

Our ESO Mission

More about our ambitions

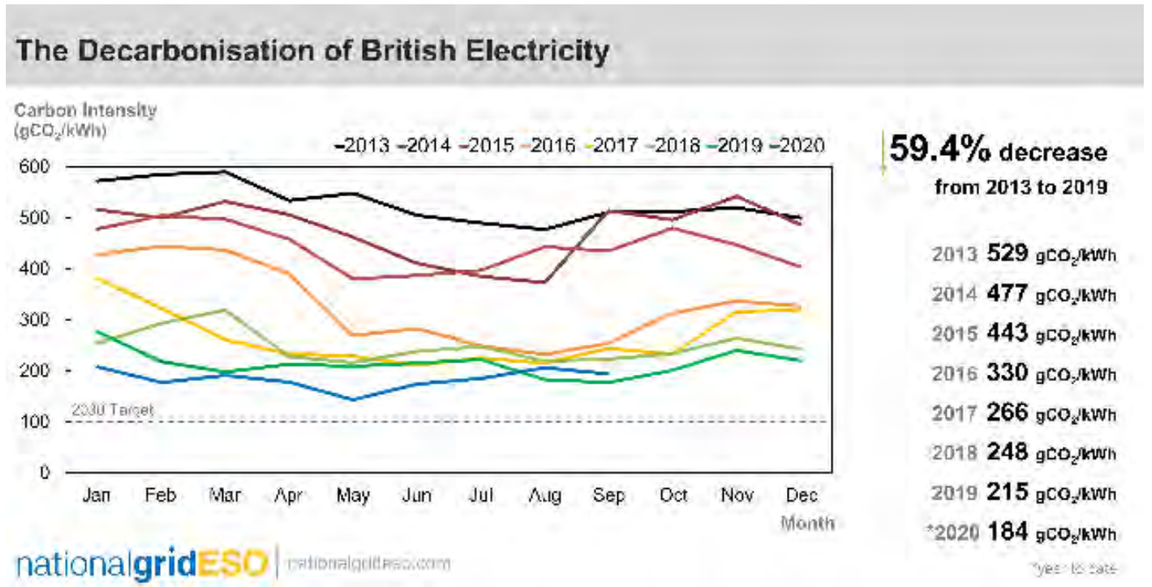
An electricity system that can operate carbon free

What is it?

When the market can economically and efficiently dispatch generation to meet all GB demand for energy with zero carbon solutions, then ESO will be able to operate this carbon free system safely and securely. In order to facilitate this, by 2025 we will have introduced new tools and technologies into the market to manage real-time challenges such as thermal constraints, voltage and inertia.

What progress have we made?

- The combination of low demands during the COVID-19 lockdown, as well as high output from renewable generation during this period, has given the ESO greater insight into operating the system at lower levels of carbon intensity
- We have implemented the first phase of Power Available, which introduces a live data feed to show our control room the potential maximum power output of a wind generator at a given time, allowing wind generators to compete with other technologies to provide reserve and response services
- Our Stability Pathfinder phase 2 seeks solutions to system operability issues resulting from the decline in transmission connected synchronous generation, aiming to fulfil a specific locational requirement in Scotland: we invited Expressions of Interest for this in September.
- Our Wider Access API went live, making connecting to the Balancing Mechanism readily accessible to all parties from 1 MW and above, unlocking more routes to market for distributed carbon free resources
- We have improved our forecasting capability, trialling for the first time explicit forecasts for distribution connected photovoltaic (PV) and wind generation at each Grid Supply Point (GSP). Improved forecasts of renewable generation output are an important step towards being able to operate a carbon free system.



More about our ambitions

More about our ambitions

continued

A whole system strategy that supports net zero by 2050

What is it?

Achieving the legislated UK net zero emissions target by 2050 is a huge challenge for all of society. We play our role in this through our work with distribution network operators and other stakeholders on whole system operability to maximise benefits across networked energy systems.

In addition, we work with a broad spectrum of stakeholders to develop shared pathways towards net zero engaging on a breadth of energy policy matters to play our role in facilitating the UK's legislated target.

What progress have we made?

- Our work with the DNOs on the Accelerated Loss of Mains Change Programme has brought forward essential work on 9.7 GW of distributed generation capacity and we continue to adapt to the challenges presented to the programme as they arise.
- We have applied whole system thinking to our Bridging the Gap work, where we are collaborating with a wide range of stakeholders across the energy sector and beyond. This analysis will feed into the next Bridging the Gap report, which will recommend actions to progress the UK towards its net zero target
- We have continued our work with the Energy Networks Association's Open Networks programme, including leading the development of a tool for whole system cost-benefit analysis.
- We worked closely with DNOs to ensure the new Optional Downward Flexibility Management (ODFM) service was utilised in co-ordination with their operability needs.
- Via ENA Open Networks, we have worked with the DNOs to agree further data sharing to enable easier comparison of the ESO Future Energy Scenarios (FES) and the Distributed FES published by the DNOs: the DNOs have also agreed to adopt the same set of scenarios as us. We have also started to share Building Block data with DNOs, enabling us to compare our scenarios to DNOs' regional scenarios, which ultimately will enable us to work with DNOs more easily.
- We continue to discuss whole energy system matters with the system operation teams in National Grid Gas Transmission (GSO) in the context of our ongoing stakeholder engagement on energy policy. We are also drafting a thought piece about clean heat pathways, which we plan to publish before the end of 2020.
- We have continued the development of Regional Development Programmes. Our N-3 intertripping work with UKPN is now entering its final commissioning, and we have agreed a commercial framework with both UKPN and WPD that build on the work of Open Networks.

More about our ambitions

More about our ambitions

continued

Competition everywhere

What is it?

Efficient well-functioning markets are essential if we are to operate a carbon free system by 2025 and unlock the full consumer benefits of flexibility. The Competition Everywhere ambition describes the approach we will take to creating markets which facilitate carbon free operation.

We have a vital role in delivering this complex task by working with a wide range of stakeholders to develop competitively procured balancing services. We also seek competitive network and non-network solutions to a range of system challenges, ensure our codes and charging arrangements are fit for the future, and promote competition in wholesale and capacity markets.

What progress have we made?

- We have successfully implemented wider access to the Balancing Mechanism (BM). In April, we carried out our first ever BM transaction with a Virtual Lead Party, and in September we went live with the Application Programming Interface, introducing a new channel for participation in the BM via the internet.
- We are delivering an Early Competition Plan that outlines how competition could be introduced for the design, build and ownership of onshore transmission assets. We have published a consultation and thought piece, and engaged with numerous stakeholders, working towards proposals to identify how competition can be introduced in a way that achieves best value for consumers and opens the door for innovative network solutions.
- The introduction of Dynamic Containment (DC), the first in a new suite of frequency response services, marks a further development in the ESO's operational capability, making the system more resilient to low inertia conditions caused by large losses. For DC the tenders will run daily, moving the frequency response market even closer to real-time. It creates further opportunity for renewables to participate – increasing competition, supporting our work to widen access and also delivering better value for consumers.
- We have continued to progress our Pathfinder projects, using competition to identify the most efficient solutions to transmission network needs. So far this year, we have published a Request for Information (RFI) and Expression of Interest (EOI) for Stability Phase 2, awarded contracts for the Long-Term Mersey Voltage Pathfinders, and published a decision to tender for the Constraint Management Pathfinder.
- We have introduced the Interested Person's (IP) submission process for the 2020-21 Network Options Assessment (NOA), allowing third parties to propose new and innovative ideas, and supporting the ESO's ambition to increase the diversity of options considered within the NOA.
- For the first time, we awarded a frequency response contract to a group made up entirely of domestic customers, as Social Energy won a contract to supply week-ahead Firm Frequency Response (FFR), following the results of our recent weekly auction trial.
- We have successfully trialled the use of batteries for reserve, proving that the ENCC can effectively request the availability of sustained upward and downward reserve through a new operational arrangement, and that this was a cost-effective option.

More about our ambitions

More about our ambitions

continued

The Electricity System Operator is a trusted partner

What is it?

The ESO is at the centre of the energy transition. In order to successfully enable all the changes needed over the coming years, we will work collaboratively across the industry, and seek to build trust with our customers and stakeholders. We are therefore focussing on building strong, cooperative relationships; being reliable in our approach, credible in our expertise, and demonstrating our impartial position, in order to ensure that we are a Trusted Partner to others in the industry.

What progress have we made?

- We have actively engaged with our stakeholders through the COVID-19 pandemic, holding weekly webinars to update the industry.
- We were transparent with our stakeholders about the impact of COVID-19 on our projects, holding a webinar to set out our revised priorities, and publishing a Forward Plan Addendum in July to give a complete view of our revised set of deliverables and metrics.
- We are continuing to increase the transparency of the decisions taken in the Control Room, including publishing the System Operating Plan (SOP) on our Data Portal, and publishing an ever-increasing range of operational information, including progressing towards our Forward Plan commitment to publish data to support better understanding our dispatch decisions (also known as “skip rates”) by Q4 of 2020-21.
- We have improved the service we provide as code administrator, receiving an average satisfaction score from members of code workgroups of 8.83 out of 10 so far this year (up from 7.34 last year) as well as progressing urgent code modifications associated with the period of low demand caused by the COVID-19 pandemic.
- In response to SSE’s proposal to defer the additional balancing costs resulting from the COVID-19 pandemic, we quickly developed and implemented a solution, reprioritising work over several teams. The eventual solution protects our customers and end consumers from incurring significant unexpected additional costs, reducing the adverse impacts on suppliers and supplier competition.
- We've listened to feedback that our customers and stakeholders want us to turn around responses to their queries more quickly, so we introduced a target that 85% of queries be resolved within 5 working days. We hit this target for the first time in June 2020 (up from 70% in January 2020), and the executive team continues to monitor this alongside other customer experience performance metrics on a fortnightly basis.
- We are co-creating with DNOs and TOs aligned flexibility markets that build on the work of the Open Networks project through our Regional Development Plans.
- The next page shows the ESO’s 4 stakeholder engagement groups.

More about our ambitions

ESO Stakeholder Engagement Groups

ESO RIIO Stakeholder Group (ERSG)

Purpose: Challenge, review and provide expert input into the ESO RIIO-2 proposals and business plan. Monitor, challenge and input into the ESO's engagement programme with stakeholders.

Membership: Representative cross section of ESO's stakeholders

Chair: Charlotte Morgan

Technology Advisory Council (TAC)*

Purpose: Leverage external experience to help set the strategic direction of the ESO transformation journey in systems (including process and technology) development, and bring transparency and accountability to our delivery and decision making.

Membership: Cross section of stakeholders including Market Participants, IT Companies etc.

Chair: To be announced

*previously referred to as Design Authority (DA)

Electricity Networks Stakeholder Group (ENSG)

Purpose: Help ensure that the ESO develops fair and transparent early competition and offshore coordination proposals that incorporate and balance feedback from all affected stakeholders.

Membership: Representative cross section of stakeholders of the off-shore coordination and early competition projects

Chair: Fiona Woolf

Engineering Advisory Council (EAC)

Purpose: Provide peer review and challenge to engineering analysis and solutions and provide insight into international best practice and new innovations

Membership: Leading academics and international TSOs

Chair: Tim Green

nationalgridESO

Thank you for reading our Mid Year Report.
For further information, please contact:

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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

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