

Forward Plan 2020-21

Introduction
March 2020



Foreword



I am pleased to introduce our 2020-21 Forward Plan.

Since preparing this plan, we have all been faced with huge changes in our home and business lives as a result of COVID-19. It is clear that disruption will continue during the months ahead and as we aren't quite clear on the impact on the full breadth of our activities and the energy industry just yet, we haven't currently changed the contents of this plan. However, we will be constantly reviewing our plans taking into account changing priorities for the ESO and our stakeholders making sure we stay focused on our primary role of operating a secure and reliable electricity system.



This document captures the extensive set of activities that we propose to deliver for our stakeholders and end consumers within the next financial year. Delivering against this plan will form a foundation for our outputs under RIIO-2, and shows how we will work towards our ESO mission to operate the electricity system of the future and play our part in delivering a system that supports the net zero by 2050 ambition.

I am excited to take forward this plan, which features several activities which are world firsts. The pace of industry change is rapid, and the ESO is stepping up to lead the industry through a transformation of a scale which has never been seen before.

In March 2019, we set out a two-year Forward Plan¹, covering the 2019-21 period. Today I'm pleased to present a revision to that document setting out our ambitious plans for this final year of the 2018-21 Incentives scheme in this 2020-21 Forward Plan.

This introduction section provides context for our plans and details how our chosen priorities will deliver consumer benefits and contribute to our 2025 ambitions.

Our Role Chapters contain all the details of our deliverables and metrics for 2020-21, and we have sought to address your feedback with updates and changes. You can see appended to our Role Chapters an explanation of how we have taken all our stakeholders' feedback into consideration.

Delivering against this ambitious plan will prepare us to undertake the activities described in our RIIO-2 business plans, as we work towards our 2025 ambitions which are a step along the way to net zero.

At ESO we are very proud of our role in keeping electricity supplies safe, reliable and efficient, now and for the future – so please read this document in context, knowing we will need to prioritise and exercise discretion in our plan delivery over the coming year, but that we remain ambitious, committed and excited to be enabling a net zero energy future.

Throughout 2020-21 we will report on our performance on a monthly basis. If you have any feedback on how we can improve these reports please contact us at box.soincentives.electricity@nationalgrideso.com.

Fintan Slye, Director of UK System Operator

1. www.nationalgrideso.com/document/140736/download

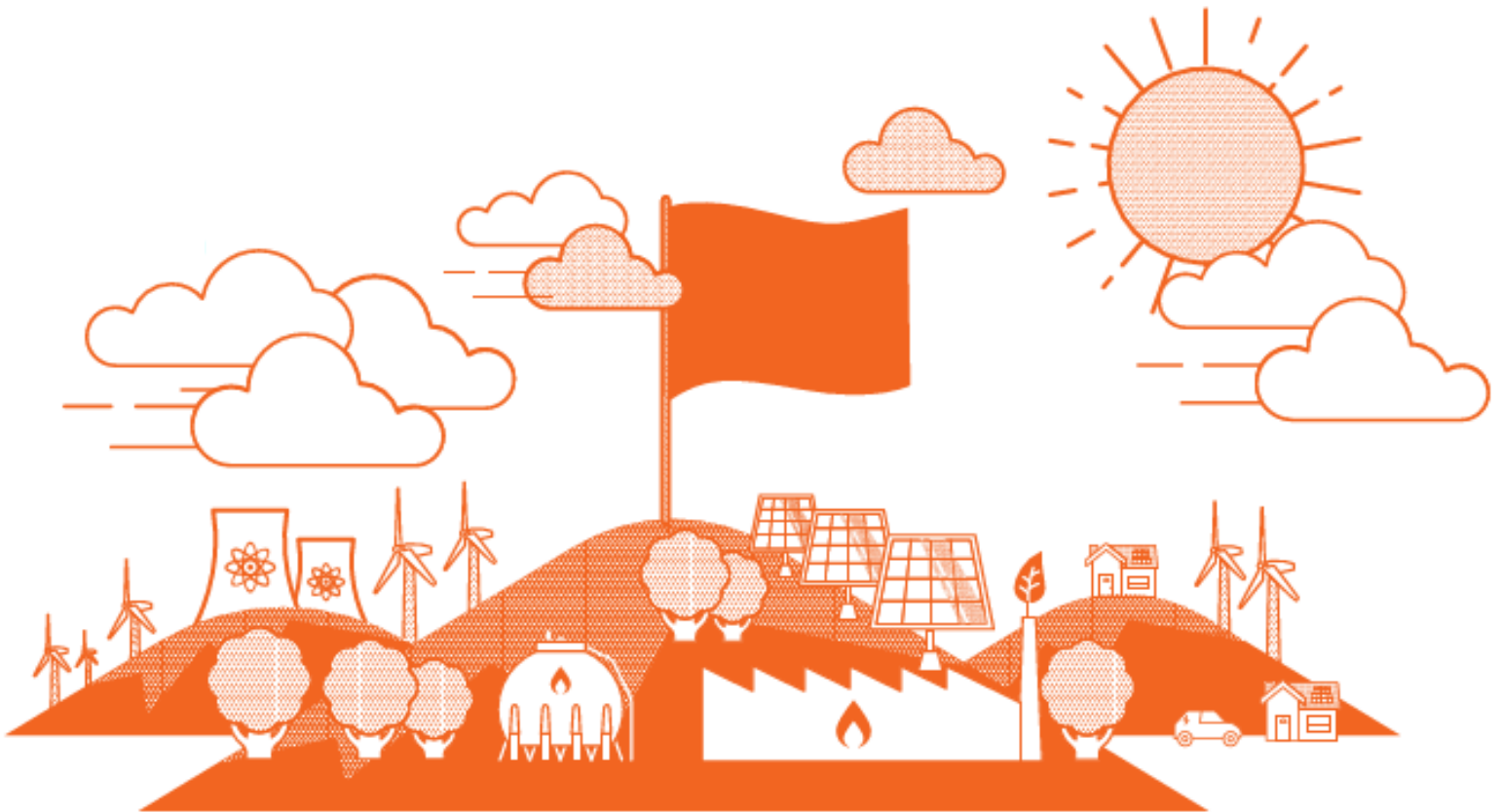
Our ESO Mission

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

In line with this vision, we are updating our 2019-21 Forward Plan, revising our deliverables and metrics to support our journey towards these measures of success.



Explaining our ESO Mission

The ESO sits at the heart of the energy landscape, which is changing at an ever-increasing pace. Conventional generation such as coal is being replaced by small-scale renewables, storage and demand-side participation.

This is making the system more challenging to operate, and the ESO is rising to this challenge by having of a clear vision of how we and the industry must change. We will facilitate the transition to a zero-carbon power system in line with the UK's recent commitment to net zero emissions by 2050. We will also ensure the delivery of reliable low carbon electricity whilst minimising costs to consumers.

We have previously set out four ambitions which define success in 2025; here we explain further what these ambitions mean. On our next two pages you can then see how our activities help us achieve these goals.



An electricity system that can operate carbon free

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 make this happen, by 2025 we will have introduced new tools and technologies in to the market to manage real-time challenges such as thermal constraints, voltage and inertia.

We consider this ambition to be fundamental to supporting the achievement of legislated net zero emissions target and therefore a crucial contribution to consumer-led action on climate change.



A whole system strategy that supports net zero by 2050

The ESO will support government and industry in meeting the legislated net zero emissions target by examining whole system operability and interactions across the GB energy landscape.

This will involve working with stakeholders, experts and decision makers to ensure that the whole energy system is coordinated and optimised for consumer value as it decarbonises. We will also work more broadly than the electricity system to ensure that the decarbonisation efforts of the whole energy system, and the interactions with other elements of our economy and society are considered.



Competition everywhere

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.

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.



The Electricity System Operator is a trusted partner

The ESO is at the centre of the energy transition and well placed to deliver consumer benefits through the changes we are driving to support the legislated net zero emissions target.

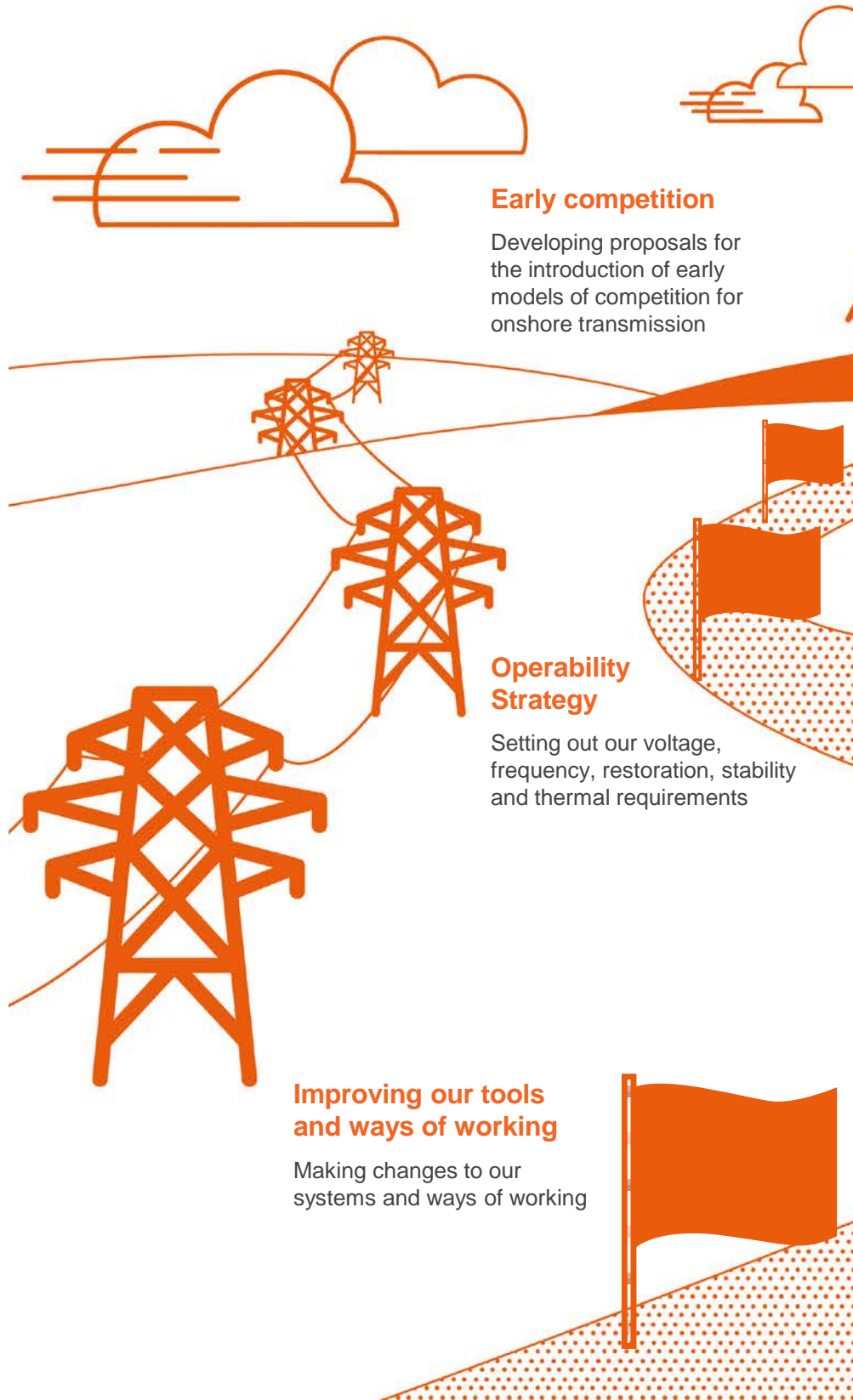
In order to successfully enable all the changes needed over coming years, we will work collaboratively and transparently across the industry, and seek to build trust with our customers and stakeholders. We are therefore focussing on building strong, cooperative relationships through reliability, credibility and demonstrating our impartial position, in order to ensure that we are a Trusted Partner.

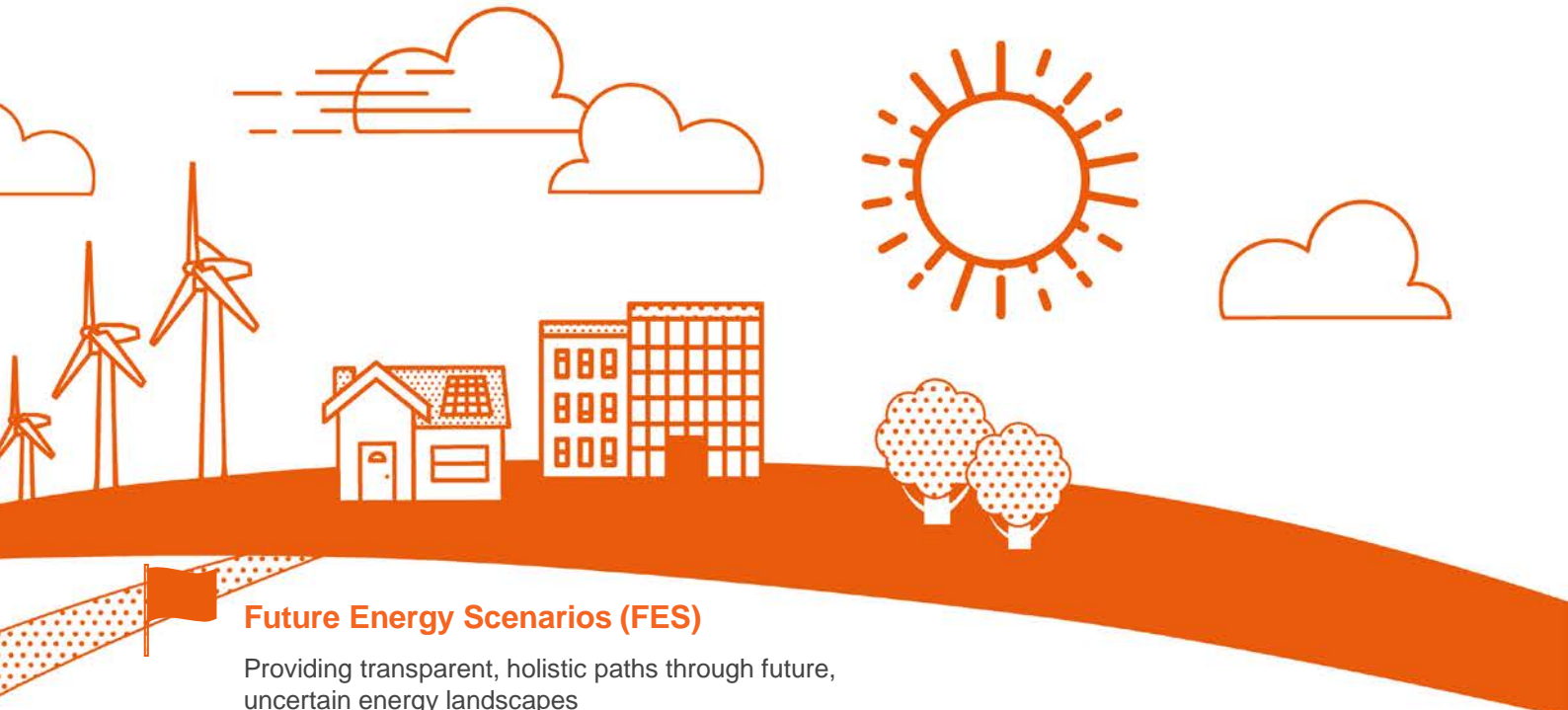
How we deliver across different horizons

The ESO's core role is to manage system balancing and operability. In real time, we ensure that the system is safely and securely operated at the most efficient cost for consumers. This role is not delivered in isolation, but by teams of people looking across various time horizons.

To meet our 2025 goals of being able to operate a zero carbon system with services that have been competitively procured requires us to look at what system operation needs to be in 2025, and start building the market and technical environment now. We work across our organisation to achieve this, considering whole system solutions, facilitating markets and planning market and network solutions. We do this through stakeholder-led change, building options that have never been tried before by any system operator, and learning from our experiences and engagement to develop our solutions for the better. This isn't an easy activity, and nor is it necessarily bringing about immediate visible change from a cost point of view. But it does mean that we can deliver our core balancing role, controlling and minimising balancing costs both today and in the future, and ensure that we are working flexibly towards a net zero future for GB.

Here we show our priorities: areas that we feel are best focused on to deliver net zero and meet both consumers' and stakeholders' needs.





Future Energy Scenarios (FES)

Providing transparent, holistic paths through future, uncertain energy landscapes

Network Options Assessment (NOA) process

Considering longer term challenges of system design

Pathfinders

Buying new and existing products in new ways to solve the technical challenges of future system operation

Balancing services reform

Delivering stakeholder-led changes to system operability needs in ways that work for providers

System Balancing

Balancing the system in real time, and looking ahead to the medium and long-term future

Delivering across different horizons: more detail

Future Energy Scenarios (FES)

The FES, an annual publication, is how we pull together not only our view but the views from stakeholders across both industry and academia to set out four scenarios of where we see the energy landscape moving towards over the next thirty years. This then creates a baseline upon which we can build. The FES are then used to create more focused views through our Operability Strategy, Electricity Ten Year Statement and our NOA publications.

Network Options Assessment (NOA) process

Our Network Options Assessment is a licence requirement and a vital part of how we consider longer term challenges of system design. NOA's purpose is to make recommendations to transmission owners across Britain as to which projects to proceed with to meet the future network requirements as defined in the Electricity Ten Year Statement (ETYS). We work with stakeholders each year to develop our assessment methodology so are continually evolving how NOA can best deliver benefits. Our network development roadmap was updated in January 2020, and explains our intention to identify the most efficient solutions to transmission needs by also considering solutions from distribution networks or from commercial providers alongside Transmission Owner (TO) solutions. Our pathfinders are therefore a natural extension to our NOA process.

Early competition

The ESO is leading the development of proposals for how early models of competition for onshore transmission could be introduced. This will explore design, build and own models for the delivery of solutions to transmission needs. This activity supports our ambitions for competition everywhere by 2025, and will in the longer term deliver value for consumers through the efficiency and value that competition can bring. The work will deliver implementation plans, including roles for the ESO and other industry bodies, for selected model(s) in February 2021.

Operability Strategy

Our Operability Strategy report aims to set out specifically the requirements for the ESO over the near term in five categories namely Voltage, Frequency, Restoration, Stability and Thermal. It is in these key areas which we need support from providers and networks to help deliver new capability to ensure that the GB system remains operable.

Pathfinders

Pathfinders are a genuine opportunity to learn through buying new and existing products in new ways, and increase levels of participation through running discrete tender processes where an initial RFI has proven that interest exists. This will include the offering of longer term contracting opportunities to either offset traditional network asset investment, or manage residual requirements once such investment has been assumed. We are at the beginning of this journey, and will reflect on how these services and tenders influence and integrate into how we procure our balancing service requirements in the future. We therefore work closely with colleagues who are delivering balancing services reforms. In this way, our pathfinders are a vital tool for looking to solve the technical challenges of system operation in the future, whilst also continuing the delivery of competition everywhere.

Taken together, FES, the Electricity Ten Year Statement, Network Options Assessment process and our Operability Strategy report help us understand the steps we need to take now to deliver on our 2025 goals and beyond.



Reform of balancing services

We commenced our reform of balancing services with a System Needs and Product Strategy in 2017. Since then, our work has been stakeholder-led, delivering changes that meet both technical and balancing services providers' needs.

This type of reform requires an agile approach to managing our priorities, and as a result we are now working towards deadlines which have been set through our product roadmaps for response and reserve, restoration, and reactive power. These activities are critical to opening up balancing services to competitive procurement and therefore a core priority for us as we work towards our goal of competition everywhere.

Improving our tools and ways of working

We are focusing on making a number of significant changes to our systems and ways of working which will deliver improvements to the services we offer and help set us up for the future.

We feel these are crucial to both today's customers and consumers and to ensure that we can meet the technical needs of system operation in the future. These include updates to our systems for access to the Balancing Mechanism, particularly for smaller units, enhancing the way in which we facilitate code change and using our internal experts to lead and support the delivery of fundamental reform to transmission charging and access.

As ESO we continually look for opportunities to work more innovatively and to achieve this we consult with other network companies as we develop and refresh our yearly innovation strategy. We deliver an Open Innovation Day for the review and approval of new projects, and collaborate through ENA on the industry Innovation Strategy. You can read more about our Innovation Strategy on our website².

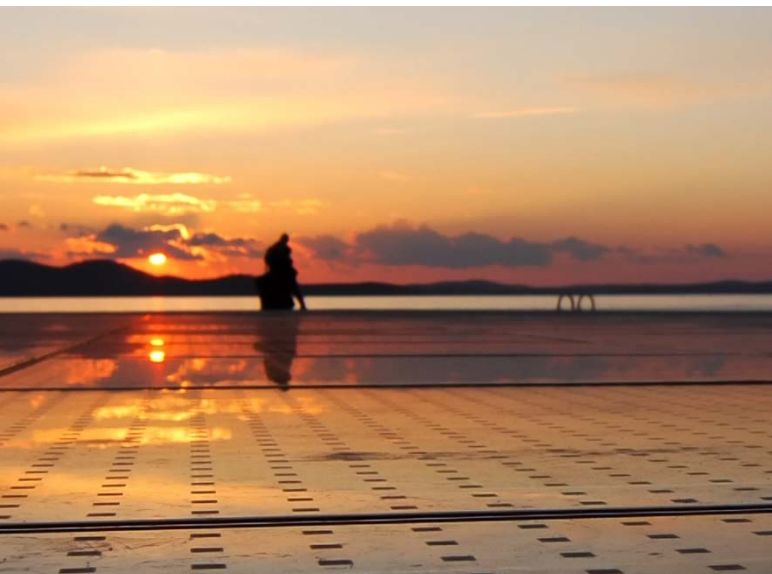
System balancing

Our real time role of system balancing can only be successful through the actions and decisions that we make as we look across all of our roles and into the medium and long term future.

There are a number of factors that are driving increases in balancing costs, and we are pleased that balancing costs remained broadly flat during some significant milestones in the increase of low carbon generation on the system.

However, the upward pressures due to increased renewable generation and interconnection, one-hour gate closure on interconnectors, reduced inertia and system constraints continue. The Connect and Manage scheme has facilitated rapid deployment of wind generation without the associated network infrastructure, which has resulted in costs being incurred to balance the system, rather than construct assets.

In the short term we deliver proactive real time cost optimisation, striking the right balance between forward and Balancing Mechanism actions by looking at costs on a daily basis, working with Transmission Owners for enhanced ratings and undertaking extra planning for significant events such as bank holidays. As we progress towards our longer term ambitions, we will also work to improve the transparency of our real-time actions and decision making. We believe that this level of information availability to market participants can help their real time decision making and lead to overall benefits for consumers.



Forward Plan 2020-21 priorities

For each role, we have identified a small number of priority deliverables. Many of these deliverables are ongoing activities, but they are those which we believe will add the most value for consumers.

In considering which activities to prioritise, we have weighed up the short term and long term consumer benefits of each deliverable, and how we think our work will help meet the needs of end consumers and our stakeholders. A large proportion of what we achieve will be through delivering stakeholder-led change, where we will apply our expertise to deliver benefits across the industry whilst being transparent about our decision-making.

How our activities benefit consumers



Lower bills than would otherwise be the case



Benefits for society as a whole



Improved safety and reliability



Reduced environmental damage



Improved quality of service

Role 1:

Control Centre Operations

Priorities



Minimising balancing costs: the costs incurred by the ESO in balancing the system contribute directly to BSUoS charges, which are paid by users of the system and eventually flow through into consumers' bills.



Improve forecasting accuracy for demand and wind: More frequent and accurate forecasts enable market participants to balance their position ahead of time, reducing the requirement for balancing services and residual balancing actions, and providing valuable information to our stakeholders.



Give more clarity of operational decision making, allowing stakeholders to make better informed decisions, leading to a better functioning market- this includes the use of our new Data Portal. This should result in lower bills than would otherwise be the case.









Expand dispatch facility to handle a large number of small Balancing Mechanism Units (BMUs), increasing competition by allowing smaller players to participate.



Role 2:

Market development and transactions






Priorities

-  **Product Roadmaps for Response and Reserve implementation:** we set out how we will reform response and reserve products to be compatible with carbon free operation. The new markets we will create will help us to manage the future costs of system balancing, resulting in lower consumer bills than would otherwise be the case. It will also have a positive environmental outcome, allowing the ESO to accommodate a secure system with an ever-increasing proportion of renewable generation.
- 
-  **Product Roadmap for reactive implementation:** we will determine the future role for reactive power, designing more competitive reactive power services to minimise the spend on reactive power services, leading to lower consumer bills than would otherwise be the case.
- 
-  **Improving the way we facilitate code change:** Code administration processes are a key building block to successful change management. Our ambitions for 2025 will only be delivered through successful code change, and therefore acting on stakeholder feedback and improving the way we facilitate code change is a key priority.
- 

Role 3:

System insight, planning and network development

Priorities

-  **Progress Pathfinder projects,** finding the most economic way to operate a low-carbon system. This will preserve system security, whilst finding solutions which lead to the lowest possible consumer bills, and is likely to minimise the environmental impact of the electricity industry.
- 
-  **Produce Early Competition plan,** allowing competing network options to be considered and the most economic selected: this will place downwards pressure on the costs of providing transmission infrastructure, which is eventually paid for by consumers. An early model will maximise the opportunity for innovation, benefitting consumers and the environment in the long term.
- 
-  **Enhance Network Options Assessment process,** providing more complete information to stakeholders, to optimise between balancing and network costs, ensuring that consumers only pay for the projects which are most effective in resolving system issues.
- 
-  **Progress Loss of Mains Protection programme,** allowing us to operate the system with an increasing proportion of distributed low-carbon generation, and reducing the need for expensive balancing actions to maintain system security.
- 

How our priorities are relevant to stakeholders

You have already read about how our activities take account of different time horizons, and how we will deliver on our 2025 ambitions. We have also explained what our priorities are for 2020-21; you can find out more about these activities within our detailed Role Chapters.

Much of the value of what we will deliver comes through our customers and stakeholders; depending on the role that you and your organisation play in the energy industry, you may be interested in different aspects of our roles. Here we explain the core areas in which you may have an interest, so that you can understand where to read more and how to get involved.

Network company

You can find out more about our Pathfinders and Early Competition work in the Role 3 chapter. This is an important part of the future of network development, and relevant to current and future network companies. As network companies are also code participants, we also think you might be interested in the work we do on Industry codes which is explained in Role 2.

Market participant and / or balancing services provider

We think your primary areas of interest will be our balancing services reform and industry codes work under Role 2, where crucial reforms are taking place that could impact your commercial position. But you might also be interested in our pathfinders under Role 3 where reforms are introducing other system management products, and our core activities under Role 1 such as system balancing.

New entrant

If you are a new entrant, activities under Role 1 such as system balancing and forecasting may be of interest, as they will help with understanding current and future market opportunities. Our balancing services reforms and industry codes work under Role 2 may also be important to you, as these reforms could impact your commercial position.

Electricity supplier

If you are an electricity supplier, we think your areas of interest will include system balancing and forecasting from Role 1, which will impact the costs of your business. Under Role 2 you might also want to know about network charging, balancing services reform and our Industry codes activities, where changes to network charging will be progressed and there are opportunities to be involved in providing balancing services.

Find out more about these areas, including what to expect during 2020-21.

Charging queries

For information about the charges that users of the electricity transmission system have to pay, how they are calculated and what changes are currently being considered by the industry, please see

www.nationalgrideso.com/charging.

Pathfinders

To learn more about our Pathfinder Projects, which form part of our Network Development Roadmap work, please see

www.nationalgrideso.com/publications/network-options-assessment-noa/network-development-roadmap.

Balancing reform

To find out about the future of balancing services, please see

<https://www.nationalgrideso.com/publications/future-balancing-services>.

You can also contact us at

box.futureofbalancingservices@nationalgrideso.com.

Code admin

For information about industry codes, and our role in administering them, please see

www.nationalgrideso.com/codes.

ESO Data Portal

For data about Ancillary Services, Balancing Costs, Constraint Management, Demand (including forecasts), Generation (including forecasts), System, and Trading, please see our Data Portal at

data.nationalgrideso.com.

2020-21 and beyond

This timeline shows which deliverables we will prioritise during 2020-21, and how these deliverables will set us up to deliver the ambitious plan we have proposed for RII0-2. Our activities over the coming years will pave the way for us to deliver our ESO mission: the right hand side of this diagram shows how we will define success in 2025.

Role 1: Control Centre Operations

Role 2: Market development and transactions

Role 3: System insight, planning and network development

2020-21

2021-22

2022-23

Role 1

Minimise balancing costs

Scoping work for new tools for Network Control and Network Monitoring

Engage with academia and universities on new system operation training courses

Start design and development of new tools

Run new training courses

Improve forecasting accuracy

Enhance forecasts with more granular weather data

Give more clarity of operational decision making

Start data platform foundation work for increased transparency

Data platform requirements and design work

Deliver data platform foundation

Integrate data platform with digital engagement platform and single markets platform

Expand dispatch facility to handle a large number of small Balancing Mechanism Units (BMUs)

Engage with Design Authority on requirements and design for enhanced balancing tool

Finalise project scope and procurement options for balancing tool

Agile build of modular design

Role 2

Product roadmaps for response and reserve implementation

Trial day ahead frequency response market

Design and implement reformed reserve products

Enhancing provider support with interactive guidance for each balancing service

Single day-ahead response and reserve market
Single integrated platform for ESO markets

Day-ahead response market integrated with single markets platform

Reserve products integrated with single markets platform

Product roadmap for reactive implementation

Communicate next steps on reactive procurement

Single integrated platform for ESO markets

Improving the way we facilitate code change

Stakeholder engagement and consultation on the process to amend our codes

Create and consult with stakeholders on plan to deliver the transformed codes process

Licence change to support transforming the process to amend our codes

Transform the process to amend our codes – go live

Role 3

Pathfinders

New areas of need identified for tendering e.g. voltage, stability, congestion

Tenders prepared and run

Stability market outcome decision

Early competition

Adapt processes to accommodate any new funding arrangements

Work with industry to implement any other framework changes that may be needed

Support Ofgem to consider ED2 funding implications

Network Options Assessment

Full stability assessment tool development

Extend NOA approach to end of life asset replacement decisions and connections wider works

Loss of Mains protection

Accelerated Loss of Mains Protection changes

Loss of Mains Protection works must be completed

2023-24

2024-25

2025-26

Integrate network modelling tool with enhanced balancing tool

Deliver new network control tool
Deliver enhanced training and simulation capability

Further iterations based on priority needs

Integrate data platform with enhanced balancing tool

Integrate data platform with new network control tool

Continued data platform expansion

Deliver new enhanced balancing tool
Integrate interconnector tools and ASDP

Further iterations based on priority needs

Further iterations based on priority needs

Start balancing and wholesale market review

Implement change to codes required to create whole system Grid Code

Digitalised whole system grid code

Improved tender approaches that enable more participants to enter the market

Connections Wider Works proposals implemented in NOA



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

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Forward Plan 2020-21



March 2020



Introduction

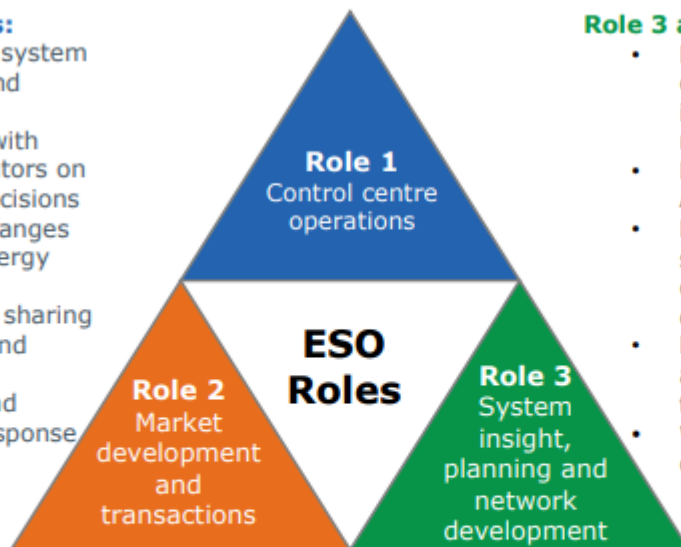
This document sets out the ESO's plans for 2020-21. For 2020-21, Ofgem has divided the ESO's activities into three roles:

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

Although three distinct roles are defined for the purposes of reporting and incentivisation, this does not represent how the ESO operates in practice. Our control centre operations activities (role 1) inform our decisions of which balancing services products to procure in the short term, and our view of how markets should evolve into the future to facilitate zero carbon operation (role 2). Similarly, experience of real time operation (role 1) informs our view of the long-term operability concerns which will need to be addressed, which lead into our system insight, planning and network development work (role 3). Many long term network development activities (role 3) also consider whether a market-based solution could meet the system need: this therefore creates an interaction with our market development and transactions activities (role 2).

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

For each of the three roles, we present a high-level introduction, and then discuss how the role fits in with our vision and strategy, and how the activities we will perform under each role will benefit consumers. We then set out our deliverables for 2020-21, and the measures we will use to report on our performance.

We also set out in appendix 1 how we have taken on board stakeholder feedback received since the publication of our draft Forward Plan in December 2019.

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Role 1

Control Centre operations

A. Role 1 Control Centre operations

A.1 Introduction to Role 1

Our vision

Our ESO 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 priorities: what do they mean for consumers, and how do they contribute to our ambitions?

Minimise balancing costs

In the short term, we minimise balancing costs by pro-active real time cost optimisation, striking the right balance between forward and Balancing Mechanism actions whilst maintaining a secure and reliable system. We quickly resolve any issues and share best practice, negotiate with Transmission Owners around enhanced ratings, and plan carefully for significant events such as Bank Holidays.

The money the ESO spends on balancing the system directly feeds into BSUoS charges, which are paid by users of the transmission system. These charges will flow through into consumer bills, and therefore minimising these costs is a key priority from a consumer perspective. Minimising balancing costs in the short term is consistent with being a Trusted Partner, as our stakeholders should have confidence that we are taking the right actions to operate the system safely and securely at the lowest cost. We are taking proactive steps to minimize balancing costs in the long term, by stimulating competition in line with our Competition Everywhere ambition.

Improve forecasting accuracy

As well as seeking to minimise our forecasting errors on a day-to-day basis, we are also developing the Platform for Energy Forecasting, which supports market participants in making informed decisions, by providing more accurate, frequent and granular forecasts. We will produce an updated Energy Forecasting Strategic Roadmap. This will detail our deliverables for the year, which will include publishing additional demand forecasts and wind power forecasts.

More accurate forecasts will enable market participants to balance their position ahead of time. As the Control Room becomes more confident in the accuracy of demand and wind forecasts, it can hold less response, which would help to minimise balancing costs. In providing accurate forecasts to market participants, we are fulfilling our role as a Trusted Partner. Improving the accuracy of wind forecasts will also reduce the uncertainty associated with large volumes of renewables, moving the ESO closer to its ambition of an electricity system that can operate carbon free.

Give more clarity of operational decision making

We will engage with stakeholders to find out which data is most valuable to them, and publish it on our data portal. We will also share analysis and insight of how we make operational decisions. We are striving to ensure that the data provided on our data portal¹ is useful to our stakeholders. We are currently seeking feedback via a survey, which stakeholders are invited to complete.

Giving more clarity of operational decision making will allow stakeholders to make better informed decisions, leading to a better functioning market. This should lead to lower bills than would otherwise be the case. By publishing additional data about our decision making, we will fulfil our ambition of being a Trusted Partner.

Expand dispatch facility to handle a large number of small Balancing Mechanism Units (BMUs)

As smaller market participants can now take part in the Balancing Mechanism, we plan to update our software to accommodate the anticipated increase in the number of participants. We will scale up our dispatch facility, which can currently accommodate up to 100 small units. The extent of this scaling will take into account how many Virtual Lead Parties come forward. We will create additional data storage capacity for our existing Balancing Mechanism

¹ <https://data.nationalgrideso.com/>

(BM) dispatch system, re-platform our existing multi-dispatch tool, and replace our existing dispatch optimiser so that it can solve for more complex scenarios such as those where there is a large number of small BMUs.

Accommodating smaller providers in our dispatch system will increase wholesale competition and competition for balancing services, which will lead to lower bills than would otherwise be the case. And of course, increasing wholesale competition and competition for balancing services is consistent with our Competition Everywhere ambition. We will continually review the expansion requirements based on market take up.

How we deliver

Our Role 1 operations cover real time 24/7 system balancing activities, and the primary activities that we deliver in order to enable the control room teams to do their jobs. Our forecasting, trading and system planning activities are crucial to the real-time success of system operation and all play an important role in managing costs. Our deliverables in 2020-21 are focussed on further improving our energy forecasting, with a strategic cloud-based machine-learning system and bringing greater transparency to our decision making. As part of this transparency, we will set up a cross-sector design authority, which will give stakeholders a say in the design of new systems and ensure that they reflect future market needs.

The GB energy landscape has witnessed significant change of more than 40GW renewable connections in recent years, far beyond anyone's expectations. We are operating the system and controlling costs for consumers in every decision we make. We take actions in advance where we have the confidence that it is more cost effective than using real time balancing mechanism actions, ensuring that we manage energy balancing, voltage, inertia and thermal constraints.

Whilst Role 1 looks mainly at near term activities, our teams also support across other timescales by providing their expertise. A primary area for our collaboration across ESO is the Pathfinder projects – you can read more about this in Role 3. But to deliver on all of the changes needed to meet consumers' needs and our 2025 goals, teams involved in Role 1 activities also work on many of the deliverables being led from both Role 2 and Role 3, and you can see how our priorities fit together in the How we deliver section in our Forward Plan introduction document.

A.2 Consumer benefits

A.2.1 How our Role 1 deliverables benefit consumers

The table below illustrates how our high-level deliverables in Role 1 benefit consumers, focussing on the following aspects of consumer benefit:

- Improved safety and reliability
- Reduced environmental damage
- Lower bills than would otherwise be the case
- Improved quality of service
- Benefits for society as a whole

In 2020-21 we are going to deliver...	Benefitting energy consumers this year...	...and in the future
Upgrade of information systems	Improved IT infrastructure contributes to safe and reliable operation, optimises the dispatch process to minimise cost, and enables us to provide stakeholders with the information they require. Improved energy forecasting systems such as the Platform for Energy Forecasting will also allow market participants to balance their own position, reducing spend on balancing costs. Our work to integrate intermittent generation into market frameworks will lower barriers to entry in our markets, increasing competition and lowering prices	More accessible IT systems encourage non-traditional participants to enter the market, leading to increased competition for balancing services and downward pressure on prices. More accurate energy forecasts enabled by the Platform for Energy Forecasting will allow the ESO to review its response and reserve holding: spending less on these services will lead to lower consumer bills than would otherwise be the case. Widening access to the Application Programming Interface (API) system and streamlining the process for Balancing Mechanism (BM) registration will lower barriers to entry for providers in the BM, leading to increased competition which will place downwards pressure on prices.
Transparency of data used by our ENCC in our close-to-real-time decision making	Stakeholders have specifically requested more transparency of ENCC actions. In publishing operational planning data, we are allowing stakeholders to make better informed decisions, leading to a better functioning market which will eventually lead to lower bills than otherwise would be the case.	Transparency of ESO decision making, and a clear direction of travel for the future of the ENCC as part of the operability strategy report, will give stakeholders confidence that the market is functioning correctly, encouraging more new entrants and driving increased competition.
Support access for Intermittent Generation	Our work to integrate intermittent generation into market frameworks will lower barriers to entry in our markets, increasing competition and lowering prices.	Our reforms in this area will facilitate greater participation from low carbon forms of generation; enable the transition to net zero and increase competition to reduce costs to end consumers.
Whole system operability	With the potential introduction of Distribution System Operators (DSOs), the whole system becomes fundamentally different in its nature, and the ESO can no longer make assumptions about how distribution networks will operate. Co-ordination between networks at different voltage will avoid conflicting balancing actions being taken, which will minimise balancing costs and maintain security of supply. The ability to measure inertia will contribute to improved reliability, and allow the ENCC to optimise its holding of reserve, as it will have more confidence in the system requirements. This may lead to reduced spending on reserve holding.	The ability to measure inertia will give more confidence in the level of renewables which can be accommodated. This could lead to less conventional generation being run to increase inertia, leading to reduced environmental damage and lower balancing costs than would otherwise be the case. It will also allow for the optimisation of real-time operation, service procurement and network development.
Product Roadmap for Restoration Implementation	We will work closely with our stakeholders to give them visibility of the opportunities which are available.	The delivery of competitively tendered Black Start contracts will lead to increased competition, which will place downwards pressure on prices. It will also encourage non-traditional providers to offer Black Start services, which will enable us to operate a carbon free network securely, contributing to reduced environmental damage. Diversifying the portfolio of generation which can

In 2020-21 we are going to deliver...

Benefitting energy consumers this year...

...and in the future

**Electricity
Operational Forum
and stakeholder
engagement**

In helping stakeholders to understand our business and seeking to understand theirs, we provide them with an improved quality of service, and enable them to provide timely and accurate information to the end consumer.

provide Black Start services contributes to improved system security, which benefits society as a whole.

If stakeholders better understand our operations, it will give them improved confidence in their business models and make them more willing to participate in more markets, driving increased competition for balancing services in the future which should place downwards pressure on consumer bills.

A.3 Role 1 deliverables

In the table below, we set out our deliverables for this role, and identify several deliverables as priorities. Our Introduction Sections for each role explain why particular deliverables have been identified as priorities.

A.3.1 Summary of Role 1 deliverables

Please see table A.3.2 for a detailed description of each deliverable.

Deliverable	Target delivery date
Produce plan for widening access to API (Application Programming Interface) system (Priority)	Q1 2020-21
Expand dispatch facility to handle a large number of small Balancing Mechanism Units, subject to market take-up	Q1-Q4 2020-21
Interconnector programmes	Ongoing
Platform for Energy Forecasting (PEF) (Priority)	Q1-Q4 2020-21
Design Authority	Q3 2020-21
Improving information access (Priority)	Ongoing
More clarity of operational decision making	Q2 – Q4 2020-21
Publishing the BMU ID for trades	Dependent on P399 code change
Deliver second phase of Power Available integration	Q3 2020-21
Implement State of Energy signal	Q4 2020-21
Inertia measurement	Q2 2020-21 and ongoing
Deliver competitively tendered black start contracts	Q2–Q4 2020-21
Electricity Operational Forum	Q2, Q3 and Q4 2020-21
ENCC visit days	Q1-Q4 2020-21

A.3.2 Role 1 deliverables

The table below sets out our detailed deliverables for this role area. In response to stakeholder feedback, for deliverables which are ongoing throughout the year we have defined a number of interim milestones. The purpose of the interim milestones is to provide extra visibility of our activities to Ofgem and stakeholders, we expect our performance to be measured against our overall progress and achievements and not individual interim milestones. We work flexibly across the roles to prioritise and manage our resources, therefore interim milestones may be changed during the year as activities progress. Updates will be provided on the Forward Plan tracker² which can be found on our website and is updated on a monthly basis.

Deliverable	Target delivery date	Description	Further context
Upgrade of information systems			
Produce plan for widening access to API (Application Programming Interface) system	Q1 2020-21	Review the scaling requirement for the API system based on current and forecasted volumes in the market. If required, we will produce a plan which sets out proposals and timescales for widening access to the web based API and any associated code and policy modifications which will be required to facilitate this.	To allow providers choice of which communications system they use, and improve the provider experience. We are currently doing a cost-benefit analysis of this requirement, as part of the review of Wider Access expansion.
Expand dispatch facility to handle a large number of small Balancing Mechanism Units, subject to market take-up		Currently, our dispatch system can accommodate up to 100 small units. We plan to scale this, such that by the end of September it can accommodate a larger number of units. We will keep the scale of this expansion under review, depending on how many Virtual Lead Parties (VLPs) come forward to participate.	To date, no BM units are actively participating in the BM as a VLP through the Wider Access arrangements which went live in December 2019. There is one active pre-qualification application nearing completion. In total, we are in conversations with 18 participants who are wanting to come in through the VLP route.
	Q1 2020-21	Creation of additional data storage capability for existing BM dispatch system	We have however seen continuing access to the BM through the Supplier Volume Allocation (SVA) route. Since 2018 we have seen 58 BM units registered (3 have since deregistered). We have seen 7 units registered from December 2019.
	Q2 2020-21	Complete the design stage for re-platforming our existing multi-dispatch tool	
	Q3 2020-21	Replacement of existing dispatch optimiser with modern optimiser with capability to solve for more complex scenarios, including a larger number of small BM units	
	Q4 2020-21	Re-platforming our existing multi-dispatch tool delivery. This will fully integrate the current interim process for bulk dispatch of Balancing Mechanism Units (BMUs) into control room systems. This will reduce our manual processes, and make it easier for the ENCC to dispatch a large number of small BMUs at once.	This will allow the control room to dispatch a number of small BMUs to meet a requirement as efficiently as large BMUs where economical to do so. This work will be carried out iteratively throughout the year, and will involve improvements being made to the systems which are used for Customer Prequalification and Registration, Dispatch, and Settlement.
Interconnector programmes	Ongoing	Continued integration of interconnectors into operational systems. Before an interconnector begins commercial operation, there are a range of IT systems which need to be updated, and for each system there are milestones	This year we will deliver IT changes to accommodate two new interconnectors due to go live over the summer and autumn respectively, increasing the amount of clean energy the UK can exchange with Europe. We will update

² <https://www.nationalgrideso.com/document/162046/download>

Deliverable	Target delivery date	Description	Further context
		<p>which need to be completed: requirements, design, development and testing, implementation, and closure. During 2020-21, we will work on IT changes for Eleclink, IFA2, and NSL- but the precise timing of the phases will depend on the go-live date for each interconnector, which can be changed by the interconnector owner. We will hold regular meetings to collect customer feedback and carry out satisfaction surveys to measure our performance.</p>	<p>the interconnector management tool to enable the additional interconnectors going live throughout the year and introduce Balancing Mechanism system updates. We will also introduce updates to aid intraday market changes for one existing interconnector and to set up intraday markets for two new interconnectors; this will increase flexibility for market participants. Compliance with European Codes continues, with new European methodology due to go live beginning this summer, this will increase our ability to participate in real time European markets. We are aiming to introduce efficiencies by aligning processes, enabling new commercial services, and streamlining our IT systems.</p>
Platform for Energy Forecasting (PEF)	<p>Q1 2020-21</p> <p>Q2 2020-21</p> <p>Q3 2020-21</p> <p>Q4 2020-21</p>	<p>Produce updated version of Energy Forecasting Strategic roadmap. The previous version, from June 2019, is published on our website³. We will publish additional energy forecasts to the market:</p> <p>2-14 days ahead national demand forecast</p> <p>2-52 weeks ahead national demand forecasts</p> <p>Within day-14 days wind power forecasts</p>	<p>Project PEF (Platform for Energy Forecasting, also referred to as Energy forecasting strategic project) focuses on delivering improved forecasting services to support market participants to make informed decisions by providing forecasts which are more accurate, frequent and granular. This will help the market to balance their position ahead of time, and as forecasts improve then less reserve will need to be held.</p>
Design Authority	Q3 2020-21	We will launch the Design Authority (DA) in Q3 2020-21, in preparation for RIIO-2.	The Design Authority ⁴ will be dual-layered: a strategic design authority to inform the overall direction and a delivery design authority that will provide input into the design, development and testing phases of our solution development. In the run up to introducing the DA, we will actively engage with suitably independent parties who will participate. The DA will be formed of a small number of ESO representatives and a larger number of independent industry representatives. We envisage this operating in a similar way to the Electricity System Operator RIIO-2 Stakeholder Group (ERSG) ⁵ .
Improving information access	Ongoing, to be delivered in RIIO-2	<p>Foundation work for data analysis platform, involving auditing current data flows and designing new platform for RIIO-2</p> <p>Make all published ESO data available via the ESO data portal</p>	<p>This year, we will build a detailed strategy for our data platform, understanding the business requirements across ESO. This will then be translated into an IT architecture, and we will test the market for solutions and develop a Proof of Concept. Implementation will not take place until the RIIO-2 period.</p>

Transparency of data used by our ENCC in our close-to-real-time decision making

³ <https://www.nationalgrideso.com/document/145941/download>

⁴ <https://www.nationalgrideso.com/document/158051/download>, pp. 43.

⁵ <https://www.nationalgrideso.com/about-us/business-planning-riio/eso-riio-2-stakeholder-group>

Deliverable	Target delivery date	Description	Further context
More clarity of operational decision making		We will continue to engage with stakeholders through our Operational Forums and webinars to find out what data is valuable to them and how we could best provide this. Based on the feedback from our stakeholders, we will share complementary analysis and insight of how we make decisions where required. We will continue engaging with stakeholders and industry throughout the year and we will be expanding the data portal offering based on stakeholders' feedback, to ensure we keep delivering the most beneficial data.	We will build on the experiences of the data introduced in 2019-20, such as our systems constraint information, and continue to work with stakeholders to identify the data which is of most value to them to support improved transparency of our decision making.
	Q2 2020-21	Machine readable version of the System Operation Plan (SOP)	
	Q3 2020-21	Improving the transparency of our trading decisions	
	Q4 2020-21	Data to support better understanding our dispatch decisions	
Publishing the BMU ID for trades	Dependent on P399 code change	We will take forward the recommendations of the P399 industry working group modification and publish information to the market about the trades we carry out. We will proactively work with our stakeholders to publish data in an accessible format using the API technology.	We have done the preparation work to enable us to publish this information. However, the target delivery date depends on the publication of P399. We will provide updates on this deliverable in our Forward Plan tracker.
Support access for Intermittent Generation			
Deliver second phase of Power Available integration	Q3 2020-21	Phase 2b of Power Available (PA) is a continuation of the existing PA project to integrate the PA signal into the Control Room to enable greater use of wind for Mandatory Frequency Response (MFR). This will improve wind forecasting and response optimisation by blending PA with weather forecasts to provide a real time measure of output for wind units.	<p>In order to provide industry with a view of how balancing service frameworks will evolve, we are producing a "wider strategy for flexibility from intermittent generation" mini-report as part of our 2019-21 Forward Plan commitments. The strategy will cover current opportunities for intermittent generation and focus in particular on opportunities for wind.</p> <p>The Power Available project is a key example of how the ESO has sought to unlock the potential of wind to provide balancing services, and we hope to be able to use the capabilities PA provides in services going forward as we open up markets further to intermittent generation providers and support our ambition of zero carbon system operation by 2025.</p>
Implement State of Energy signal	Q4 2020-21	Define and implement a state of energy signal from limited-energy assets into the Control Room to give visibility of the remaining energy in limited-duration assets, such as batteries.	We are working with market participants on what information/data they should provide to facilitate their participation in the market given that the current frameworks do not fully recognise the attributes of technology types such as batteries. This will be included in our systems in a phased way. Consideration will be given to rolling this out to industry via code changes when we have a more established solution.

Deliverable	Target delivery date	Description	Further context
Whole system operability			
Inertia measurement	Q2 2020-21 (first supplier) Q1 2021-22 (second supplier)	<p>Implement novel tools to measure system inertia in real-time which will significantly improve the accuracy and optimise the ESO's real-time operation, service procurement and network development with the increasing number of embedded generators. It is essential to measure the full system inertia from both the transmission and distribution sides.</p> <p>To mitigate delivery risks, two suppliers are currently working on different methods to provide the first operational installations. Unfortunately, we have experienced programme delays due to issues with integration with existing systems, resulting in an anticipated delivery date of Q2 rather than Q1 for the first solution.</p> <p>it is estimated that the projects will provide up to 15 percent improvement in the accuracy of the rate of change of frequency measurement. This is based on the limited results from the Samuel Inertia Element project (SIM) final report⁶.</p>	<p>Inertia monitoring is the ESO's responsibility, as total system inertia has a direct impact on the ability of the network to recover from a frequency incident. Regional monitoring prevents generators from tripping in low frequency events, however, it's the inertia across the whole system that is most important to minimise generation losses.</p> <p>Current methods for estimating inertia, including validating against large system losses, are becoming harder during periods of high renewable generation due to the reduction of conventional fossil fuel plant. To maintain network stability, costly constraints are applied to operate within the estimated limits.</p> <p>A more accurate and frequently updated inertia measurement will provide additional transparency to the constraints applied due to inertia levels, reducing the quantity of control actions. In addition, the improved inertia forecasting will reduce balancing costs due to a more accurate understanding of the contribution from distributed generation.</p>
Product Roadmap for Restoration implementation			
Deliver competitively tendered black start contracts	Q2 2020-21	Award contracts to successful parties for South West/Midlands tender	<p>We will be awarding contracts to successful parties for the South West / Midlands tender in Q2 2020-21, and for the Northern Tender in Q3 2020-21 and then supporting those parties through the process before they start delivering the contracts in April 2022 and October 2021 respectively.</p> <p>Delivery of these tenders is enabling the transition of Black Start from a service which is bilaterally procured to one with a more open and transparent procurement approach.</p>
	Q3 2020-21	Award contracts to successful parties for Northern tender	
	Q4 2020-21	Carry out preparatory work for future tender opportunities in South East, in preparation for tender event in Q1 2021-22.	
Electricity Operational Forum and stakeholder engagement			
Electricity Operational Forum	Q2, Q3 and Q4 2020-21	This stakeholder event takes place three times a year to provide operational information.	The Electricity Operational Forum is a regular event, which takes place several times a year. This is a baseline activity for the ESO.
ENCC visit days	Q1-Q4 2020-21	Monthly open door to market participants to the ENCC to learn about system operation.	We recognise that this is a routine activity, but we note that stakeholders have found these sessions valuable.

⁶ https://www.smartnetworks.org/project/nia_ngso0015

A.4 Role 1 metrics and performance indicators

Following consultation with stakeholders, we have defined a set of metrics and performance indicators for Role 1. Metrics are measures which have set benchmarks, and Performance Indicators are measures which do not.

These are set out below, where we indicate how the metric relates to the deliverables and ESO ambitions. We explain how a focus on this activity benefits consumers, and how performance will be measured.

Where possible, we have defined a metric, indicating the level of performance we will define as “below expectations”, “in line with expectations” or “exceeding expectations”, along with the justification for these benchmarks.

However, there are some areas we would like to measure where it is not sensible to define a benchmark in this way. For example, there are some areas of performance we will start to measure this year, in order to define a robust benchmark we can use for RIIO-2 reporting. Although we recognise that a benchmark would be needed to use this data as a measure of our performance, we have heard from stakeholders that they would welcome visibility of this data, and it would allow us to be transparent about how a benchmark is set for RIIO-2. We will therefore start to publish certain sets of data this year as Performance Indicators.

For Role 1, we will publish the following measures:

Metrics:

- 1a: Balancing cost management
- 1b: Energy forecasting accuracy
- 1c: Security of supply
- 1d: System Access Management
- 1e: Customer Value Opportunities

Performance indicators:

- 1f: CNI system reliability

A.4.1 Role 1 metrics for 2020-21

Metric Name	1a Balancing costs
Reporting frequency	Monthly
Role	1
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Addressing Operational Issues Whole System Operability Product Roadmaps Forecasting Product Roadmaps for response and reserve implementation Stability Pathfinder Constraints Pathfinder
Link to ESO ambitions	An electricity system that can operate carbon free Competition everywhere
How does it benefit consumers?	Lower balancing costs will feed into lower BSUoS charges. This will flow through into lower consumer bills. This is linked to the following consumer benefit outcome: <ul style="list-style-type: none"> Lower bills than would otherwise be the case
How is performance measured? How will this metric show performance above baseline expectations?	<p>The approach we use for measuring our Balancing Costs performance was proposed by Ofgem at the start of the 2018-21 incentive scheme. It is based on a linear trend in a five year rolling mean, based on annual Balancing Services Costs (excluding Black Start). Ofgem's requirements were that the methodology should be simple, avoiding the opacity of previous schemes.</p> <p>However, the generation mix is evolving, bringing new operational challenges which often result in increased balancing costs in the short term, but which we are seeking to resolve in the long term with projects such as the Pathfinders. As it is getting harder to balance the system, it is challenging to operate the system safely and securely without a year-on-year increase in balancing costs. This will be the case until we have put in place the long-term solutions we are developing to manage balancing costs.</p> <p>We note that there are many different factors which impact on balancing costs: some of which are within the ESO's control, such as its procurement of balancing services and the decisions it makes in operational timescales. However, other drivers of balancing costs are outside of the ESO's control, such as weather patterns, the increasing percentage of renewable generation due to initiatives such as Connect and Manage, and fault outages on key network assets. Although it would be possible to put together a model which seeks to differentiate between costs the ESO can and cannot control, this would lead to a complex model similar to the previous BSIS model, which stakeholders did not find to be sufficiently transparent.</p> <p>In order to preserve simplicity, the existing metric simply creates a benchmark (not a target) based on previous years and adjustment factors for specific system changes, and then compares each month's balancing costs to that benchmark. The benchmark is defined for the purposes of comparison, rather than to provide a measure of the ESO's performance.</p> <p>The methodology uses a linear trend, which seeks to replicate the increasing challenges of operating the system. In order to meaningfully employ a linear trend, the data points need to handle one-off permanent changes to the system network which would not be captured by the five-year trend. So far, the only change modelled in this way has been the Western Link.</p> <p>We also make adjustments for significant events which we expect to have an impact on balancing costs, whether this is an upwards or downwards adjustment: details of the calculations are provided in Appendix 2. These are trends which we would not expect to be captured in the 5-year rolling average, because they relate to either new assets or new trends in market behaviour. For 2020-21, we have applied the following adjustment factors:</p>

- **Energy Uplift:** Over the past few years, the cost of the energy components (i.e. Energy Balancing, different types of Reserve and Response) of the total balancing cost had been steadily decreasing. However, in 2019-20 it rose sharply, as greater renewable penetration in the generation mix, lower levels of inertia, less controllable generation and greater uncertainty have led to a greater requirement for Reserve and Response and more expensive balancing options to maintain the system. This has therefore increased costs across these elements (although STOR costs have fallen). As such, this increase in energy costs is not accounted for in the historic trend so an uplift has been applied. The calculations for this uplift are provided in Appendix 2.
- **Rate of Change of Frequency (RoCoF):** RoCoF costs have increased sharply over the past few years, as less synchronous plant has been running. Lower demand and increased non-synchronous generation and interconnection have led to lower levels of inertia. This has resulted in a higher spend, either due to constraining large generators whose capacity if lost suddenly would cause a RoCoF issue, or running synchronous plant to increase system inertia. Both of these are costly actions and have increased out of step with the general upward trend. RoCoF costs have increased fivefold in the last four years, and therefore are not reflected accurately in the historical trend calculation. The Loss of Mains Change Programme (LoMCP) has been set up to tackle RoCoF by changing the sensitivity of embedded generators to RoCoF, so that the loss of large generators would not cause subsequent losses of embedded generation, this is expected to yield a £10m benefit this year. The calculations for this uplift are provided in appendix 2.
- **ElecLink:** Two new interconnectors are due to go live this year: ElecLink and IFA2. The connection site for ElecLink is close to that for IFA, BritNed and NEMO, which has the potential to cause constraint issues if all interconnectors are flowing in. IFA2 is also due to connect, but it will sit outside of this constraint boundary. The calculations for the ElecLink uplift are provided in appendix 2.

Please see appendix 2 for a step-by step guide to how the benchmarks are calculated. We have also uploaded a spreadsheet to our website to provide additional transparency of these calculations⁷. Please note that the benchmarks were re-calculated in April 2020 to take account of March 2020 data.

Note on benchmarks

The benchmarks for balancing costs act as a trigger for the ESO to explain why its costs have differed from the expected figures set out in the Forward Plan.

The costs could differ from the expected values for a wide range of reasons. Real consumer value is derived from the ESO seeking to understand the drivers behind the trends in balancing costs, and taking actions which will minimise balancing costs now and in the future.

The benchmarks are shown in the table below:

Month	April	May	June	July	August	Sept
Exceeding expectations (£m)	60.3	43.6	75.2	64.2	92.3	94.1
In line with expectations (£m)	67.0	48.4	83.6	71.3	102.6	104.5
Below expectations (£m)	73.7	53.2	91.9	78.4	112.8	115.0

Month	Oct	Nov	Dec	Jan	Feb	March	Total
Exceeding expectations (£m)	115.0	75.3	114.8	120.7	129.0	109.9	1094.3
In line with expectations (£m)	127.8	83.7	127.5	134.1	143.3	122.1	1215.9

⁷ <https://www.nationalgrideso.com/document/166231/download>

	Below expectations (£m)	140.6	92.0	140.3	147.5	157.7	134.3	1337.5																																																			
Benchmark-exceeding expectations	<p>In line with our licence obligation, we have defined a value for “exceeding expectations”, which is the ESO’s balancing costs in a particular month being at least 10% lower than the figure implied by the benchmark.</p> <p>However, the benchmark, along with the “exceeding expectations” and “below expectations” figures, are only provided for the purposes of comparison. Each month, the ESO will explain the reasons for the balancing costs differing from the benchmark with reference to the defined adjustment factors.</p>																																																										
Benchmark-in line with expectations	<p>In line with our licence obligation, we have defined a value for “in line with expectations”, which is the ESO’s balancing costs in a particular month being within 10% of the figure implied by the benchmark.</p> <p>However, the benchmark, along with the “exceeding expectations” and “below expectations” figures, are only provided for the purposes of comparison. Each month, the ESO will explain the reasons for the balancing costs differing from the benchmark with reference to the defined adjustment factors.</p>																																																										
Benchmark-below expectations	<p>In line with our licence obligation, we have defined a value for “below expectations”, which is the ESO’s balancing costs in a particular month being at least 10% higher than the figure implied by the benchmark.</p> <p>However, the benchmark, along with the “exceeding expectations” and “below expectations” figures, are only provided for the purposes of comparison. Each month, the ESO will explain the reasons for the balancing costs differing from the benchmark with reference to the defined adjustment factors.</p>																																																										
Benchmark calculations and comparison to previous years.	<p>The purpose of providing a balancing cost benchmark will be to provide an understanding of the expected balancing costs across the year as a whole, and how costs might typically be distributed across the year, so providing a supporting indicator on whether costs are emerging in line with expectations. Where balancing costs deviate from this benchmark, this will act as a trigger for the ESO to provide an explanation of the causes of this as part of the monthly reporting process.</p> <p>It is important to note that the balancing cost benchmark will only be used for information and context, rather than for the purposes of assessing the ESO’s performance.</p> <p>Please see Appendix 2 for details of how the benchmark and adjustments are calculated.</p> <p>Historic data⁸ for 2019-20 is provided here:</p> <table border="1"> <thead> <tr> <th></th> <th>Apr</th> <th>May</th> <th>Jun</th> <th>Jul</th> <th>Aug</th> <th>Sep</th> </tr> </thead> <tbody> <tr> <td>Benchmark cost (£m)</td> <td>83.2</td> <td>97.5</td> <td>75.3</td> <td>85.6</td> <td>87.4</td> <td>96.6</td> </tr> <tr> <td>Additional cost forecast due to WHVDC fault (£m)</td> <td>11.3</td> <td>11.2</td> <td>1</td> <td>0</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>Benchmark adjusted for WHVDC (£m)</td> <td>94.5</td> <td>108.7</td> <td>76.3</td> <td>85.6</td> <td>87.9</td> <td>97.6</td> </tr> <tr> <td>Outturn cost (£m)</td> <td>80.1</td> <td>60.8</td> <td>85.8</td> <td>67.2</td> <td>105.2</td> <td>107.4</td> </tr> </tbody> </table> <p><i>2019-20 Monthly balancing cost benchmark and outturn.</i></p> <table border="1"> <thead> <tr> <th></th> <th>Oct</th> <th>Nov</th> <th>Dec</th> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Benchmark cost (£m)</td> <td>103.3</td> <td>98.4</td> <td>91</td> <td>82.6</td> <td>81.9</td> <td>81.1</td> <td>1063.9</td> </tr> </tbody> </table>									Apr	May	Jun	Jul	Aug	Sep	Benchmark cost (£m)	83.2	97.5	75.3	85.6	87.4	96.6	Additional cost forecast due to WHVDC fault (£m)	11.3	11.2	1	0	0.5	1	Benchmark adjusted for WHVDC (£m)	94.5	108.7	76.3	85.6	87.9	97.6	Outturn cost (£m)	80.1	60.8	85.8	67.2	105.2	107.4		Oct	Nov	Dec	Jan	Feb	Mar	Total	Benchmark cost (£m)	103.3	98.4	91	82.6	81.9	81.1	1063.9
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⁸ The diagram was updated on 21 April 2020.

Additional cost forecast due to WHVDC fault (£m)	0	1.5	0	8.1	2.6	0	37.2
Benchmark adjusted for WHVDC (£m)	103.3	99.9	91	90.7	84.5	81.1	1101.1
Outturn cost (£m)	130.3	86.5	130.0	144.8	148.9	121.4	1268.4

Metric Name	1b Energy Forecasting Accuracy
Reporting frequency	Monthly
Role	1
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric- with changes
Relevant deliverables	Platform for energy forecasting
Link to ESO ambitions	An electricity system that can operate carbon free
How does it benefit consumers?	<p>It is widely accepted that accurate demand and wind forecasts are useful to the ESO in operating the system, and where forecasts are provided to stakeholders this can help them to balance their own position, resulting in fewer residual balancing actions. Thus, with improved energy forecasting accuracy, we can better manage our balancing services and reduce operational costs. This is therefore linked to the following consumer benefit outcomes:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Reduced environmental damage
How is performance measured? How will this metric show performance above baseline expectations?	<p>Day Ahead Demand forecasting:</p> <ul style="list-style-type: none"> • Demand forecasting is becoming significantly more difficult. Errors are not proportional to transmission system demand, and are not expected to be. Although the overall level of GB demand has remained stable over the past three to four years, the proportion of this which is met by the transmission system has fallen, and the proportion met by the distribution system has increased. This has resulted in increased uncertainty, because the ESO does not have visibility of how much distributed generation will run at a given time. • In addition, significant increases in weather driven renewable generation, particularly solar, have meant that the demand forecast is exposed to increasing levels of errors in the weather forecast. Of all the weather variables, solar radiation (sunlight) is the hardest to forecast, and this has become one of the biggest sources of error in daytime demand, meaning that demand forecast errors would be expected to increase. • As a result of this, the underlying models that we use have increased their standard error by between 40-70%. The ESO has recently re-designed the mathematical modelling it uses for demand forecasting, within the constraints of the Grid Code. However, even with this significant improvement in forecasting technology, it remains challenging to maintain the same level of demand forecasting error seen in previous years. • Demand forecast errors are driven by the overall level of demand on the system, which has remained flat. The uncertainty is caused by the increase in the proportion of the demand met by distributed generation (which the ESO does not have visibility of) and the increased weather error associated with increased renewable generation therefore the error in the demand forecast comes from the combination of these factors, not from the level of residual demand seen on the transmission system, so a percentage error measure is not appropriate. In addition, a percentage error measure would incentivise the ESO to focus forecasting skill on periods when demand is low, however this forecasting skill is more valuable to our customers when demand is high. • If for any reason the forecast cannot be produced on a particular day, we will exclude this day from our calculation, and as part of the metric commentary we will explain the reasons for not producing the forecast. <p>Day Ahead BMU Wind Generation forecasting:</p> <ul style="list-style-type: none"> • The accuracy of wind forecasts is driven by factors such as the positioning of individual turbines, the age of the turbines, and the precise direction of the wind. In order to more accurately forecast levels of wind generation, a complex model would need to be developed to take account of all of these factors: however, this would require input data which is not available to the ESO.

	<ul style="list-style-type: none"> • Wind forecasting errors would be expected to increase as wind capacity increases. Average error is therefore expected to be proportional to installed capacity. We therefore use percentage error as a measure of accuracy, in order to account for increases in installed wind generation capacity. • If for any reason the forecast cannot be produced on a particular day, we will exclude this day from our calculation, and as part of the metric commentary we will explain the reasons for not producing the forecast. <p>As a response to the feedback received in relation to the energy forecasting metrics (day ahead demand and day ahead wind forecasting), we have re-designed this metric. We have introduced an annual benchmark for both demand and wind forecasts. We have defined criteria for exceeding, in line with and below expectations with reference to these annual benchmarks.</p> <p>To provide an indication of the ongoing performance of the energy forecasting metrics, each month we will publish the monthly mean average error (day ahead demand) and monthly mean absolute percentage error (day ahead wind) for that month and the corresponding value averaged over the previous three financial years. This will be for monitoring purposes and not be part of the incentive measure.</p> <p>Each month, we will report our performance for the previous month as detailed above, and against the benchmark for the year to date.</p> <p>At the end of the year, we will compare our error across the year to the benchmark, using the criteria for exceeding, in line with and below expectations set out below. Note that an asterisk denotes a provisional figure, which will be updated in April 2020 when complete forecasting data for 2019-20 is available.</p>																					
Benchmark- exceeding expectations	Energy forecasting benchmark metrics:																					
Benchmark- in line with expectations	<ul style="list-style-type: none"> • Day ahead demand annual mean absolute error: 571MW⁹ • Day ahead wind annual percentage error: 5.27%¹⁰ 																					
Benchmark- below expectations	<table border="1" data-bbox="448 1111 1406 1391"> <tr> <td>Benchmark- exceeding expectations</td> <td>Error which is at least 5% lower than the benchmark</td> </tr> <tr> <td>Benchmark- in line with expectations</td> <td>Error which is within 5% of the benchmark</td> </tr> <tr> <td>Benchmark- below expectations</td> <td>Error which is at least 5% higher than the benchmark</td> </tr> </table> <p>This translates into the following criteria for exceeding, in line with and below expectations¹¹:</p> <table border="1" data-bbox="448 1514 1406 1861"> <thead> <tr> <th>Energy forecasting metric</th> <th>Day ahead demand forecasting</th> <th>Day ahead wind forecasting</th> </tr> </thead> <tbody> <tr> <td>Performance measure</td> <td>Annual mean absolute error (MW)</td> <td>Annual mean absolute percentage error (%)</td> </tr> <tr> <td>Exceeding expectations</td> <td><542</td> <td>< 5.01</td> </tr> <tr> <td>In line with expectations</td> <td>542 – 599</td> <td>5.01 – 5.54</td> </tr> <tr> <td>Below expectations</td> <td>> 599</td> <td>> 5.54</td> </tr> </tbody> </table>	Benchmark- exceeding expectations	Error which is at least 5% lower than the benchmark	Benchmark- in line with expectations	Error which is within 5% of the benchmark	Benchmark- below expectations	Error which is at least 5% higher than the benchmark	Energy forecasting metric	Day ahead demand forecasting	Day ahead wind forecasting	Performance measure	Annual mean absolute error (MW)	Annual mean absolute percentage error (%)	Exceeding expectations	<542	< 5.01	In line with expectations	542 – 599	5.01 – 5.54	Below expectations	> 599	> 5.54
Benchmark- exceeding expectations	Error which is at least 5% lower than the benchmark																					
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Energy forecasting metric	Day ahead demand forecasting	Day ahead wind forecasting																				
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⁹ Updated in April 2020 to take into account March 2020 outturn figures.
¹⁰ Updated in April 2020 to take into account March 2020 outturn figures.
¹¹ Updated in April 2020 to take into account March 2020 outturn figures.

Benchmark calculations and comparison to previous years.

The annual benchmarks for Energy Forecasting are calculated based on the mean outturn values for the past three financial years (2017-18, 2018-19 and 2019-20).

Day ahead demand forecasting: monthly mean absolute errors (MW)

Month	Scheme Year 2017/18	Scheme Year 2018/19	Scheme Year 2019/20
Apr	671	642	648
May	588	546	503
Jun	514	438	522
Jul	489	489	440
Aug	445	465	431
Sep	484	505	429
Oct	624	543	519
Nov	620	587	543
Dec	614	671	597
Jan	641	583	667
Feb	611	567	654
Mar	786	602	869 ¹²

Day ahead BMU wind forecasting: monthly mean absolute percentage errors (%)

Month	Scheme Year 2017/18	Scheme Year 2018/19	Scheme Year 2019/20
Apr	4.76	6.22	5.82
May	4.90	4.89	3.84
Jun	7.26	4.57	4.83
Jul	5.71	3.96	3.21
Aug	5.30	3.83	4.08
Sep	5.32	4.63	4.36
Oct	5.45	5.51	5.61
Nov	5.32	5.46	7.01
Dec	5.61	5.55	4.99
Jan	7.53	5.56	5.99
Feb	6.16	5.46	4.63
Mar	5.35	5.44	5.82 ¹³

¹² Updated in April 2020 to take into account March 2020 outturn figures.

¹³ Updated in April 2020 to take into account March 2020 outturn figures..

The errors averaged over the previous three financial years are given below.

Day ahead demand forecast benchmarks for financial year 2020-21

Month	Benchmark (MW)	Month	Benchmark (MW)
April	654	October	562
May	546	November	583
June	491	December	627
July	473	January	630
August	447	February	611
September	473	March	752 ¹⁴

BMU wind generation forecast benchmarks for financial year 2020-21

Month	Benchmark (%)	Month	Benchmark (%)
April	5.60	October	5.53
May	4.54	November	5.93
June	5.56	December	5.38
July	4.29	January	6.36
August	4.41	February	5.42
September	4.77	March	5.54 ¹⁵

There appears to be some evidence that some wind farms, especially the one constructed recently, control their output using on-site storage. The output from these wind farms is no longer directly related to the meteorological conditions, and will have a negative effect on the wind forecast performance metric.

Also, using the last three years of performance to calculate a benchmark is not fully representative of the full range of the variability and uncertainty of wind conditions. If the previous three years, for a relevant month, exhibit a relatively low and stable levels of wind than the proposed benchmark could be artificially low. Similarly, autumn and winter of 2019-20 experienced more storms than is typical, so the benchmarks for those months are higher compared to the two previous reporting years.

The World Meteorological Organisation suggests a minimum of 15 years to capture inter-year variability.

¹⁴ Updated in April 2020 to take into account March 2020 outturn figures.

¹⁵ Updated in April 2020 to take into account March 2020 outturn figures.

Metric Name	1c Security of Supply
Reporting frequency	Monthly
Role	1
Continuation of 2019-21 metric, or new metric from RIIO-2?	New metric from RIIO-2
Relevant deliverables	Whole system operability
Link to ESO ambitions	An electricity system that can operate carbon free
How does it benefit consumers?	<p>This metric will measure the quality of service that we deliver in running the electricity network by the number of voltage and frequency excursions that take place. This will increase transparency of the operational issues experienced in operating the system. This is linked to the following consumer benefit outcomes:</p> <ul style="list-style-type: none"> • Improved safety and reliability • Benefits for society as a whole
How is performance measured? How will this metric show performance above baseline expectations?	<p>Security of supply is measured with reference to system voltage and frequency where we will report the number of occasions that we are outside of the limits defined in the Security and Quality of Supply Standards (SQSS), as set out below. We will report on a monthly basis, the number of frequency and voltage excursions that have been incurred during the previous month, and a total for the year to date. This will include details of an investigation into the reasons why the excursion took place, the duration of the excursion and the relative size to the nominal limits. We will use the criteria set out in the National Electricity Transmission System C17 Report to determine which excursions to report.</p> <p><u>Voltage excursions</u> The Electricity Safety, Quality and Continuity Regulations 2002 permit variations of voltage not exceeding 10 per cent above and below the nominal at voltages of 132kV and above and not exceeding 6 per cent at lower voltages. Any voltage excursions in excess of 15 minutes must be reported. The Grid Code reflects these limits, and imposes a further constraint for the 400kV system in that voltages can only exceed +5 per cent for a maximum of 15 minutes. Consumers may expect the voltage to remain within these limits, except under abnormal conditions e.g. a system fault outside of the limits specified in the Security and Quality of Supply Standards (SQSS). Normal operational limits are agreed and monitored individually at connection points with customers to ensure that voltage limits are not exceeded at steady state or following the specified credible fault events described in the SQSS.</p> <p><u>Frequency excursions</u> The Electricity Safety, Quality and Continuity Regulations 2002 permit variations in frequency not exceeding 1 per cent above and below 50Hz (a range of 49.5 to 50.5Hz). Any frequency excursions outside these limits for 60 seconds or more are required to be reported. The electricity system is normally managed such that frequency is maintained within operational limits of 49.8 and 50.2Hz. Frequency may, however, move outside these limits under fault conditions or when abnormal changes to operating conditions occur. Losses of generation between 1320MW and 1800MW are considered abnormal or infrequent and a maximum frequency change of 0.8Hz may occur, although operation is managed so that the frequency should return within the lower statutory limit of 49.5Hz within 60 seconds.</p> <p>The report includes both Secured Events, which are defined in SQSS and include normal and infrequent infeed losses; and Unsecured Events, for example the event of 9 August 2019. This event resulted in a cumulative level of power loss greater than the level required to be secured by the SQSS, and as such a large frequency excursion occurred. Such events will be reported in the NETS C17 report and in the ESO Forward Plan monthly incentives report.</p>
Benchmark- exceeding expectations	0 excursions for both voltage and frequency

Benchmark- in line with expectations	1 excursion for either voltage or frequency																		
Benchmark- below expectations	More than 2 excursions in total																		
Benchmark calculations and comparison to previous years.	<p><i>Table 4 – Voltage and Frequency excursions</i></p> <table border="1"> <thead> <tr> <th></th> <th>2014-15</th> <th>2015-16</th> <th>2016-17</th> <th>2017-18</th> <th>2018-19</th> </tr> </thead> <tbody> <tr> <td>Voltage excursions</td> <td>6</td> <td>0</td> <td>0</td> <td>3</td> <td>2</td> </tr> <tr> <td>Frequency excursions</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table> <p>In RIIO-2 we have proposed an exceeding expectations benchmark of zero excursions for both voltage and frequency, in line with the SQSS. This is ambitious, given the historic data, however it represents the high quality of service we strive to deliver for our customers.</p>		2014-15	2015-16	2016-17	2017-18	2018-19	Voltage excursions	6	0	0	3	2	Frequency excursions	0	0	0	0	0
	2014-15	2015-16	2016-17	2017-18	2018-19														
Voltage excursions	6	0	0	3	2														
Frequency excursions	0	0	0	0	0														

Metric Name	1d System Access Management
Reporting frequency	Monthly
Role	1
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Whole system operability
Link to ESO ambitions	A whole system strategy that supports net zero by 2050 The ESO is a trusted partner
How does it benefit consumers?	<p>Publishing this metric encourages the ESO to investigate the causes of outage cancellations, and amend processes where appropriate to prevent a repeat. We will continue to cancel system access requests where needed, if system or generator faults occur, but this number should be as low as possible to avoid unnecessary costs for external stakeholders, and the ESO's costs in re-planning these requests.</p> <p>The cancellation of outages is important from both a consumer and stakeholder perspective, as planned outages allow for the timely progression of TO and DNO network reinforcement projects, many of which will resolve system constraints or improve safety and system reliability when completed. Cancellation of outages can also result in network companies standing down contractors, a cost which will eventually be met by the end consumer. This metric is therefore linked to the following consumer benefit outcomes:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	<p>This metric, which is mirrored by a transmission owner (TO) Key Performance Indicator proposed in the GB RIIO-T2 Network Access Policy document, is useful in driving down the number of planned outages that are delayed by more than an hour or cancelled by the ESO in the control phase due to process failure.</p> <p>This measure is a count of the number of outages out of every 1,000 delayed by more than an hour, or cancelled within day that is not because of a system or generator fault occurring between day ahead handover and real time. There are around 9000 outages planned on the transmission networks each year.</p> <p>Stakeholders requested the inclusion of this metric in RIIO-2, as it measures an aspect of system operation which is important to them. Although some have argued that reducing outage cancellations is a baseline activity, publishing this metric drives a particular focus on this area where the ESO has real potential to drive consumer benefit by enabling the timely progression of planned outages. However, it is important to note that our overall focus remains on optimising overall system costs, rather than solely on minimising changes to planned outages.</p>
Benchmark- exceeding expectations	< 1 outage cancellations per 1,000 outages
Benchmark- in line with expectations	1 - 2.5 outage cancellations per 1,000 outages
Benchmark- below expectations	> 2.5 outage cancellations per 1,000 outages
Benchmark calculations and comparison to previous years.	We have reviewed the current targets and believe they should be lowered further to be more ambitious, as our current performance is 2.27 outage cancellations per 1000 outages (this is based on ten months of data).

Metric Name	1e Customer Value Opportunities
Reporting frequency	Quarterly
Role	1
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Whole system operability
Link to ESO ambitions	A whole system strategy that supports net zero by 2050 The ESO is a trusted partner
How does it benefit consumers?	<p>This metric aims to measure the performance of our network access planning process in transmission outage optimisation by capturing direct and indirect savings to the end consumer.</p> <p>This metric helps us to create valuable opportunities for customers and the whole system by going over and above our network access planning policies and procedures. We perform innovative actions to increase boundary capabilities for generators and DNOs by not constraining off energy, in doing this we also allow more renewable energy onto the system. When we do, this results in savings in BSUoS costs, which is linked to the following consumer benefit outcome:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case
How is performance measured? How will this metric show performance above baseline expectations?	<p>This metric captures the customer savings from the following ESO activities:</p> <ul style="list-style-type: none"> • Coordinating with the TOs to calculate the cost benefit analysis of outage requests which have been identified by the ESO to cause system constraints using the Network Access Policy frameworks. • Proactively seeking to minimise the duration of outages requested by the TO • Identifying opportunities to reduce constraint costs through re-planning outages in coordination with the TOs using the System Operator-Transmission Owner Code Procedures (STCP) 11-4 • Accepting and agreeing optimal placement of additional high value TO outages received within year, which will drive longer term benefits, • Optimising outage placement including nesting of outages, • Proposing alternative solutions to the TO such as temporary connections for generation affected by long outages • Initiating changes to high constraint cost outages within year using STCP 11-3 • Reassessing system capacity in conjunction with network owners to deliver increased access to energy providers. <p>The metric targets are split into direct and indirect savings to the end consumer. The direct savings to the end consumer are those that are tied to BSUoS cost savings, while the indirect savings are those that positively affect our customers (such as generators and DNOs) and ultimately give benefit to the end consumer.</p> <p>The MWh values of energy saved are calculated as follows:</p> <ul style="list-style-type: none"> • Note the amount of capacity or boundary limit saved (MW) • Note the duration of the outage (hours) • Energy saved= capacity or boundary limit saved (MW) x Outage duration (hours) <p>Some stakeholders have also found it difficult to assess the value of the metric, as it is measured in units of energy rather than value. Presently we believe continuing to report this metric in units of energy is more beneficial, as it gives a more accurate representation rather than providing a monetary calculation based on assumptions.</p> <p>We note that there are some aspects of this metric where NGENSO is not able to fully affect the performance levels: we will describe this in the narrative that supports the metric. We also note that good performance for this metric is dependent on collaboration with DNOs and TOs.</p>
Benchmark- exceeding expectations	Total savings >11,000GWh
Benchmark- in line with expectations	Total savings between 7000GWh and 11,000GWh

Benchmark- below expectations	<7000GWh
Benchmark calculations and comparison to previous years.	The original benchmarks for Scotland Outage Planning were set from historic measurements and performance. When this metric was originally introduced, we did not have historical data for the North and South Outage Planning teams which cover England and Wales. The benchmark has now been re-calculated using the limited data we have now obtained to include England and Wales, and to take into account that we have so far outperformed our targets for 2019-20 by 10%.

A.4.2 Role 1 performance indicators for 2020-21

There are some sets of data we would like to publish where it is not sensible to define a benchmark. For example, there are some areas of performance we will start to measure this year, in order to define a robust benchmark we can use for RIIO-2 reporting. Although we recognise that a benchmark would be needed to use this data as a measure of our performance, we have heard from stakeholders that they would welcome visibility of this data, and it would allow us to be transparent about how a benchmark is set for RIIO-2. We will therefore start to publish certain sets of data this year as Performance Indicators: please see below.

Performance Indicator Name	1f CNI System Reliability																																								
Reporting frequency	Quarterly																																								
Role	1																																								
Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?	Performance indicator from RIIO-2																																								
Relevant deliverables	Upgrade of information systems																																								
Link to ESO ambitions	An electricity system that can operate carbon free A whole system strategy that supports net zero by 2050																																								
How does it benefit consumers?	This RIIO-2 metric will measure our ability to accurately forecast and deliver planned outages for key critical national infrastructure (CNI) systems, and minimise unplanned outages to these systems. Many of our systems, including our core situational awareness, scheduling and dispatch tools, are defined as CNI systems. An outage or failure of these systems can have significant cost and system security consequences. Given this, it is important we measure and report on the health of our CNI systems. This metric is linked to the following consumer benefit outcomes: <ul style="list-style-type: none"> • Improved safety and reliability • Improved quality of service 																																								
How is performance measured?	<p>In RIIO-2 we propose to report on the outages of our CNI systems (for example our network control, scheduling and dispatch tools). The measure would be time of planned outage accuracy \pm time of unplanned outages. In other words, we would be measured to accurately forecast and deliver planned outages, and minimise unplanned outages. We consider an unplanned outage to be a system failure that is not expected in our planning stages.</p> <p>As the minimisation of unplanned CNI system outages is a key priority, we will start reporting on some aspects of this in 2020-21, focussing on reporting unplanned outages for a subset of the CNI systems (the Integrated Energy Management System (IEMS) and Balancing Mechanism (BM)). We propose to report this as a Performance Indicator (i.e. without a benchmark level) on a Quarterly basis. This would allow us to establish a suitable benchmark level, ahead of RIIO-2 where it could be used as a metric to measure our performance.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5">Planned CNI System Outages (mins)</th> </tr> <tr> <th></th> <th>Q1</th> <th>Q2</th> <th>Q3</th> <th>Q4</th> </tr> </thead> <tbody> <tr> <td>BM</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>IEMS</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th colspan="5">Unplanned CNI System Outages (mins)</th> </tr> <tr> <th></th> <th>Q1</th> <th>Q2</th> <th>Q3</th> <th>Q4</th> </tr> <tr> <td>BM</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>IEMS</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Planned CNI System Outages (mins)						Q1	Q2	Q3	Q4	BM					IEMS					Unplanned CNI System Outages (mins)						Q1	Q2	Q3	Q4	BM					IEMS				
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Role 2

Market development and
transactions

B. Role 2 Market development and transactions

B.1 Introduction to role 2

Our vision

Our ESO 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 priorities: what do they mean for consumers, and how do they contribute to our ambitions?

Product Roadmap for Response and Reserve implementation

We consider this deliverable to be a priority because services for response and reserve are a vital part of system operation. They were historically designed for a system with different technical characteristics, so their reform is key to delivering the system for today and progressing towards our carbon free operation of 2025. Our aim is to develop, together with industry, reformed response and reserve services. These activities will result in fundamentally different markets for participants, which will drive value for consumers. We will ensure we unlock consumer value by commercial procurement, standardised requirements, closer to real time procurement and a single platform for all frequency response and reserve services. And, we will continue to work towards alignment with the recast Electricity Regulation, also known as the Clean Energy Package. These activities all have a bearing on system balancing costs, and therefore are an important part of managing the future costs of system balancing in consumer bills.

Product Roadmap for Reactive implementation

Designing more competitive reactive power services will help deliver our ambition of competition everywhere by 2025. The Product Roadmap for Reactive implementation is a key priority, and will help determine the future role for reactive power. As the transmission system has evolved, there has been an increase in the pace and scale of changing reactive power flows. More competitive reactive power services should minimise the spend on reactive power services, leading to lower consumer bills than would otherwise be the case. We want to work with providers to replace this service with a better-functioning market for Reactive Power. Our vision is to be able to tailor our requirements area by area, procure from the most cost-effective providers, and broadcast the broad value of reactive solutions in each area. This work will follow on from our Pathfinders and regional tenders.

Improving the way we facilitate code change

Code administration processes are a key building block to successful change management, our ambitions for 2025 will only be delivered through successful code change and therefore acting on stakeholder feedback and improving the way we facilitate code change is a key priority.

By improving the service we provide as code administrator, we will ensure that stakeholders receive the information they need, and make the best use of industry time to develop regulatory change. This is important to consumers as the cost of our customers' time will eventually flow through into consumer bills.

We have already increased our resources in this area to help improve the service we provide, furthermore our stakeholders have told us that they look for more support to navigate the complexity of codes. Our Forward Plan deliverables have therefore been focused on providing more support to industry, the deliverables we have selected are the areas that industry told us they wanted us to improve on.

How we deliver

Under role 2 we are driving change which will impact all of our stakeholders, building competitive, transparent markets that will ensure we deliver on our 2025 goal of competition everywhere. Our balancing services reform (which includes response, reserve and reactive products) is a long-term programme of work that seeks to improve and expand on our existing services to competitively meet the evolving system operability needs. We also need to

continue to focus on meeting stakeholder expectations in our core customer services such as code reform and network charging. In this latter area we use our expertise to work closely with industry and Ofgem to deliver complex reforms.

Many of our deliverables are stakeholder-led, we discuss and consult externally to make sure our end results best meet customers' needs as well as technical solutions for the system. Accommodating external positions and ideas can be a difficult balance to strike but will, we believe, result in more cost-effective solutions which will benefit consumers. It also can take longer to achieve change than perhaps we and others may anticipate, so we always make sure we are focussing on the priority actions that will deliver most value the soonest.

We find that role 2 sits across our medium-term activities meaning that we collaborate extensively with experts from our commercial teams and our network specialists who are driving changes under both roles 1 and 3. We optimise our use of expert resources and take account of stakeholder feedback to achieve this, reviewing and adjusting detailed tasks and priorities accordingly. We believe this flexible approach is the best way to ensure that we are continually driving the deliverables which will ensure we minimise costs to consumers whilst meeting our 2025 goals.

B.2 Consumer benefits

B.2.1 How our Role 2 deliverables benefit consumers

The table below illustrates how our high-level deliverables in Role 2 benefit consumers, focussing on the following aspects of consumer benefit:

- Improved safety and reliability
- Reduced environmental damage
- Lower bills than would otherwise be the case
- Improved quality of service
- Benefits for society as a whole

We note that Role 2 mainly relates to forward-looking market development, and as such many of the benefits associated with these deliverables will be realised in future years. We are confident that we have put forward a set of deliverables which will benefit consumers in years to come.

In 2020-21 we are going to deliver...	Benefitting energy consumers now...	...and in the future
Product roadmaps for response and reserve, product roadmaps for reactive implementation	This provides a high-quality service to our stakeholders, giving them visibility of how these products will develop in the future and how all our developments fit together, giving them a view of the future opportunities to participate in new markets.	These documents set out how the markets will evolve in the future, driving increased competition leading to lower bills than would otherwise be the case. In many cases, we are procuring these products from non-traditional sources, reducing our dependency on conventional generation which will lead to reduced environmental damage.
Improving the way we facilitate code change	By taking an active role as code administrator, we can ensure that stakeholders receive the information they need, and workshops are designed to make the best use of industry time.	Well-signalled, clear and timely changes to industry codes will facilitate the market reforms which are necessary to transition to a world where we can operate carbon free. They will also increase competition, and ensure that charges are levied on the party which is best placed to bear them, leading to better outcomes for society as a whole.
Facilitate electricity network charging reform through Charging Futures	We will facilitate this important piece of work, providing a high quality of service to our stakeholders.	An efficient, well-designed framework would result in lower bills than would otherwise be the case. It would also fairly distribute network charges between different parties, which would benefit society as a whole.
Transform the customer experience for network charging	We will provide a high quality of service to our customers, allowing them to provide timely and accurate information to end consumers.	We will improve our approach to onboarding new suppliers, leading to increased competition and more choice for future consumers.
Transform Industry Frameworks to enable decentralised, decarbonised and digitised energy markets	We will run workshops effectively, making best use of industry time and providing our stakeholders with the information they need.	Our leadership in the transformation of electricity access and charging will result in a fair distribution of network charges, bringing benefits for society as a whole.
Making Electricity Market Reform (EMR) easier for participants	By making EMR easier for participants, we will provide an improved quality of service to our stakeholders.	As part of our Capacity Market Modelling deliverable, we will investigate improved modelling that may include various technology types and cross-border participation in the Capacity Market. Improving the effectiveness of the scheme would provide security of supply at best value for consumers, resulting in lower bills than would otherwise be the case.
Delivery of the Power Responsive initiative	We will continue to engage with our stakeholders, providing them with an improved quality of service, and the information they want.	We are developing a programme to increase and focus feedback and interaction with the demand side community on our balancing services developments, which will ensure a coordinated approach to balancing service procurement across transmission and distribution, delivering a more efficient and economic use of resources leading to reduced costs for the end consumer.

B.3 Role 2 deliverables

In the table below, we set out our deliverables for this role, and identify several deliverables as priorities. Our Introduction Sections for each role explain why particular deliverables have been identified as priorities.

B.3.1 Summary of Role 2 deliverables

Please see table B.3.2 for a detailed description of each deliverable.

Deliverable	Target delivery date
Implement the first new frequency response product (priority)	Q1 2020-21
Consult on future frequency response products (priority)	Q1 2020-21
Report on auction trial (priority)	Q2 2020-21
Publish our strategy for the future of reactive power (priority)	Q3 2020-21
Market design and implementation plan for reformed reserve products (priority)	Q4 2020-21
Support development and implementation of Pan-European replacement reserve standard products (priority)	Q1-Q4 2020-21
Publish our strategy for the future of reactive power (priority)	Q3 2020-21
Power Potential trial with UKPN (priority)	Q1-Q4 2020-21
Review learning from Power Potential (priority)	Q3-Q4 2020-21
Improving the way we facilitate code change: Customer focussed communications (priority)	Q1 2020-21
Improving the way we facilitate code change: Onboarding process for new industry parties (priority)	Q2–Q3 2020-21
Improving the way we facilitate code change: Improving industry confidence in ESO Code Governance (priority)	Q1-Q4 2020-21
Facilitate electricity network charging reform through Charging Futures	Q1-Q4 2020-21
Publications and guidance of the impact of charging reform to our customers	Q3-Q4 2020-21
Introduce new 'new entrant' e-learning on charging	Q1-Q4 2020-21
Improve the digital customer experience for TNUoS, BSUoS and Connection Charging Data; including improvements to existing NGESO billing system to improve user experience	Q1-Q4 2020-21
Establish a 'cross party' approach to onboarding, mapping out whole industry requirements	Q1-Q4 2020-21
Implement Targeted Charging Review (TCR) decision in conjunction with DNOs	Q4 2020-21
Lead code modifications	Q3-Q4 2020-21
Balancing Services Charges Task Force	Q1 2020-21
Capacity Market Modelling - Cross-border participation in capacity markets	Q4 2020-21
Capacity Market (CM) Modelling – facilitating broader participation in the CM to provide security of supply at best value for consumers	Q1-Q4 2020-21
Support coordination of Distributed Energy Resource (DER) engagement on flexibility developments	Q1-Q4 2020-21
Power Responsive Stakeholder Engagement	Q1-Q4 2020-21

B.3.2 Role 2 deliverables

The table below sets out our detailed deliverables for this role area. In response to stakeholder feedback, for deliverables which are ongoing throughout the year we have defined a number of interim milestones. The purpose of the interim milestones is to provide extra visibility of our activities to Ofgem and stakeholders, we expect our performance to be measured against our overall progress and achievements and not individual interim milestones. We work flexibly across the roles to prioritise and manage our resources, therefore interim milestones may be changed during the year as activities progress. Updates will be provided on the Forward Plan tracker¹⁶, which can be found on our website and is updated on a monthly basis.

Deliverable	Target delivery date	Description	Further context
Product Roadmaps for Response and Reserve implementation			
Implement the first new frequency response product	Q1 2020-21	Buy Dynamic Containment.	Following on from the frequency response strategy, this is the first step towards successful implementation of the new product.
Consult on future frequency response products	Q1 2020-21	Consult with the industry on the design of future frequency response products beyond Dynamic Containment.	Our industry consultations will allow us to form a view of the next stages of frequency response implementation, to follow on from the 2019-20 deliverables.
Report on auction trial	Q2 2020-21	Status update on the success of trial, learnings from the first six months and how these are informing future developments.	
Market design and implementation plan for reformed reserve products	Q4 2020-21	Deliver a proposal for reformed reserve products, including detail of how they will interact with both new frequency response products and pan-European Standard products (Trans European Replacement Reserve Exchange (TERRE) and Manually Activated Reserves Initiative (MARI), as well as other elements of Electricity Balancing Guideline (EBGL) and the recast Electricity Regulation, and a plan for implementation. Increase competition and transparency in the procurement of fast reserve.	This work is now expected to be delivered in Q4 2020-21, rather than Q1 2019-20. We are also considering the reserve design in light of how the new pan-European Standard product TERRE will be used, and what the impact of wider access will be on the makeup of the Balancing Mechanism. We will be progressing reformed reserve products once we have more clarity on these areas.
Support development and implementation of Pan-European replacement reserve standard products	Q1-4 2020-21	Support development and implementation of Pan European standard products TERRE (Trans European Replacement Reserve) and MARI (Manually Activated Reserves Initiative) to allow Great Britain parties to participate.	A number of TSOs, including NGESO, were granted a derogation against the original target implementation date of December 2019. The implementation date is no later than 30 June 2020. MARI is dependent on other parties in Europe.
	Q2 2020-21	TERRE go live	
	Q1 2020-21 Q3 2020-21 Q2 2022-23	MARI external milestones we are following: <ul style="list-style-type: none"> • Grid Code and BSC changes • Start of parallel run • Go live 	

¹⁶ <https://www.nationalgrideso.com/document/162046/download>

Deliverable	Target delivery date	Description	Further context
Product Roadmap for Reactive implementation			
Publish our strategy for the future of reactive power	Q3 2020-21	Strategy outlining how we will look to integrate learnings from all reactive power projects (pathfinders, Power Potential, DNO boundary investigations) to create a coherent plan for the development for the future of reactive power.	<p>To build on our 2019-20 deliverable, we will seek to determine the future role for reactive power and design more competitive reactive power services.</p> <p>Our focus through Q1 and Q2 of 2020-21 is to progress the pathfinder, Power Potential and efficient network transfers work. We are keen to ensure our learnings from these projects on areas such as technical capability, embedded participation, service and contract structure, and required systems progress the delivery of a reactive implementation roadmap.</p> <p>We will begin engaging with industry on a wider scale in March 2020, starting at the Operational Forum, followed by specific further events in Q1 2020-21. Our product roadmap will outline our approach to reactive procurement and the timelines to achieve this.</p>
Power Potential trial with UKPN	Q1-Q4 2020-21	Innovation project in partnership with UKPN aiming to create a new reactive power market for DER and generate additional capacity on the network.	The delay to this trial is due to a delay in system readiness and subsequent delay in commissioning trial participants. Currently, the Mandatory trials are set to commence in April 2020.
Review learning from Power Potential	Q3-Q4 2020-21	Learnings to inform whether to procure reactive power services from DER and if so, how to do so in partnership with DNOs.	Review of trial learning will be continuous throughout the trials. However, in October 2020, based on technical and market learning, both project partners NGENSO and UKPN will decide if and how this project could evolve into Business as Usual.
Improving the way we facilitate code change			
Customer focussed communications	Q1 2020-21	Feedback from stakeholders has clearly stated that communications from the ESO Code Administration team could be improved upon. In a dynamic and resource stretched landscape, it is essential that people who want to engage with the modification process gain clarity on our role, as well as find accurate and updated information. We will progress the following deliverables:	In the last three years, the number of modifications to the codes that we administer has grown significantly; we've administered more modifications this financial year than any previous year. The increased number of modifications, coupled with increased complexity of content, has made it difficult for us to move these quickly and efficiently through the process. We know this is something that has frustrated our stakeholders and so we've increased our resource in this area to help improve the service we provide. The ESO Code Administration team is currently administering 46 CUSC mods, 22 Grid Code mods, 1 STC mod & 3 SQSS mods (total 72).
	Q1 2020-21	<ul style="list-style-type: none"> Launching easier to read industry emails with a subscription tool that enables users to quickly manage their communication preferences 	
	Q1 2020-21	<ul style="list-style-type: none"> Publish a Code Administrator annual report; 	

Deliverable	Target delivery date	Description	Further context
		a report for our stakeholders providing more detail on how we're performing, our improvements and what changes mean for them	We were disappointed in the CACoP survey results published in October 19. We summarized our views and findings in a communication to industry in November 19, which can be found on our website ¹⁷ . We also held discussions with our code panels. The CACoP survey highlighted that industry resource to support the code process is reducing, this is particularly acute for the codes we administer, and hence industry is understandably asking for more support to help navigate the process in addition to our BAU activity. Our Forward Plan deliverables have therefore been focused on providing more support to industry. We have carefully selected the deliverables below, as these are the areas that industry told us they wanted us to improve on.
Onboarding process for new industry parties	Q2 – Q3 2020-21	Feedback told us that new parties often struggle to understand our processes and find it confusing to know where to look for information. We will deliver the following:	
	Q2 2020-21	<ul style="list-style-type: none"> Updating all our documentation and advice on the website for both new and current industry parties, consolidating this information on the website for ease of access and use. This will include different media such as podcasts 	
	Q3 2020-21	<ul style="list-style-type: none"> Offering in-house training; launching a new induction day for our stakeholders where they can learn more and meet the team. Once established these will be held on a regular basis based on industry need 	
Improving industry confidence in ESO Code Governance	Q1-Q4 2020-21	Feedback told us that stakeholders lacked confidence in the ESO Code Governance team, with the main issue being that our documentation (that forms the basis of our modification process), was often inaccurate and complex. As a result, we are changing our internal processes, making us more efficient and helping us to write in Plain English. We believe this will help create more confidence in our output and role.	
	Q1 2020-21	<p>We will deliver the following incremental improvements to our service:</p> <ul style="list-style-type: none"> Better articulating ESO's role as Code Administrator in facilitating the change process, enabling all parties to contribute to change and maximizing the delivery of consumer benefit <p>Improvements in how our reports are written, with an ambition to adopt Plain English principles. Reaching a wider audience and better informing them of the changes being developed. A number of deliverables are scheduled:</p>	

¹⁷ <https://www.nationalgrideso.com/document/156551/download>

Deliverable	Target delivery date	Description	Further context
	Q1 2020-21	<ul style="list-style-type: none"> Skills and capabilities assessed within the team complimented by external Plain English training. All documentation (proposal form, workgroup report, workgroup consultation) updated to simplify the process. 	
	Q2 2020-21	<ul style="list-style-type: none"> The whole team capable of writing our documents in Plain English reinforced through documented feedback from industry 	
	Q3 2020-21	<ul style="list-style-type: none"> All web pages refreshed to reflect Plain English style 	
	Q4 2020-21	<ul style="list-style-type: none"> Conduct proactive engagement with industry to reassess all of our changes to seek further feedback and evaluate the next level of change 	
Facilitate electricity network charging reform through Charging Futures			
Facilitate electricity network charging reform through Charging Futures 1. Targeted Charging Review (TCR) 2. Access and Forward Looking Charges Significant Code Review (SCR) 3. Reform of Balancing Services Charges	Q1-Q4 2020-21	Facilitate reform of arrangements across the whole electricity system by communicating with all users of the electricity system and creating opportunities for all users to learn, ask and contribute to reform. This will include: <ul style="list-style-type: none"> Regular Forums Webinars Podcasts Summary notes Charging Futures website. 	
Transform the customer experience for network charging			
Publications and guidance of the impact of charging reform to our customers	Q4 2020-21	Significant reforms to charging arrangements are expected over the 2019–21 timeframe. The Charging Futures project helps to facilitate industry input and guide users through reform. Complementary to Charging Futures, we will provide extra guidance on how this will affect users' charges in understandable, real terms.	
	Q3 2020-21	Provide industry with regular updates on the changes and impact that TCR will have to processes and deliverables, and ensure that guidance and publications fall in line.	
Introduce new 'new entrant' e-learning on charging		Developing and roll-out further training such as webinars and workshops, in addition to publishing guidance documents to help all parties understand charging methodologies, in particular the new TNUoS methodologies introduced through TCR. We aim to complete the following milestones: <ul style="list-style-type: none"> Publish an updated webinar for connection charges Publish an updated webinar for BSUoS charges 	The 2019-20 deliverable focussed on internal onboarding e-learning documentation for new entrants. The 2020-21 deliverables are now focussing on working with external industry experts to put together a wider new entrant e-learning package.
	Q1 2020-21		
	Q2 2020-21		

Deliverable	Target delivery date	Description	Further context
	Q3 2020-21	<ul style="list-style-type: none"> Develop workshops on the topics selected by the customers as part of the Charging Forum event 	
	Q4 2020-21	Publish an updated webinar for TNUoS charges with a focus on new charging methodologies introduced by TCR.	
Improve the digital customer experience for TNUoS, BSUoS and Connection Charging Data; including improvements to existing NGESO billing system to improve user experience	Q1 – Q4 2020-21	<p>We are investigating options for updating our systems, and have a clear drive to put customer functionality at the heart of any new products.</p> <p>Our intent is to deliver the following milestones:</p>	Please note, the above plan will be heavily impacted by the TCR and the required modifications. All planned updates will factor in the requirements outlined in our findings as we progress with implementing the required changes.
	Q1 2020-21	<ul style="list-style-type: none"> We will complete the review of the current systems, data requirements and the information we currently provide externally, taking into account the TCR decisions. 	
	Q2 – Q3 2020-21	<ul style="list-style-type: none"> A scope and plan will be outlined, we will look to develop the required changes throughout, by revisiting our scope and seeking feedback to ensure delivery is fit for purpose and meets expectations, both internally and externally. 	
	Q4 2020-21	<ul style="list-style-type: none"> We will be looking to enter the implementation phase 	
Establish a 'cross party' approach to onboarding, mapping out whole industry requirements	Q1 – Q4 2020-21	<p>Work with other industry stakeholders such as ELEXON and Ofgem to provide a joint-up onboarding guidance document, mapping out the industry requirements and obligations.</p> <p>In Q1 2020-21 we plan to agree the approach and scope for the joint-up onboarding guidance with ELEXON</p> <p>By Q2 2020-21 we aim to engage with customers seeking their feedback and suggestions on the onboarding process</p> <p>In Q3 2020-21 we intend to begin drafting the guidance documents</p> <p>During Q4 2020-21 we will finalise and publish the guidance, incorporating the finalised new TNUoS and BSUoS charging methodologies.</p>	Initial interactions with Elexon and wider industry have been deferred due to availability and will take place in Q1 2020-21. Whilst it is anticipated that the work planned throughout 2020-21 to bring together an industry standard for onboarding will be delivered, there is an expectation that the impact of the TCR and RII02 deliverables will initially limit progress internally and externally. It is envisioned that there will be a need for additional review of our internal onboarding processes, guidance and documentation with the changes that TCR brings with it.
Transform industry frameworks to enable decentralised, decarbonised and digitised energy markets			
Implement Targeted Charging Review (TCR) decision in conjunction with DNOs	Q4 2020-21	<p>Raise and implement Connection and Use of System Code (CUSC) modifications to support the TCR. The key milestones for delivering the TCR are:</p> <ul style="list-style-type: none"> Working groups complete development of modifications and submit to Ofgem 	In order to prepare for TCR implementation in 2021, modifications have been raised for the TCR, and we have proactively been engaging with DNOs, Elexon and industry to create a delivery plan for the TCR. This has been bilaterally, and through webinars and workgroups which will continue into 2020-21.
	Sub milestones delivery dates are information only		
	Q1 2020-21		
	Q1 2020-21		

Deliverable	Target delivery date	Description	Further context
	Q1 2020-21	<ul style="list-style-type: none"> • ESO to produce preliminary cut of bands 	
	Q2 2020-21	<ul style="list-style-type: none"> • CUSC and DCUSA modifications approved by Ofgem 	
	Q4 2020-21	<ul style="list-style-type: none"> • Designated party set final bands • TNUoS go-live 	
Lead code modifications	Q3 - Q4 2020-21	<p>Leading and implementing code modifications on key areas, such as:</p> <ul style="list-style-type: none"> • Removing distortions between co-located and single technology sites; • Re-design Transmission Network Use of System (TNUoS) generation zones • BSUoS changes, subject to the second balancing services taskforce outcome. <p>The target delivery date for these modifications refers to when the modifications are expected to conclude, including the relevant regulatory decisions.</p>	<p>The aims of these modifications are to remove distortions in charging between co-located and single technology sites; provide stability and clarity over what the longer-term TNUoS tariffs will be, and therefore reduce price risks for generators; and prepare for the delivery of the ESO RIIO-2 Business Plan in respect of changes to BSUoS in RIIO-2.</p> <p>The modifications we have noted as being led by the ESO are where we consider there to be important historical arrangements to be challenged (rezoning), changes to arrangements due to developments in the business models of market participants (co-location) and where we will lead delivery on the outcome of an industry wide piece of work (BSUoS charging).</p> <p>It is important that the ESO takes a leading role in these topics as they are either difficult for industry to assess the full impact of, or they have effects on multiple parties and the ESO can provide an independent consumer value led perspective on the changes required.</p>
Balancing Services Charges Task Force	Q1 2020-21	Publication of the second ESO-led balancing services charges task force final report	After the success of the first, Ofgem has asked the ESO to lead a second balancing services charges task force. This will inform the future direction of BSUoS. Our aim will be to deliver the terms of reference in a timely and high-quality manner with industry stakeholders.
Capacity Market Modelling - Cross-border participation in capacity markets	Q4 2020-21	<p>Development of a modelling methodology to calculate available capacity for cross-border participation in capacity markets on a consistent basis across Europe. We will be demonstrating our progress with the following milestones:</p> <ul style="list-style-type: none"> • ENTSO-E (European Network of Transmission System Operators) Task Force begins 	<p>The Clean Energy Package requires ENTSO-E to develop a methodology to calculate the maximum capacity for cross-border participation in capacity markets. The ESO will be taking a leadership role in developing the methodology in line with the ENTSO-E plan.</p>
	Q1 2020-21	<ul style="list-style-type: none"> • Draft methodology will be developed 	
	Q2 2020-21	<ul style="list-style-type: none"> • ENTSO-E consultation. 	
	Q3 2020-21	<ul style="list-style-type: none"> • Methodology will be finalised 	<p>ENTSO-E currently have an open consultation on this area with more focus on market design with high-level data on the modelling. A detailed methodology is to be developed later this year.</p>

Deliverable	Target delivery date	Description	Further context
Q4 2020-21			
Making Electricity Market Reform (EMR) easier for participants			
Capacity Market (CM) Modelling – facilitating broader participation in the CM to provide security of supply at best value for consumers	Q4 2020-21	Investigate the various sources of technology type and capacity data that would enable a robust method to be developed and implemented into the future. Dependent on the investigation, improved methodology may be developed.	<p>This deliverable has moved from Q4 2019-20 to Q4 2020-21.</p> <p>In order to fully meet this deliverable, a new register of embedded assets is required. The Distribution Connection and Use of System Agreement (DCUSA) modification was raised to create the register of embedded assets. We are supporting this modification and are involved in the working group. The modification was due to be approved in Q4 2019-20, but this has been delayed as the working group had to resolve legal concerns regarding the provision of the data. The modification is now open for consultation with approval currently scheduled for May 2020. The Capacity Market analysis used to produce the Electricity Capacity Report (ECR) works on an annual cycle. As the analysis for the 2020 ECR will already be complete by the time the new embedded data is available, full implementation will not be possible until the next annual cycle in the 2021 ECR.</p>
Delivery of the Power Responsive initiative			
Support coordination of Distributed Energy Resource (DER) engagement on flexibility developments	Q1-Q4 2020-21	Facilitate constructive dialogue between the demand side community and ESO subject matter experts in the development of flexibility products and markets.	<p>This builds on our 2019-20 deliverables of stakeholder engagement and innovation projects, moving closer to introducing a whole system flexibility programme. We will run a flexibility forum, a summer event, quarterly steering groups and attend events hosted by our stakeholders. We will produce an annual report, and participate in Open Networks WS1A. Upcoming events will be listed on our website¹⁸.</p>
Power Responsive Stakeholder Engagement	Q1- Q4 2020-21	Promote industry developments for demand side flexibility and facilitate feedback to shape ESO deliverables through a range of engagement activities. These will include conferences, working groups, webinars, consultations, editorials, training sessions and reports.	

¹⁸ <http://powerresponsive.com/category/events/>

B.4 Role 2 metrics and performance indicators

Following consultation with stakeholders, we have defined a set of metrics for Role 2.

These are set out below, where we indicate how the metric relates to the deliverables and ESO ambitions. We explain how a focus on this activity benefits consumers, and how performance will be measured. Where possible, we have defined a metric, indicating the level of performance we will define as “below expectations”, “in line with expectations” or “exceeding expectations”, along with the justification for these benchmarks.

For Role 2, we will publish the following measures:

Metrics:

- 2a Reform of balancing services markets
- 2b Code admin stakeholder satisfaction
- 2c Charging futures
- 2d Year ahead BSUoS vs outturn annual BSUoS
- 2e Month ahead forecast vs outturn monthly BSUoS.

B.4.1 Role 2 metrics for 2020-21

Metric Name	2a Reform of Balancing Services Markets																																						
Reporting frequency	Quarterly																																						
Role	2																																						
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric																																						
Relevant deliverables	<ul style="list-style-type: none"> Product Roadmaps for Response and Reserve implementation Product Roadmap for Reactive implementation Product Roadmap for Restoration implementation Support access for Intermittent Generation Delivery of the Power Responsive initiative Upgrade of information systems 																																						
Link to ESO ambitions	An electricity system that can operate carbon free Competition everywhere The ESO is a trusted partner																																						
How does it benefit consumers?	This metric encourages us to provide a high quality service to our stakeholders as well as visibility, transparency and engagement. The reform of balancing services markets should increase competition and lower prices. This is linked to the following consumer benefit outcomes: <ul style="list-style-type: none"> Lower bills than would otherwise be the case Improved quality of service 																																						
How is performance measured? How will this metric show performance above baseline expectations?	Performance is measured using metrics such as total spend and total volume procured. Where possible, we will look to include average market price paid. The measures will be by service area rather than individual market. The data for each measure will be split into two categories: competitively procured or competitive bilateral. We will present the data in a similar format to the 2019-20 reporting, but will include targets.																																						
Benchmark- exceeding expectations	<table border="1"> <thead> <tr> <th></th> <th>Current % through open and competitive procurement (Q2 2019-20)</th> <th colspan="3">Target % through open and competitive procurement for 2020-21</th> </tr> <tr> <th></th> <th></th> <th>Benchmark – exceeding expectations</th> <th>Benchmark – in line with expectations</th> <th>Benchmark – below expectations</th> </tr> </thead> <tbody> <tr> <td>Frequency response</td> <td>81%</td> <td>95% or above</td> <td>Above 75% and less than 95%</td> <td>75% or less</td> </tr> <tr> <td>Reserve</td> <td>43%</td> <td>60% or above</td> <td>Above 40% and less than 60%</td> <td>40% or less</td> </tr> <tr> <td>Reactive</td> <td>0%</td> <td>15% or above</td> <td>Above 0% and less than 15%</td> <td>0%</td> </tr> <tr> <td>Black start</td> <td>0%</td> <td>20% or above</td> <td>Above 0% and less than 20%</td> <td>0%</td> </tr> <tr> <td>Constraints</td> <td>0%</td> <td>20% or above</td> <td>Above 0% and less than 20%</td> <td>0%</td> </tr> </tbody> </table>					Current % through open and competitive procurement (Q2 2019-20)	Target % through open and competitive procurement for 2020-21					Benchmark – exceeding expectations	Benchmark – in line with expectations	Benchmark – below expectations	Frequency response	81%	95% or above	Above 75% and less than 95%	75% or less	Reserve	43%	60% or above	Above 40% and less than 60%	40% or less	Reactive	0%	15% or above	Above 0% and less than 15%	0%	Black start	0%	20% or above	Above 0% and less than 20%	0%	Constraints	0%	20% or above	Above 0% and less than 20%	0%
					Current % through open and competitive procurement (Q2 2019-20)	Target % through open and competitive procurement for 2020-21																																	
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Constraints	0%	20% or above	Above 0% and less than 20%	0%																																			
Benchmark- in line with expectations																																							
Benchmark- below expectations																																							
Benchmark calculations and comparison to previous years	We have not had a target for this metric to date, however we are introducing targets for 2020-21 in response to stakeholder feedback. The table below appeared in the Draft Forward Plan: we have defined “in line with expectations” as within ±10% of the targets proposed below.																																						

In order to receive a score of “in line with expectations”, the ESO must improve its performance from 2019-20, as such we believe that the targets for this metric are ambitious.

	Current % through open and competitive procurement (Q2 2019-20)	Proposed 2020-21 Target
Frequency response	81%	85%
Reserve	43%	50%
Reactive	0%	5%
Black start	0%	10%
Constraints	0%	10%

Metric Name	2b Code Admin Stakeholder Satisfaction																
Reporting frequency	Quarterly																
Role	2																
Continuation of 2019-21 metric, or new metric from RII0-2?	Continuation of 2019-21 metric																
Relevant deliverables	<ul style="list-style-type: none"> Improving the way we facilitate code change Transform Industry Frameworks to enable decentralised, decarbonised and digitised energy markets 																
Link to ESO ambitions	An electricity system that can operate carbon free Competition everywhere The ESO is a trusted partner																
How does it benefit consumers?	Retaining this metric would measure whether we are improving the Code Administration service we provide to industry. This is linked to the following consumer benefit outcome: <ul style="list-style-type: none"> Improved quality of service 																
How is performance measured? How will this metric show performance above baseline expectations?	<p>We measure our performance through:</p> <ul style="list-style-type: none"> Ofgem annual Code Administration Code of Practice (CACoP) survey ESO led stakeholder surveys benchmarked with our previous scores <p>Administering modifications is a baseline activity and therefore we have not reported modification numbers in previous Forward Plans. However, we feel that reporting the number of modifications we are supporting is a useful KPI. This will provide additional context to the regulatory environment we are operating in, helping to provide additional background to our Forward Plan deliverables which we believe will stretch us beyond baseline performance. We have therefore included an additional code modification measure as part of our code admin metric, which we will update on a quarterly basis.</p>																
Benchmark- exceeding expectations	<ul style="list-style-type: none"> CACoP - Increased overall performance by at least 5% for the average score across all our three codes, when benchmarked against our previous scores (CACoP). ESO led stakeholder surveys – increased performance by at least 5% above our baseline score. 																
Benchmark- in line with expectations	<ul style="list-style-type: none"> CACoP - Maintained performance (within +/-5%) for the average score across all our three codes when benchmarked against our previous scores (CACoP), within +/- 5 % tolerance for each code. ESO led stakeholder surveys – Maintain performance within 5% of our baseline score. Our baseline performance is based on average survey scores taken for the 2019-20 period. These results and baseline score are set out in our benchmark calculations section. 																
Benchmark- below expectations	<ul style="list-style-type: none"> CACoP - Decreased overall performance across by at least 5% for the average score across all our three codes, when benchmarked against our previous scores (CACoP) ESO led stakeholder surveys – performance below our baseline score by at least 5%. 																
Benchmark calculations and comparison to previous years.	<p>Historic CACoP scores for our codes:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>CUSC</th> <th>Grid Code</th> <th>STC</th> </tr> </thead> <tbody> <tr> <td>2019</td> <td>43</td> <td>46</td> <td>44</td> </tr> <tr> <td>2018</td> <td>65</td> <td>66</td> <td>58</td> </tr> <tr> <td>2017</td> <td>47</td> <td>59</td> <td>49</td> </tr> </tbody> </table> <p>Historic ESO led stakeholder survey scores - Workgroup score for 2019-20 to date: 7.25 Workgroup score for 2018-19: 6.93</p> <p>Webinar score for 2019-20 to date: 7.67</p> <p>The below table sets out the historic code modifications over the past 3 years. It highlights the regulatory environment that the ESO Code Governance team currently operates in. We have also included a new data set highlighting the number of workgroup meetings we have facilitated this year. We intend to report</p>	Year	CUSC	Grid Code	STC	2019	43	46	44	2018	65	66	58	2017	47	59	49
Year	CUSC	Grid Code	STC														
2019	43	46	44														
2018	65	66	58														
2017	47	59	49														

the number of modifications and workgroups facilitated per quarter, to provide context on the regulatory environment we are operating in.

Number of new modifications raised by year and code:

	CUSC	Grid Code	STC	SQSS	Total
Year 3 (19/20) to date	24	14	1	0	39
Year 2 (18/19)	22	16	8	3	49
Year 1 (17/18)	14	12	2	0	28

Number of workgroups facilitated by code:

	CUSC	Grid Code	STC	SQSS	Total
Year 3 (19/20)	70	45	1	0	115
Year 2 (18/19)	58	48	2	0	108

The number of new modifications has increased significantly over the past five years, up from 18 raised in 2014-15 to 39 raised to date in 2019-20. 2018-19 saw an additional peak of modifications due to the legal separation of the ESO.

In response to the increasing level of change in our codes, we have increased our capacity to deliver more workgroups. Whilst we also facilitate monthly code panels, we will not report these as the number of meetings remain relatively static.

Metric Name	2c Charging Futures
Reporting frequency	Quarterly
Role	2
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	<ul style="list-style-type: none"> Improving the way we facilitate code change Transform Industry Frameworks to enable decentralised, decarbonised and digitised energy markets Transform the customer experience for network charging
Link to ESO ambitions	An electricity system that can operate carbon free Competition everywhere The ESO is a trusted partner
How does it benefit consumers?	This work benefits consumers by stimulating competition and facilitating an expanding market, by reducing barriers to entry for new customers. This will lead to greater choice and enhanced service. This is linked to the following consumer benefit outcomes: <ul style="list-style-type: none"> Lower bills than would otherwise be the case Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	There is a high level of change happening to electricity network charging, and this has a significant effect on network users. Charging Futures supports network users by giving them opportunities to learn about the changes, and to contribute to how future arrangements work. Surveys are conducted following Charging Futures Forums and webinars with their attendees. This year, we will not include survey results for webinars where the main content is not led by National Grid ESO. Benchmarks will be based on the average feedback scores received throughout the performance year 2019-20.
Benchmark- exceeding expectations	<ul style="list-style-type: none"> Average scores from surveys undertaken throughout the year are more than 5% higher than the baseline score.
Benchmark- in line with expectations	<ul style="list-style-type: none"> Average scores from surveys undertaken throughout the year are within the range of +/-5% of the baseline score.
Benchmark- below expectations	<ul style="list-style-type: none"> Engagement scores achieved throughout the year fall more than 5% below the baseline score.
Benchmark calculations and comparison to previous years.	The baseline score for 2020-21 is the result of the 2019-20 metric. At the time of writing, this score is 6.8, but this this will be updated following the publication of the 2019-20 end of year report. Score for 2019/20 to date: 6.8 Score for 2018/19: 7.3

Metric Name	2d Year ahead BSUoS vs outturn annual BSUoS
Reporting frequency	Annual
Role	2
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Transform the customer experience for network charging
Link to ESO ambitions	The ESO is a trusted partner
How does it benefit consumers?	<p>An annual BSUoS forecast is vital for those parties seeking to price long term products; such as electricity suppliers providing fixed price supply contracts to domestic consumers. The better the forecast, the lower the risk premia that needs be added to the supply contract, and as a result this lowers the cost for the end consumer. This is linked to the following consumer outcomes:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	<p>We will compare the BSUoS forecast made at the start of the financial year against the outturn BSUoS figure. An Absolute Percentage Error will be calculated.</p> <p>We have recently introduced a new model for BSUoS forecasting, however improvements beyond this would require significant investment: given that BSUoS may be fixed in the future we consider it inefficient to invest further in improvements to forecasting.</p> <p>We note that our ability to forecast BSUoS is impacted by factors outside of our control, such as unplanned transmission outages. However, we recognise that BSUoS forecasts are important to our customers, and as such we will continue to measure our performance in this area, and provide justifications for where the outturn level differs from the forecast.</p> <p>We also note that, regardless of the existence of these benchmarks, we will strive to forecast BSUoS as accurately as possible ahead of time, and closer to real time we will endeavour to keep balancing costs as low as possible.</p> <p>We produce the annual forecast in March, roughly 2-3 weeks before the start of the year. At this stage, many of the factors affecting balancing costs across the year are not known such as weather, generator outages, system outages, interconnector flows etc. The BSUoS charge is becoming more volatile and therefore harder to forecast, so we propose to keep the metric the same as last year.</p> <p>Next year's BSUoS forecast is £3.52/MWh.</p>
Benchmark- exceeding expectations	Absolute Percentage Error 10% or below
Benchmark- in line with expectations	Absolute Percentage Error between 10% and 20%
Benchmark- below expectations	Absolute Percentage Error 20% or above
Benchmark calculations and comparison to previous years.	<p>For 2018-19, we forecast a BSUoS charge of £2.23/MWh and the outturn was £2.88/MWh giving an APE of 22.6%.</p> <p>For 2019-20 we forecast a BSUoS charge of £3.07/MWh.</p>

Metric Name	2e Month ahead forecast vs outturn monthly BSUoS
Reporting frequency	Monthly
Role	2
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Transform the customer experience for network charging
Link to ESO ambitions	The ESO is a trusted partner
How does it benefit consumers?	<p>BSUoS forecasts are important to our stakeholders, although we note that our ability to forecast BSUoS is impacted by factors outside of our control. BSUoS costs are factored into the wholesale price of energy charged by generators, and therefore a forecast is vital for those parties when working out where to price their generation. The better the forecast, the lower the risk premium that needs be added to the wholesale price, and and therefore accurate forecasts lower the cost for the end consumer. This is linked to the following consumer outcomes:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	<p>There is significant volatility in the comparison of our month ahead forecast with the outturn. If we examine the percentage variance, then there can be large swings in accuracy. This metric does not just look explicitly at the volatility, but at the number of occurrences outside of a 10% and 20% band.</p> <p>BSUoS is becoming more volatile and therefore harder to forecast so we propose to keep the metric the same as last year. This also makes it easier to compare our performance with previous years. We also note that, regardless of the existence of these benchmarks, we will strive to forecast BSUoS as accurately as possible ahead of time, and closer to real time we will endeavour to keep balancing costs as low as possible.</p> <p>Our monthly BSUoS forecasts are published on our website¹⁹ two to three weeks ahead of the start of the month to which they refer. We produce the monthly by the 10th working day of the preceding month, roughly 2-3 weeks before the start of the month. Weather is the biggest driver of balancing costs, and at this stage there is a large amount of uncertainty around what the weather is likely to be, along with other short term factors such as unplanned outages.</p>
Benchmark- exceeding expectations	Less than 5 out of 12 monthly forecasts are above 20% Absolute Percentage Error, and 5 or more forecasts less than 10% Absolute Percentage Error
Benchmark- in line with expectations	Less than 5 out of 12 monthly forecasts are above 20% Absolute Percentage Error
Benchmark- below expectations	5 or more out of 12 monthly forecasts above 20% Absolute Percentage Error
Benchmark calculations and comparison to previous years.	Over the first 10 months of 2019-20 we have had 4 months with APE<10%, 3 months between 10% and 20% and 3 months >20% with an average APE of 14%.

¹⁹ <https://www.nationalgrideso.com/balancing-data/forecast-volumes-and-costs>

Role 3

System insight, planning and
network development

C. Role 3 System insight, planning and network development

C.1 Introduction to Role 3

Our vision

Our ESO 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 priorities: what do they mean for consumers, and how do they contribute to our ambitions?

Pathfinder projects

The Pathfinder projects are a new way of addressing operability challenges, using a “learning by doing” approach and collaborating with our stakeholders to ensure that the electricity system can still be operated safely, securely and economically as we move towards carbon-free operation. We are working with TOs, DNOs and service providers to establish methods to identify the most cost effective approach. We are going beyond the traditional approaches of looking only at transmission based solutions, giving an opportunity for the ESO and its partners to bring forward innovative solutions such as distribution and market based solutions. Inviting solutions from a range of different providers is consistent with our Competition Everywhere ambition. As a Trusted Partner, we collaborate extensively with interested stakeholders, keeping them informed throughout the process.

As the pathfinder projects progress, we will optimize between short-term balancing services costs (BSUoS) and long-term infrastructure costs (TNUoS) to give the best overall value for consumers. Where the need for infrastructure build can be reduced, this may also contribute to reduced environmental damage.

For each Pathfinder, we publish a technical Request For Information (RFI) to understand potential solutions and associated timescales. We then hold both technical and high-level webinars, answering questions and listening to stakeholder feedback. Once the RFI has closed, we run tenders, award contracts, and manage the process until services start.

Early Competition

Our Early Competition deliverable relates to Ofgem’s request for the ESO to develop proposals for how Early models of competition for onshore transmission could be introduced. This will explore design, build and own models for the delivery of solutions to transmission needs. The models will need to apply pre and post any legislative changes to allow competition in onshore transmission (“Competitively Appointed Transmission Owner” (CATO)). This work will make it possible for potential providers of transmission solutions, whether asset or service based, to compete. The work will deliver implementation plans, including roles for the ESO and other industry bodies, for selected model(s) in February 2021.

We will continue to co-create the Early Competition plan with our stakeholders, building on the work done in 2019 and holding webinars, stakeholder workshops and consultations. Stakeholder input will be key to ensure that we develop processes which invite participation from a wide set of solution providers, and ultimately deliver consumer benefit. Introducing competitive tendering into a new area of the industry should place downwards pressure on prices, consistent with our Competition Everywhere ambition, and benefitting future consumers.

Network Options Assessment (NOA) process

The Network Options Assessment (NOA) recommends which options for TO projects should be invested in, and the optimal timescales for this investment. It recommends whether TOs should delay or continue current projects, to make sure that they are completed at a time that will deliver the most benefit. It also indicates the optimum level of interconnection to other European electricity grids, based on market-driven analysis. The advances in NOA include all options to reduce congestion, this includes the ESO recommending low build or no build options. Examples include intertrip schemes or Automatic Network Management schemes. The Congestion Pathfinder will also feed into the NOA and find alternative ways to delivering capacity on the network.

In recommending which options should be pursued, the NOA ensures that the projects which consumers eventually pay for (via TNUoS charges levied on transmission network users) are those which deliver the most benefit. Once the projects have been constructed, consumers will benefit by way of lower BSUoS charges than would otherwise be the case.

Our Forward Plan deliverable relates to improving the accessibility of our NOA publication, consistent with our ambition to be a Trusted Partner. We will provide more information to a wider audience regarding system needs, and engage with stakeholders on the development of capabilities and the implementation of the Network Development Roadmap, which includes the Pathfinder projects.

Loss of Mains Protection

Our Loss of Mains Protection deliverable relates to the Accelerated Loss of Mains Change Programme (ALoMCP), an industry led project to accelerate compliance with the new Loss of Mains Protection requirements in the Distribution Code. It is delivered by National Grid ESO, Distribution Network Operators (DNOs), and the Energy Networks Association (ENA). Our project is structured into four workstreams: Stakeholder, Customer Support, Delivery Assurance, and Value Assurance. These workstreams are overseen by the Loss of Mains Project Steering Group, in which NGESO participates.

The Loss of Mains changes are expected to save up to £10m in Balancing Costs in 2020-21 when they are delivered, and will ultimately save over £100m per year. Making changes to Loss of Mains protection will allow us to operate the system with an increasing proportion of low-carbon generation, which will bring us closer to our ambition of an electricity system that can operate carbon free.

How we deliver

Role 3 looks to the future of system operation and network management to understand how we can act now to meet net zero at the most efficient cost for consumers. We use our expertise in modelling and data insights to build possible scenarios for the future of the energy system, look at network and non-network options that might be needed, and work with our stakeholders to find optimal ways forward.

As we accommodate an ever-increasing proportion of low carbon generation, some of the activities we are driving have never been done before by any other system operator. This makes much of what we do innovative and consequently it can be challenging, and we are learning all the time. We collaborate with our stakeholders to ensure that solutions are workable and practical, as well as delivering value for consumers. We are working with all of industry to find whole system solutions to solve challenges in the near and long term.

Although role 3 deliverables predominately look to the future, we need to implement change now to ensure that future needs are met. This requires us to collaborate with colleagues leading on role 2 deliverables, who engage directly with market participants and balancing services providers, and with role 1 colleagues who have experience of operational challenges. In this way we are working across all our roles and internal teams to ensure that we are progressing towards our ambitions and focussing on the needs of consumers.

C.2 Consumer benefits

C.2.1 How our role 3 deliverables benefit consumers

The table below illustrates how our high-level deliverables in Role 3 benefit consumers, focussing on the following aspects of consumer benefit:

- Improved safety and reliability
- Reduced environmental damage
- Lower bills than would otherwise be the case
- Improved quality of service
- Benefits for society as a whole

We note that Role 3 relates mainly to long-term activities, and therefore most of the consumer benefits associated with its deliverables will not materialise until several years in the future. However, we believe that the deliverables we set out in this Forward Plan are the right areas of focus to drive significant benefits for future consumers.

In 2020-21 we are going to deliver...	Benefitting energy consumers now...	...and in the future
Whole System Operability	Implementing the actions which were identified following the events of 9 August will help us to prevent a recurrence, which will lead to improved safety and reliability, and therefore benefits to society as a whole. The Loss of Mains changes will result in lower spending on balancing actions to resolve rate of change of frequency issues: we expect to start seeing the benefits of this in 2020-21.	More efficient reactive power flows between networks may reduce the requirement to pay for reactive power services, resulting in lower bills than would otherwise be the case. Delivering on the Regional Development Plans will provide additional capacity for Distribution Network Operators, without the need for network reinforcement.
Pathfinder Projects	Pathfinder projects are about “learning by doing”, and we are actively engaging with our stakeholders to find new commercial solutions to solve transmission system needs, which may be an alternative to transmission build, in areas such as stability and voltage.	As the pathfinder projects progress, we will find the most economic way to operate a low-carbon system, contributing to lower bills than would otherwise be the case, and reduced environmental damage where the need for infrastructure build can be reduced.
Early Competition	We will develop a model for Early Competition in consultation with our stakeholders, providing a high-quality service and designing a model which will maximise the potential consumer benefit.	The implementation of Early Competition will benefit future consumers by allowing for alternative options to be considered and the most economic one selected, contributing to lower bills than would otherwise be the case. Running the competition at an early stage will also give the opportunity for innovation, as the chosen solution will not be constrained by planning permission already being in place. An early competition also gives continuity between the consenting process and the eventual construction of the project, providing a better service to our stakeholders.
NOA: enhanced communication	We will provide an improved quality of service to our stakeholders, providing them with the information they need and enhancing their opportunities to engage with us.	Improved communication should lead to more high-quality submissions to the NOA processes including pathfinders, as those submitting options will have a better picture of the system need which they are trying to address, especially as we consider a wider range of system issues. Making the process more accessible in this way should result in increased competition, and therefore lower bills than would otherwise be the case. We will therefore engage with more participants who can potentially offer solutions to meet transmission needs, and in so doing drive competition.
Regional Development Programmes	The Regional Development Programmes use whole system thinking to resolve regional issues. These programmes avoid the unnecessary restriction of capacity, for example unlocking Distributed Energy Resources to manage transmission constraints in Scotland, and allowing more photovoltaic generation to connect and generate in the South	As more renewable generation is built, and the UK seeks to meet its climate change targets, automated dispatch capability for generation in highly constrained areas will allow more renewables to connect to the system in the absence of network investment, contributing to reduced environmental damage and increased competition.

In 2020-21 we are going to deliver...	Benefitting energy consumers now...	...and in the future
Whole system thought leadership	<p>West. This allows for a higher proportion of generation to come from renewable sources, contributing to reduced environmental damage, and lowering balancing costs by minimising the effect of transmission constraints.</p> <p>We will work with industry to co-ordinate the different approaches which are being taken to resolve regional issues, ensuring that consumers do not incur unnecessary costs. For example, we will work with distribution networks to resolve voltage issues, contributing to improved reliability, and avoiding unnecessary spend.</p>	<p>Our work on the ENA open networks project will mean that markets and infrastructure build can be optimised across different voltage levels, leading to reduced environmental damage and lower bills than would otherwise be the case. Our work on Clean Heat will find a way to reduce the environmental damage associated with heating, and will bring benefits for society as a whole by ensuring that consumers can heat their homes in an affordable and sustainable way. This is increasingly important as we move towards a low-carbon world.</p>
Network Value Assessment tools	<p>Improved network value assessment tools will allow the ESO to carry out multiple permutations of system studies, rather than just studying for system peak. This improved visibility is necessary as the network becomes more complex, and contributes to improved reliability, and confidence in our decision-making.</p>	<p>Improvements to network value assessment tools will give us more confidence in our system studies, contributing to increased system security, and meaning that we can spend less on balancing costs and reserve products than would otherwise be the case.</p>
Enhanced customer experience	<p>We will work collaboratively with our stakeholders to design the customer connections portal, providing an improved quality of service to our stakeholders.</p> <p>During 2019 we engaged with customers and network owners to determine whether they believed there was benefit in developing a tool to provide online connection application and account management functionality. Throughout 2020-21 we will continue to engage on the scope of this system to facilitate its design, development and delivery in RIIO-2.</p>	<p>The new portal will make it easier for customers to track the progress of their connection application, resulting in an improved quality of service, and time savings on behalf of all parties.</p>
Insights documents	<p>We will engage extensively as part of the development of these documents, providing a valuable service by ensuring that high-quality conversations take place between stakeholders, and our analysis is reflective of industry's view of the future.</p>	<p>These documents feed into long term network planning, ensuring that bills remain as low as possible, and environmental damage is minimised as infrastructure will only be built where necessary.</p>

C.3 Role 3 deliverables

In the table below, we set out our deliverables for this role, and identify several deliverables as priorities. Our Introduction Sections for each role explain why particular deliverables have been identified as priorities.

C.3.1 Summary of Role 3 deliverables

Please see table C.3.2 for a detailed description of each deliverable.

Deliverable	Target delivery date
Lead the of Loss of Mains programme Protection setting (priority)	Q2 2020-21 and ongoing
Address actions raised in the E3C report into the GB Power Disruption Event of 9 August 2019	Q1 2020-21
Implement approach for efficient reactive power flows between networks	Q1 2020-21
Stability pathfinder (priority)	Q4 2020-21
Mersey Voltage pathfinder: Project recommendations (priority)	Q1 2020-21
Pennines Voltage pathfinder (priority)	Q2-Q4 2020-21
Constraint Management Pathfinder (priority)	Q1-Q2 2020-21
Early Competition plan setting out implementation for models (priority)	Q1-Q4 2020-21
Improve accessibility of ETYS and NOA publications (priority)	Ongoing
RDPs: Development of commercial arrangements for Transmission Constraint Management (TCM) service from DER	Q2-Q4 2020-21
RDPs: Co-ordinated DER inter-tripping functionality for transmission fault management.	Q2-Q4 2020-21
RDPs: Develop and implement the Generation Export Management Scheme (GEMS) in South West Scotland to manage transmission constraints	Q2-Q4 2020-21
Regional Development Programmes: Identification of future RDPs	Q4 2020-21
Support BEIS and industry in developing a strategy for clean heat	Q1-Q4 2020-21
Active engagement in the development of DSO and co-ordinated flexibility markets including cross-sector considerations	Q3 2020-21
Voltage needs identification tools/ processes	Q4 2020-21 & ongoing
Continue to work with Customers and Network Owners to understand requirements and scope of system wide single platform to provide online account management and connection application functionality	Ongoing, due to be completed in 2022
Operability Strategy Report	Q3 2020-21
FES: Bridging the gap to net zero	Q3-Q4 2020-21
Summer Outlook	Q1 2020-21
Winter Outlook	Q3 2020-21
Winter Review and consultation	Q1 2020-21
Future Energy Scenarios (FES)	Q2-Q3 2020-21

C.3.2 Role 3 deliverables

The table below sets out our detailed deliverables for this role area. In response to stakeholder feedback, for deliverables which are ongoing throughout the year we have defined a number of interim milestones. The purpose of the interim milestones is to provide extra visibility of our activities to Ofgem and stakeholders, we expect our performance to be measured against our overall progress and achievements and not individual interim milestones. We work flexibly across the roles to prioritise and manage our resources, therefore interim milestones may be changed during the year as activities progress. Updates will be provided on the Forward Plan tracker²⁰ which can be found on our website and is updated on a monthly basis.

Deliverable	Target delivery date	Description	Further context
Whole system operability			
Lead the of Loss of Mains Protection setting programme	Ongoing for 2020-21	Lead the Accelerated Loss of Mains programme and provide assurance of value for money via quarterly performance reporting in June, September and in subsequent quarters subject to the need for programme continuation.	We will continue to publish programme performance measures quarterly on the National Grid ESO and Energy Networks Association webpages, including the number of sites where protection setting changes are made, in line with the programme's quarterly assessment cycle.
	Q2 2020-21	Review and update the methodology for how we intend to procure balancing services from Distribution Network Owners (DNOs) to enable RoCoF and vector shift changes.	
Provide progress reports and plans to address actions raised in the E3C report into the GB Power Disruption Event of 9 August 2019	Q1 2020-21	The E3C report into the GB Power Disruption event of 9 August 2019 identified a number of actions to be addressed by the industry. These are delivered through the Electricity Task Group.	We will address the specific actions identified for us relating to a potential SQSS modification and Grid Code compliance process, and will work with distribution companies to address Loss of Mains programme related actions. Any necessary follow up actions will be clearly identified.
Implement approach for efficient reactive power flows between networks	Q1 2020-21	Having worked with network owners to design a whole system approach to managing reactive power flows between networks, implement that approach.	We have worked collaboratively with the DNOs over the past 12 months to identify the characteristics of reactive transfers at the transmission-distribution interface. We are continuing to assess the effectiveness of different solutions at that interface. As such, further work is required to understand what an appropriate whole system approach to reactive power management would look like, and how it may be implemented. We have moved this from role 2, as it is a better fit with the high-level Whole System Operability deliverable.
Pathfinder projects			
Stability pathfinder	Q4 2020-21	Assessing a range of commercial and network solutions to meet system stability needs. When we refer to stability in this context we are talking about the stability of frequency, voltage and the ability of a network user to remain connected to the system during normal operation, during and after a fault. We will	We will use lessons learnt from Stability pathfinder phase one to inform how we take forward the next phase. We plan to complete the next Stability pathfinder tender by Q4 2020-21.

²⁰ <https://www.nationalgrideso.com/document/162046/download>

Deliverable	Target delivery date	Description	Further context
		develop and test processes to define requirements of transmission system stability needs, focussing on dynamic volts, inertia and fault levels as an indication of system stability requirements. Working with other network organisations we will develop and test processes to obtain and evaluate options to meet the requirements set out through technical and economic assessment.	
Mersey Voltage pathfinder: Project recommendations	Q1 2020-21	Working with other network organisations we will conduct post tender evaluation through NOA based criteria and assessment to determine the best combination of asset and commercial solutions for meeting the regional high voltage needs. This will develop the necessary contract arrangements to facilitate participation by new and existing providers.	
Pennines Voltage pathfinder	Q2-Q4 2020-21	Subject to reviewing whether it is in the interest of consumers to progress the Pennines Voltage Pathfinder at this time, we will publish the invitation to tender and award contracts to successful parties.	The date of the second milestone is dependent on the first. Both depend on whether it is in the interest of consumers to progress the Pennines Voltage pathfinder at this time.
	Q3 2020-21	We will continue the high voltage project in the Pennine region to also consider market based solutions, include commercial solutions and further develop the necessary funding mechanisms to facilitate the participation of DNO solutions.	
Constraint Management Pathfinder	Q1-2 2020-21	The aim of this project will be to provide a commercial product based around constraint management. We will analyse the impact of constraint services in an attempt to alleviate network congestion, reduce balancing costs, and deliver greater value to Great Britain consumers as the electricity network evolves.	We will complete the RFI stage of the Constraint Management pathfinder during Q1 2020-21: this allows for other pathfinders to be prioritised to resolve system security issues. Taking into account the results received from the RFI, we will then make a decision as to whether it is cost-effective to run a tender process, and if a tender is deemed to be cost-effective then its design will depend on the feedback received as part of the RFI process.

Early Competition

Early Competition plan setting out implementation for models	Q1 2020-21	Provide written update to Ofgem on progress to date	Further supporting our ambition of competition everywhere, throughout 2020-21 we will be developing our Early Competition Plan ²¹ . This follows on from Ofgem's ask in the May RII0-2 Sector Specific Methodology Decision ²² and their further letter ²³ . The Early Competition Plan will facilitate competition to meet system needs from parties delivering asset based solutions in
	Q2 2020-21	Consult with industry on detailed models for Early Competition	
	Q3 2020-21	Provide written update to Ofgem on progress to date	
	Q3 2020-21	Consult with industry on Early Competition Plan (including models, roles and implementation)	

²¹ <https://www.nationalgrideso.com/document/164036/download>

²² https://www.ofgem.gov.uk/system/files/docs/2019/05/riio-2_sector_specific_methodology_decision_-_eso.pdf

²³ https://www.ofgem.gov.uk/system/files/docs/2019/09/electricity_system_operators_early_competition_plan_letter_0.pdf

Deliverable	Target delivery date	Description	Further context
	Q4 2020-21	Submission of final Early Competition Plan to Ofgem	<p>addition to non-network solutions. Models will be designed to work both pre and post any Competitively Appointed Transmission Owner (CATO) legislation. During the course of the project we will be exploring whether delivery of any elements can be accelerated to maximise consumer value.</p> <p>The Early Competition Plan will build on the learning from the Pathfinder projects. As part of this work, we will develop a methodology to determine how to identify the projects where the use of Early Competition would be in the consumer interest.</p>

NOA: Enhanced communication

Improve accessibility of Electricity Ten Year Statement (ETYS) and Network Options Assessment (NOA) publications	Ongoing	<p>We will enhance the information that is provided on system needs to allow a wider audience to better understand needs and propose solutions to meet them. We will continue to engage with stakeholders on the development of capabilities and implementation of the Network Development Roadmap. Publication of needs to the market through RFI packs, which are supported by webinars.</p> <p>Enhancements to information in ETYS, to include requirements for a wider set of system needs and more detail on existing system needs.</p> <p>Provide regular updates to stakeholders on the progress of pathfinding projects and continue engagement with impacted stakeholders through mechanisms such as the ENA Open Networks project.</p>	
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Regional Development Programmes (RDPs)

Development of commercial arrangements for Transmission Constraint Management (TCM) service from DER	Q3 2020-21	Commercial arrangements for DER TCM scoped with UKPN	<p>An agreement on the appropriate way to co-ordinate transmission and distribution system needs using commercial mechanisms is fundamental to developing the technical dispatch solution. Using a Future Worlds 'world B' ethos, as supported by the ENA Open Networks project we will work with DNOs and other stakeholders to develop a least regrets approach that builds on existing ways of working. This will inform the development of DSO and distribution flexibility markets.</p> <p>As the commercial framework is still in development, it is important to note that the milestones set out within this Forward Plan are only indicative at this stage. These projects are 'design by doing' requiring the input of third parties and therefore are subject to delays as were experienced in 2019-20. As the projects evolve, progress updates will be shared through the Forward Plan Tracker on</p>
	Q4 2020-21	Delivery plan for DER TCM within UKPN RDP area published	
	Q2 2020-21	Commercial arrangements for DER TCM scoped with WPD	
	Q3 2020-21	Delivery plan for DER TCM within WPD RDP area published	

Deliverable	Target delivery date	Description	Further context
			our website, and future plans will be shared via the RDP section of our website ²⁴ .
Co-ordinated DER inter-tripping functionality for transmission fault management.	Q2 2020-21 Q4 2020-21 Q4 2020-21	Delivery of N-3 inter-tripping of DER with UKPN Delivery of N-3 inter-tripping of DER with WPD Delivery of communication link between NGESO and SSE-N	The dates for this deliverable take into account the scale of the project, and the extent of co-ordination required between the TOs, DNOs and ESO. Revised delivery dates are based on the alignment of ESO, TO and DNO delivery plans and the installation of communication links. These projects are 'design by doing' requiring the input of third parties and therefore are subject to delays as were experienced in 2019-20. Outage availability has been a driver in delays to date. There are three projects ongoing which have a range of delivery dates depending on system enhancements required. The third project, with SSE-N, will complete in the 2021-22 year, but significant work will be undertaken in 2020-21.
Develop and implement the Generation Export Management Scheme (GEMS) in South West Scotland to manage transmission constraints	Q4 2020-21 Q2 2020-21 Q4 2020-21 Q2 2020-21	Integrate SPEN ANM management of local constraints with NGESO management of wider transmission constraints. High level design of NGESO commercial systems to interface with GEMS Detailed design of NGESO commercial systems to interface with GEMS Commercial contract structure for DER TCM scoped with SPEN	Trial of service conflict principles between ESO and DNO ANM operation. Design and implementation is currently underway. The proposed 'go-live' date of GEMS is planned for Q1 2022-23, in line with customer connection agreement dates. An agreement on the appropriate way to co-ordinate transmission and distribution system needs using commercial mechanisms is fundamental to developing the technical dispatch solution. Using a Future Worlds 'world B' ethos, as supported by the ENA Open Networks project we will work with DNOs and other stakeholders to develop a least regrets approach that builds on existing ways of working. This will inform the development of DSO and distribution flexibility markets. As the commercial framework is still in development, it is important to note that the milestones set out within this Forward Plan are only indicative at this stage. These projects are 'design by doing' requiring the input of third parties and therefore are subject to delays as were experienced in 2019-20. As the projects evolve, progress updates will be shared through the Forward Plan Tracker on our website, and future plans will be shared via the RDP section of our website ²⁵ .
Identification of future RDPs	Q4 2020-21	Roadmap describing the need and timescale for future RDPs during RIIO-2.	In 2020-21 we will work with the ENA Open Networks project to develop a proactive process to identify future RDPs. We will use this process to help identify the need for future RDPs during the RIIO-2 period.

²⁴ <https://www.nationalgrideso.com/publications/regional-development-programmes>

²⁵ <https://www.nationalgrideso.com/publications/regional-development-programmes>

Deliverable	Target delivery date	Description	Further context
Whole System thought leadership			
Support BEIS and industry in developing a strategy for clean heat	Q1-Q4 2020-21	Hold meetings at least quarterly to advise BEIS on the implications of clean heat pathways for the operation of the Whole Energy System.	Since we published the Draft Forward Plan, the System Operator has restructured so that the Gas System Operator function is now part of National Grid Gas Transmission, rather than part of the System Operator ²⁶ .
	Ongoing	Develop a fuller understanding of how the Whole Energy System might be operated under different clean heat pathways; working with the Gas System Operator.	Building on our work to define a Clean Heat goal, we have re-defined this part of our mission of “A whole system strategy that supports net zero by 2050”.
	Q3 2020-21	Share and test thinking on Clean Heat pathways with networks and industry.	<p><u>How are we working with BEIS?</u></p> <p>BEIS is responsible for heat policy and is expected to publish a Heat Policy Roadmap this year. The ESO is supporting BEIS by providing input on the whole energy system operation aspects of clean heat.</p> <p>As our work develops we will collaborate with other stakeholders, including network companies, to better understand the implications of clean heat for the whole system.</p> <p><u>How do the dates align with legislation?</u></p> <p>We work closely with BEIS to understand their timeframes, so that our work provides as much value as possible to the policy development process.</p> <p>In January 2020, the ESO set itself a target of 2025 to have a whole system strategy that supports net zero by 2050. We are developing a program of work to achieve that. This aligns with the goal stated by BEIS to have a clean heat strategy by 2025.</p> <p>The role of policies to increase deployment of clean heat technologies (e.g. the RHI) is out of scope for the Clean Heat work of the ESO. Through our FES work we explore different deployment scenarios, and through our Clean Heat work we explore the implications of these for system operation.</p> <p><u>What different technologies are we considering?</u></p> <p>We consider credible scenarios for clean heat and the ways that system operation could be affected by them. These scenarios include different mature and novel heat technologies.</p> <p><u>How does this link to other sectors?</u></p> <p>Any credible system operation strategy for clean heat must consider both the gas and electricity systems, as well as interactions with other sectors such as transport.</p>
Active engagement in the development of DSO and co-ordinated flexibility markets including cross-sector considerations	Q3 2020-21	Active input into the Open Networks 2020 project including leading the Whole Energy System workstream and associated CBA product. In this workstream will continue to ensure a cross-sector representation including non-network stakeholders.	We have added this deliverable between the publication of the draft and final versions of our 2020-21 Forward Plan, to reflect the Open Networks 2020 work programme and also in response to stakeholder feedback for more information on how we are engaging with the development of DSO.

²⁶ <https://www.nationalgridgas.com/news/changing-our-gas-transmission-organisation-arrangements>

Deliverable	Target delivery date	Description	Further context
		Active engagement with Ofgem's work on DSO and the development of a DSO framework for RIIO-ED2	
Network value assessment tools			
Voltage needs identification tools/ processes	Q4 2020-21	Document and test voltage needs identification tools / processes for inclusion in the NOA methodology. Identify up to three areas for further evaluation.	The three areas identified are: <ul style="list-style-type: none"> • Historical Data Mining Tool to be developed and tested in Q1 2020-21 • Initial view on potential next priority region(s) for high voltage assessment planned for Q1 2020-21 (dependent on delivery of Data Mining Tool) Output for Network Innovation Allowance (NIA) project and investigating a proof of concept for year-round voltage needs identification and optimisation tool scheduled for Q4 2020-21
	Ongoing	Continuous improvement of the tools & processes.	
Enhanced customer experience			
Continue to work with Customers and Network Owners to understand the requirements and scope of a system wide single platform to provide online account management and connection application functionality	Ongoing, due to be completed in 2022	Detailed scoping of tool to provide a visual and live update for customers on the progress of their connection application.	Feedback suggested that a single coordinated solution covering applications in all parts of the GB network would provide the greatest value. We will continue to develop specification and design for this tool to enable build during RIIO-2.
Insights documents			
Operability Strategy Report	Q3 2020-21	Provide a view of current and future operability challenges, to help inform stakeholders' investment strategies, and commercial and operational plans.	Our operability strategy ensures future system operability. It will improve network safety and reliability by ensuring that future operational challenges can be addressed securely. It will drive lower bills by changing the way we operate and seek out better solutions. It will minimise environmental damage while promoting overall societal benefits by reducing our reliance on services from carbon emitting sources.
FES: Bridging the gap to net zero	Q3-Q4 2020-21	Taking the key messages from the 2020 Future Energy Scenarios, identify and progress the actions that need to happen to meet the net zero target. This work will be informed by feedback from the 2019-20 performance year of our FES: Bridging the gap to net zero project.	We plan to publish this document which will set out our path towards the Net Zero target, in line with the ESO mission. Stakeholders will be kept engaged through newsletters directing them to publications as the project moves forward.
Summer Outlook	Q1 2020-21	We will contribute to this National Grid Gas Transmission publication, providing our data and analysis for the upcoming summer.	As a result of changes to the Gas System Operator organisational arrangements ²⁷ , the Summer Outlook, Winter Outlook and Winter Review and Consultation will be published by

²⁷ <https://www.nationalgridgas.com/news/changing-our-gas-transmission-organisation-arrangements>

Deliverable	Target delivery date	Description	Further context
Winter Outlook	Q3 2020-21	We will contribute to this National Grid Gas Transmission publication, providing our data and analysis for the upcoming winter.	National Grid Gas Transmission. National Grid ESO will contribute to these publications.
Winter Review and consultation	Q1 2020-21	We will contribute to this National Grid Gas Transmission publication, providing data and analysis relating to the previous winter	
Future Energy Scenarios (FES)	Q2-Q3 2020-21	Provides our range of credible scenarios for the future of energy to support the planning of the Great Britain transmission system supported by continued, varied and wide stakeholder engagement and research. In Q2 we will produce the FES publication with the supporting data workbook, hold the FES conference and executive briefing, and publish a call for evidence. Stakeholder engagement will happen throughout the year in the form of bilaterals, workshops, webinars, videos and thought pieces. We are also planning on delivering more information on the costing of each scenario pathway following the FES publication.	

C.4 Role 3 metrics and performance indicators

Following consultation with stakeholders, we have defined a set of metrics and performance indicators for Role 3. Metrics are measures which have set benchmarks, and Performance Indicators are measures which do not.

These are set out below, where we indicate how the metric relates to the deliverables and ESO ambitions. We explain how a focus on this activity benefits consumers, and how performance will be measured. Where possible, we have defined a metric, indicating the level of performance we will define as “below expectations”, “in line with expectations” or “exceeding expectations”, along with the justification for these benchmarks.

However, there are some areas we would like to measure where it is not sensible to define a benchmark in this way. For example, there are some areas of performance we will start to measure this year, in order to define a robust benchmark we can use for RIIO-2 reporting. Although we recognise that a benchmark would be needed to use this data as a measure of our performance, we have heard from stakeholders that they would welcome visibility of this data, and it would allow us to be transparent about how a benchmark is set for RIIO-2. We will therefore start to publish certain sets of data this year as Performance Indicators.

For Role 3, we will publish the following measures:

Metrics:

- 3a: Right first time connection offers
- 3b: NOA consumer value
- 3c: Customer connections- customer satisfaction

Performance indicators:

- 3d: Whole system unlocking cross boundary solutions
- 3e: Future balancing costs saved by operability solutions
- 3f: Capacity saved through operability solutions

C.4.1 Role 3 metrics for 2020-21

Metric Name	3a Right First Time connection offers																																																																														
Reporting frequency	Monthly																																																																														
Role	3																																																																														
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric																																																																														
Relevant deliverables	Enhanced customer experience																																																																														
Link to ESO ambitions	Competition everywhere The ESO is a trusted partner																																																																														
How does it benefit consumers?	<p>This metric measures whether the ESO aspects of connection offers were correct the first time they were sent out to customers. Connection offers being right first time reduces re-work, saving time for the ESO and its customers. The internal costs of the ESO and its customers are eventually met by bill payers, so the extent of re-work impacts on consumer bills. Connection offers which are right first time also allow new parties to be connected more quickly.</p> <p>This is linked to the following aspects of consumer benefit:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Improved quality of service 																																																																														
How is performance measured? How will this metric show performance above baseline expectations?	<p>The Right First Time metric will report all connection offers signed within a calendar month and identify if a 'reoffer' has been made (i.e. the offer was not right first time and needed re-work) and whether the re-work resulted from an issue caused by the ESO. Any reoffers directly attributable to the ESO will impact the performance of the metric.</p>																																																																														
Benchmark-exceeding expectations	100% of connection offers Right First Time (excluding those where the error was not due to the ESO)																																																																														
Benchmark- in line with expectations	95-99.9% of connection offers Right First Time (excluding those where the error was not due to the ESO)																																																																														
Benchmark- below expectations	Less than 95% of connection offers Right First Time (excluding those where the error was not due to the ESO)																																																																														
Benchmark calculations and comparison to previous years.	<p>The graph below shows our performance to date during 2019-20. Our year to date performance is now 92%.</p> <table border="1"> <caption>Approximate data from the bar chart</caption> <thead> <tr> <th>Month</th> <th>Right First Time</th> <th>ESO related reoffer</th> <th>TO related reoffer</th> <th>Customer related reoffer</th> <th>Other (DNO...) reoffer</th> </tr> </thead> <tbody> <tr><td>Apr-19</td><td>6</td><td>0</td><td>4</td><td>0</td><td>0</td></tr> <tr><td>May-19</td><td>9</td><td>2</td><td>1</td><td>6</td><td>0</td></tr> <tr><td>Jun-19</td><td>8</td><td>2</td><td>5</td><td>4</td><td>0</td></tr> <tr><td>Jul-19</td><td>7</td><td>2</td><td>2</td><td>2</td><td>0</td></tr> <tr><td>Aug-19</td><td>14</td><td>1</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>Sep-19</td><td>9</td><td>1</td><td>2</td><td>5</td><td>0</td></tr> <tr><td>Oct-19</td><td>11</td><td>3</td><td>1</td><td>12</td><td>0</td></tr> <tr><td>Nov-19</td><td>8</td><td>1</td><td>3</td><td>8</td><td>0</td></tr> <tr><td>Dec-19</td><td>14</td><td>0</td><td>0</td><td>2</td><td>0</td></tr> <tr><td>Jan-20</td><td>10</td><td>1</td><td>4</td><td>5</td><td>0</td></tr> <tr><td>Feb-20</td><td>28</td><td>0</td><td>3</td><td>6</td><td>0</td></tr> <tr><td>Mar-20</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>	Month	Right First Time	ESO related reoffer	TO related reoffer	Customer related reoffer	Other (DNO...) reoffer	Apr-19	6	0	4	0	0	May-19	9	2	1	6	0	Jun-19	8	2	5	4	0	Jul-19	7	2	2	2	0	Aug-19	14	1	1	1	0	Sep-19	9	1	2	5	0	Oct-19	11	3	1	12	0	Nov-19	8	1	3	8	0	Dec-19	14	0	0	2	0	Jan-20	10	1	4	5	0	Feb-20	28	0	3	6	0	Mar-20	0	0	0	0	0
Month	Right First Time	ESO related reoffer	TO related reoffer	Customer related reoffer	Other (DNO...) reoffer																																																																										
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Jan-20	10	1	4	5	0																																																																										
Feb-20	28	0	3	6	0																																																																										
Mar-20	0	0	0	0	0																																																																										

Metric Name	3b NOA consumer value
Reporting frequency	Annual
Role	3
Continuation of 2019-21 metric, or new metric from RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	Pathfinder projects NOA: enhanced communication
Link to ESO ambitions	Competition everywhere The ESO is a trusted partner
How does it benefit consumers?	<p>The Network Options Assessment optimises between spend on balancing services and network investment, with the aim of consumers paying the optimised lowest cost possible for a transmission network. The Network Options Assessment process recommends which options should proceed, and when the TOs should invest in them, so their transmission networks can manage risk in an uncertain world. It recommends whether TOs should delay or continue current projects, to make sure they are completed at a time that will deliver the most consumer benefit. It also indicates the optimum level of interconnection to other European electricity grids to maximise socio-economic welfare, based on market-driven analysis. It is therefore linked to the following consumer benefit outcomes:</p> <ul style="list-style-type: none"> • Reduced environmental damage • Lower bills than would otherwise be the case • Benefits for society as a whole
How is performance measured? How will this metric show performance above baseline expectations?	<p>Although running the NOA is a licence obligation, the extent to which we seek alternatives to TO-led solutions exceeds baseline activities.</p> <p>We have set benchmarks in the areas which the ESO can control, which is in the options which are put into the NOA process and are recommended as part of the optimal paths. We will publish a count of the options which are submitted as part of the NOA process, using the following categories:</p> <ul style="list-style-type: none"> • ESO exclusive options • ESO collaborative options • TO exclusive options <p>For the Pathfinder projects, we will measure the value created by each project: this would be the difference between a reference solution (such as a conventional transmission build solution) and the solution which is successful in the tender process. We note that where a conventional solution is eventually successful, this figure will be zero, but the process gives us confidence that we have chosen the best solution.</p> <p>Targets are set based on historic performance. The target is to encourage the ESO to consider a wide range of options, therefore by having a target for exclusive and collaborative options this is driving more options into the process. Only options which appear in the optimal path count towards the metric, so that the options put forward are credible.</p> <p>The NOA cost benefit analysis will determine which options form part of the optimal path, and as such ESO options are treated no differently to TO options. Therefore, the optimisation process should select the best option regardless of its category. As has been noted in the past for this metric, the ESO may have a low number of options as in some cases there may be no options which the ESO can put forward.</p>
Benchmark- exceeding expectations	The % of ESO exclusive and ESO collaborative options is >12% of the total number of options in the optimal path or the value is >4% of the overall consumer benefit.
Benchmark- in line with expectations	The % of ESO exclusive and ESO collaborative options is between 10% and 12% of the total number of options in the optimal paths or the value is between 3% and 4% of the overall consumer benefit.
Benchmark- below expectations	The % of ESO exclusive and ESO collaborative options is below 10% of the total number of options or the value is below 3% of the overall consumer value.
Benchmark calculations and	The benchmark numbers were calculated based on the split of option types in 2018-19, where the ESO calculated what proportion of the overall NOA value was

comparison to previous years.

represented by the ESO options (but this was not reported at the time). As we are yet to report the metric for 2019-20 (it is an annual metric), we have not been able to test the robustness of this benchmark.
Using a percentage value, rather than a total value, allows us to illustrate the relative value of ESO options.
We will publish the output of this metric for the first time in the 2019-20 end of year report.

Metric Name	3c Customer Connections- Customer Satisfaction
Reporting frequency	Quarterly
Role	3
Continuation of 2019-21 metric, or new metric from RIIO-2?	New metric from RIIO-2
Relevant deliverables	Enhanced customer experience Regional Development Programmes
Link to ESO ambitions	Competition everywhere The ESO is a trusted partner
How does it benefit consumers?	<p>Running an efficient, streamlined connections process will save time for both the ESO and its customers, whose activities are eventually paid for by consumers by way of use of system charges (BSUoS, TNUoS, DUoS) and wholesale energy costs. A more efficient process will also allow new generation to be connected earlier, increasing wholesale competition.</p> <p>This is linked to the following types of consumer benefit:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	<p>During 2020-21, this will be similar to the existing customer satisfaction (CSAT) survey which is currently used across National Grid. However, in RIIO-2 it will become a more ESO-focussed survey, targeted at customers connecting at both Transmission and Distribution network voltages who have had an interaction with the ESO.</p> <p>Although connecting customers is a baseline activity from the ESO, in order to receive a high score from our customers we will have to demonstrate that we have gone above and beyond our licence obligations.</p>
Benchmark- exceeding expectations	Score out of 10 of 8.2 or more
Benchmark- in line with expectations	Score out of 10 between 7.8 and 8.2
Benchmark- below expectations	Score out of 10 of 7.8 or below
Benchmark calculations and comparison to previous years.	n/a

C.4.2 Role 3 performance indicators for 2020-21

There are some sets of data we would like to publish where it is not sensible to define a benchmark. For example, there are some areas of performance we will start to measure this year, in order to define a robust benchmark we can use for RIIO-2 reporting. Although we recognise that a benchmark would be needed to use this data as a measure of our performance, we have heard from stakeholders that they would welcome visibility of this data, and it would allow us to be transparent about how a benchmark is set for RIIO-2. We will therefore start to publish certain sets of data this year as Performance Indicators: please see below.

Performance Indicator Name	3d Whole System, Unlocking Cross Boundary Solutions
Reporting frequency	Quarterly
Role	3
Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?	Continuation of 2019-21 performance indicator
Relevant deliverables	Regional Development Programmes
Link to ESO ambitions	A whole system strategy that supports net zero by 2050 Competition everywhere
How does it benefit consumers?	<p>We have implemented new systems, contracts and processes to allow additional generation capacity to connect to the distribution networks. This is in response to industry feedback that it is difficult to obtain a generation connection to the distribution network.</p> <p>The most significant example of this is the “Appendix G” process, relating to Appendix G of customers’ Bilateral Connection Agreements, a trial we have been running to try and speed up the process for the connection of generators which are embedded within the DNO network. Without our new ways of working, the generation wishing to connect would have to wait for network reinforcements to be completed before being able to connect, which could be years in the future.</p> <p>We have established new commercial arrangements, between three parties (ESO, DNO, generators), instead of the traditional bilateral arrangements. We also have put technical arrangements in place to manage power-flow congestion across network boundaries. Our work with DNOs has helped to identify commercial and operational solutions that enable access to be provided to new embedded customers more quickly than was previously possible, this has resulted in increased volumes of low carbon generation connecting to the network.</p> <p>An increase in generation connections increases competition, putting downwards pressure on wholesale prices. Reducing the requirement for network infrastructure is beneficial for the environment, consumer bills, and visual amenity.</p> <p>This is linked to the following types of consumer benefit:</p> <ul style="list-style-type: none"> • Reduced environmental damage • Lower bills than would otherwise be the case • Improved quality of service • Benefits for society as a whole <p>This Performance Indicator is closely linked to Performance Indicator 3f, which also measures the success of the ESO’s engagement across the transmission-distribution interface at solving Operability solutions, providing wider market access and increasing the volume and types of participant able to provide operability solutions. However, Performance Indicator 3d only measures the outcome of the Appendix G process.</p>
How is performance measured?	This Performance Indicator measures the outcome of the Regional Development Programmes. For each region, we will report the total MW of DER connected during the quarter. The volume at each GSP will also be shown, along with a commentary.

This data is presented as a Performance Indicator, rather than a metric, as the ESO does not have a target for the volume of capacity it wishes to connect. The ESO aims to provide the opportunity for generation to be able to connect if investment signals exist.

For each region, we will report in the format shown below for each region, for each quarter.

Grid Supply Point (GSP)	MW	Commentary on DER technology types
Total		

Comparison to previous years

Last year's outturn figures (in MW) were:

	Q1	Q2	Q3	Q4
UKPN	49	5.5	N/A	TBC
WPD	367.17	746.52	147.31	TBC

Performance Indicator Name	3e Future balancing costs saved by operability solutions																																		
Reporting frequency	Quarterly																																		
Role	3																																		
Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?	New performance indicator from RIIO-2																																		
Relevant deliverables	Pathfinder Projects Regional Development Programmes Whole System Operability																																		
Link to ESO ambitions	An electricity system which can operate carbon free																																		
How does it benefit consumers?	<p>The implementation of new operability tools, such as stability, frequency or constraint management services, or operational policies such as loss of mains risk management will help to reduce the cost of managing the network. We define 5 categories of operability constraints: Thermal, Frequency, Voltage, Stability and Black Start. We are currently progressing the following initiatives under Role 3:</p> <ul style="list-style-type: none"> • Constraint management pathfinder • Voltage pathfinder • Stability pathfinder <p>This metric will therefore relate to the following category of consumer benefit:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case 																																		
How is performance measured?	<p>For each of the categories listed above, we will consider the extent to which each of the projects listed above would reduce balancing costs in future years. We will set out a counterfactual spend on each operability category (per year), and then demonstrate how this would be impacted by the development of each of the projects listed. We will highlight areas where benefits might flow through to other performance metrics if there is a risk of double counting.</p> <p>This is a Performance Indicator rather than a Metric: no benchmark is set as the information has not previously been recorded. During 2020-21 we will develop a projection of potential opportunities over the RIIO2 period and a realistic expectation of value to be delivered. This will give transparency in the setting of our RIIO-2 benchmark.</p> <table border="1" data-bbox="432 1283 1366 1630"> <thead> <tr> <th>Year</th> <th>2021-22</th> <th>2022-23</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Counterfactual Spend (£m)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Savings due to project 1 (£m)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Savings due to project 2 (£m)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total savings (£m)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Year	2021-22	2022-23				Counterfactual Spend (£m)						Savings due to project 1 (£m)						Savings due to project 2 (£m)						Total savings (£m)					
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Total savings (£m)																																			

Performance Indicator Name	3f Capacity saved through operability solutions																												
Reporting frequency	Quarterly																												
Role	3																												
Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?	New performance indicator from RIIO-2																												
Relevant deliverables	Regional Development Programmes																												
Link to ESO ambitions	An electricity system which can operate carbon free Competition everywhere																												
How does it benefit consumers?	<p>Our network operability processes identify improvements to systems, policies and service procurement which optimise the use of infrastructure to allow more participants, including renewable generation, to access energy markets. The increased competition will lead to a more diverse market, resulting in a potential reduction in consumer bills and reduction of carbon emissions. As it will optimise infrastructure build, it will result in less transmission infrastructure being created, which will impact positively on visual amenity.</p> <p>We able to do this where, for example, intertrips or active network management can be used to avoid the need for infrastructure to cater for fault conditions, or where specific analysis of local network requirements indicates a cheaper network solution can be used.</p> <p>This metric will therefore relate to the following category of consumer benefit:</p> <ul style="list-style-type: none"> • Lower bills than would otherwise be the case • Benefits for society as a whole • Reduced environmental damage 																												
How is performance measured?	<p>During 2020-21 we will develop a projection of the potential volume of opportunity measured in MW over the RIIO2 period and a realistic expectation of value to be delivered, including how this relates to customer demand for connections. Benefits are jointly delivered by network companies and the ESO working together.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>2021-22</th> <th>2022-23</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Customer Demand (MW)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Baseline Capacity (MW)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Capacity Delivered (MW)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>					Year	2021-22	2022-23				Customer Demand (MW)						Baseline Capacity (MW)						Capacity Delivered (MW)					
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Appendix

Appendix 1: Changes since the Draft Forward Plan

We published our Draft Forward Plan^{28,29} for consultation in December 2019, and held a stakeholder event in January 2020. We received feedback both at the event and in response to the consultation³⁰, and where possible we have sought to incorporate this feedback into our Final Forward Plan. We set out below how we have incorporated stakeholder feedback, and provide justifications for where we have not been able to do so.

General feedback resulting in changes to the Forward Plan

Topic	Feedback	Change made
Deliverables	Deliverables should be specified, time bound, relevant, beneficial for consumers, and in line with industry priorities. Provide justifications for delays, and set out what actions are being taken to avoid further delays. The ESO should provide more granular information on the steps and actions that need to be taken to meet the deliverables set-out, for example by “live” documents outside of the Forward Plan outlining deliverables and key milestones.	We have added interim milestones to many deliverables to show what exactly will be delivered in 2020-21, and provided more narrative to explain the activities which will be carried out as part of each deliverable. We have added justification for delays. We have added an introduction section which describes how we have prioritised deliverables to benefit consumers. We have also uploaded our Forward Plan tracker ³¹ to our website, giving stakeholders visibility of the progress of our deliverables and associated milestones on a monthly basis.
Priority Deliverables	The ESO should explain more clearly why certain deliverables have been prioritised over others and are considered to be challenging. Explain how/if priority deliverables will be treated differently to other deliverables, what additional benefits will be delivered as a result of this prioritisation.	Further information about the priority deliverables is included in the introduction section, as well as at the start of each role chapter.
ESO ambitions	Explain how the priority deliverables bring the ESO towards achieving its 2025 ambitions. Explain what the ambitions mean in practice, and how the ESO will address the trade offs between the four ambitions. Explain how well the ESO is progressing against these ambitions.	More detail about the ESO ambitions is provided in the introduction section.
Metrics	Performance metrics should be specified, relevant, and benchmarked. Include full historic and current performance in Forward Plans. Provide narrative explaining why performance benchmarks have been chosen.	We have changed the way we present our metrics, using tables to clearly specify how performance will be measured, which of the deliverables and ESO ambitions the metric relates to, and what the benchmarks are. There are some areas which stakeholders have asked us to start measuring, for which we do not have historical data available to set meaningful benchmarks. We have therefore set out several Performance Indicators-although these may not provide a direct measure of the ESO’s performance, we believe that presenting this information will allow us to be transparent in setting benchmarks when these measures become metrics in RIIO-2. These measures are clearly identified in the document.

²⁸ <https://www.nationalgrideso.com/document/159351/download>

²⁹ <https://www.nationalgrideso.com/document/159346/download>

³⁰ <https://www.nationalgrideso.com/our-strategy/forward-plan>

³¹ <https://www.nationalgrideso.com/document/162046/download>

		We have included historic and current performance data, and narrative explaining why performance benchmarks have been chosen.
RIIO-2 deliverables	The ESO should consider whether deliverables proposed in the RIIO-2 period (particularly work that involves scoping and engagement) can be progressed in 2020-21.	We are progressing a number of scoping and engagement activities this year in order to ensure that we are well-placed to deliver our RIIO-2 commitments: these are identified in the investment roadmaps within our RIIO-2 business plan ³² . As many of the activities we will progress during 2020-21 are internally focussed, we have not described them in the Forward Plan, which is a description of the key activities which matter the most to stakeholders.
Golden thread	Provide a clearer link, or “golden thread”, between the ESO’s mission/long-term vision, its strategy to deliver the vision, its chosen deliverables and consumer outcomes. Discuss consumer benefits in more detail throughout the plan, and explain how deliverables have been prioritised to provide the most consumer benefit. Show linkages between roles.	This narrative is now included within our upfront introduction section, and the new introduction sections for each role.
Consumer benefit of deliverables	Direct or indirect consumer benefits associated with each of the deliverables, and how those benefits have been estimated, should be included in Forward Plans.	We recognise that it is important to consider the consumer benefit of each deliverable. Our RIIO-2 business plans include an extensive cost-benefit analysis ³³ of our RIIO-2 deliverables: however, this was a complex piece of work which required a significant time commitment from subject matter experts. We have therefore not been able to provide this level of detail for our Forward Plan commitments within this final year of the RIIO-1 price control and incentives scheme, but have instead included a high-level articulation of the consumer benefit of each deliverable within the consumer benefit tables.
Role of DSO	Acknowledge the role the DSO can play in meeting the ESO’s system operation requirements.	We have added an additional deliverable to role 3 to provide clarity on how we are engaging with DNOs and other stakeholders in the development of Distribution System Operation (DSO). Consistent with Ofgem’s approach to DSO we are considering DSO as a set of functions rather than a role.
Deliverables from Ofgem and E3C 9th August reports	The ESO should put additional deliverables noted in Ofgem’s and the E3C’s 9th August report into the Forward Plan	We have added this into the role 3 deliverables table.

³² <https://www.nationalgrideso.com/document/158051/download>

³³ <https://www.nationalgrideso.com/document/158061/download>

Role 1 feedback resulting in changes to the Forward Plan

Topic	Feedback	Changes made
RIIO-2 deliverables	The ESO should bring forward RIIO-2 deliverables under role 1, particularly those relating to Balancing IT. We would like to understand what work on the data portal will take place during 2020-21.	<p>We are progressing a number of scoping and engagement activities (such as solution investigation work for enhanced balancing capability, exploring best practice from external organisations, and setting up the Design Authority) this year in order to ensure that we are well-placed to deliver our RIIO-2 commitments: these are identified in the investment roadmaps within our RIIO-2 business plan³⁴.</p> <p>As we are currently working within our RIIO-1 allowances, it is not currently possible to progress any additional work within 2020-21 without compromising the Forward Plan deliverables which are important to our stakeholders.</p> <p>As many of the activities we will progress during 2020-21 are internally focussed, we have not described them in the Forward Plan, although there are a few exceptions such as the Design Authority (which is described in the role 1 deliverables table).</p> <p>We have described our data portal activities for 2020-21 in the role 1 deliverables table.</p>
Deliver competitively tendered black start contracts	The ESO should clarify what it will deliver during 2020-21, what it intends to do to contract with successful parties, and what it will do in the remainder of the year after contracting with successful parties.	We have added additional detail and milestones for this deliverable.
Future of the ENCC	The ESO should publish the five operability challenges, and evidence how its publications meet stakeholder needs	We now plan to include information on these operability challenges as part of the Operability Strategy Report.
Interconnector Programmes	Provide more details regarding this deliverable, including evidence of innovation and stretch. Give a view of how this will be aligned with Competition Everywhere, and give due consideration to creation of a level playing field in procurement of system services.	More information has been added to the further context section of the deliverables table.
Platform for Energy Forecasting (PEF)	Provide more detailed milestones. Explain how this deliverable will reduce balancing costs for 2020-21 and beyond.	We have provided more detailed milestones. An explanation of consumer benefit has been added to the deliverables table and consumer benefit table.
Control Capability Development	Specify what this process will deliver in practice, and how the ESO will develop a cross-industry process to achieve the deliverable.	The name of this deliverable has been changed to Design Authority to clarify what it will deliver in practice, and an explanation of the purpose of the Design Authority has been added to the deliverables table.
More clarity of operational decision making	The ESO should consider whether any additional milestones can be added.	We have added more milestones into the deliverables table.
Inertia Measurement	Provide more specific information detailing what the tool is, how it will be developed, how it will benefit	One system is built upon the Phasor Measurement Unit (PMU) technology being rolled out by the TOs during RIIO-2. The

³⁴ <https://www.nationalgrideso.com/document/158051/download>

	<p>consumers, and why it has been delayed.</p> <p>Be clear on boundaries of ESO vs DSO responsibility.</p>	<p>PMUs continually measure the power exchange at boundaries, along with the frequency, to establish the effective inertia within each region. These are then combined to give the total inertia. More information is available here³⁵. The alternative system is based on a “Modulator” to provide small (<10MW, 0.0005Hz) power changes into the network to alter the frequency slightly. Specially designed high-speed measurement units distributed around the grid observe the frequency changes which are used to continuously measure the full grid inertia. More information is available here³⁶. More information has been added to the deliverable to clarify the boundaries of ESO vs DSO responsibility.</p>
Collaboration with network operators	<p>Provide more information about how the ESO will engage with network operators over 2020–21 – especially in relation to their whole-system strategy for supporting net-zero by 2050.</p>	<p>We have recently published a paper³⁷ describing how the ESO is working with others to facilitate the future energy landscape. This paper both describes both our approach to working with others and indexes the relevant activities and innovation projects we are undertaking in 2020-21 as well as the activities we are planning to undertake in RIIO-2. More information about our whole system strategy that supports net zero by 2050 is now included in the upfront introduction section.</p>
Improve dispatch facility to handle a large number of small Balancing Mechanism Units	<p>The ESO should more clearly describe this deliverable, including what is a “large number” and what specific activities will be completed.</p>	<p>We have added more information to the deliverable table. In order to provide better clarity of what this deliverable is, we have changed its title to “Expand dispatch facility to handle a large number of small Balancing Mechanism Units”.</p>
Transmission network access	<p>Performance metrics should be aligned with network companies’ own performance metrics. Use the Network Access Policy (NAP) to align key performance indicators for TOs and the ESO.</p>	<p>We have aligned our metrics with those proposed in the draft NAP where appropriate. Our current system access metric, measuring outages delayed or cancelled within control room timescales, mirrors their proposal “Percentage of TO outages started outside 60mins of agreed start time”. We currently report outage changes within 4 weeks of start date attributable to the ESO at the OC2 forum alongside those attributable to the TOs. At this point we don’t apply an upper limit on the number of changes that the ESO initiates, as during these timescales we are optimising the outage plan to manage system security and constraint costs as more detailed forecasts are received for weather based demand and generation output. However, through the E&W and Scotland NAPs (Network Access Policies) and SO-TO Mechanism (Scotland only) we would work with the TOs to determine the overall consumer benefit to ensure the optimal decision is being made.</p>
Roll out of Loss of Mains protection settings	<p>Explain why the “roll out of loss of mains protection settings” isn’t being progressed as a priority</p>	<p>This deliverable is specified as a priority in role 3. We have consolidated all activities</p>

³⁵ https://www.ge.com/digital/sites/default/files/download_assets/effective-inertia-datasheet-ge-grid-analytics.pdf

³⁶ <http://reactive-technologies.com/wp-content/uploads/2019/07/Cigre-Symposium-Aalborg-Paper.pdf>

³⁷ <https://www.nationalgrideso.com/document/163026/download>

		relating to Loss of Mains into role 3, where it is defined as a priority deliverable.
Transparency of balancing actions	The ESO should publish more information about Balancing Adjustment Actions taken outside of the Balancing Mechanism, including identifying the counterparty and the justification for using a bilateral trade rather than a competitive tender.	Subject to the outcome of Balancing and Settlements Code (BSC) Modification P399, we will begin publishing a transparent identifier of the units we trade with bilaterally. However, we have not committed to a specific date within the Forward Plan, as the code modification process has not yet concluded.
Metric- balancing costs	<p>Provide more justification of benchmark and adjustment factors. Benchmark should factor in changes associated with rollout of loss of mains protection settings.</p> <p>Show what the ESO will do to drive down balancing costs.</p> <p>Use a simple average of expenditure over the past 5 years, and take account of the fact that the Western Link is now available.</p> <p>Consider using outturn expenditure for 2019-20: a provisional benchmark could be used, and then finalised once the data is available.</p>	<p>The methodology was proposed by Ofgem at the beginning of the 2018-21 incentives scheme. We have provided a step-by-step guide to how the benchmark is calculated- please see appendix 2. We have also uploaded a spreadsheet to our website³⁸.</p> <p>The cost savings associated with the rollout of loss of mains protection settings are included within the RoCoF adjustment factor. We have also provided additional detail in our introduction to show how the ESO is seeking to drive down balancing costs, and the consumer benefit of projects such as pathfinders will be reported as consumer benefit case studies as these projects progress.</p> <p>The linear trend is used rather than a simple average as it takes account of the changing nature of operating the system.</p> <p>We have changed our methodology so that we will use outturn expenditure for 2019-20: this is explained further in the metric description and appendix 2.</p>
Metric- energy forecasting accuracy	<p>Consider changing the performance benchmarks, as only having to meet the target in 5 to 7 months of the year is not stretching.</p> <p>Explain why the methodology and calculated targets are ambitious, and why it is ambitious to target only 6 months of accurate forecasts. Explain why the forecast for national demand has monthly targets in mean absolute error, and BMU wind generation has monthly targets in mean absolute percentage error.</p> <p>Consider a benchmark based on mean absolute percentage error across the year, setting the benchmark for Exceeds Expectations at 25%.</p>	<p>As a response to the feedback received in relation to the energy forecasting metrics (day ahead demand and day ahead wind forecasting), we have re-designed this metric. We will introduce an annual benchmark for both demand and wind forecasts. We will define criteria for exceeding, in line with and below expectations with reference to these annual benchmarks.</p> <p>Within the metric table, we have provided an explanation of why the existing targets are ambitious: as the level of uncertainty on the system is increasing due to the changing generation mix, and therefore maintaining the same level as accuracy as previous years is becoming increasingly difficult. We have also provided an explanation of the use of different units to measure demand and wind forecasting.</p>
Metric- information provision scorecard	Support the removal of this metric	We have removed this metric from the Forward Plan.
Metric- System Access Management	<p>Include a below expectations benchmark, and consider whether benchmarks are sufficiently ambitious.</p> <p>Ensure that the ESO seeks to optimise overall system costs, rather than minimising changes to planned outages.</p> <p>Develop metrics to measure ESO performance during the Optimisation and</p>	<p>We have revised our benchmarks to be more ambitious, and included a below expectations benchmark. We have explained how we seek to optimise overall system costs.</p> <p>We are developing a metric for RIIO-2 which will measure the performance of ESO system access looking at the time taken to process access requests from network owners. In</p>

³⁸ <https://www.nationalgrideso.com/document/166231/download>

	Delivery phases of the within year outage planning process.	2020-21 we will be measuring our performance to set a benchmark which we would seek to better through process improvements from 2021.
Metric- Customer Value Opportunities	Clarify that consumer benefits would not be possible without the TOs.	We have added this clarification to the metric table.

Role 1 feedback which has not resulted in changes to the Forward Plan

Topic	Feedback	Rationale for not making changes to Forward Plan
Operability challenges	The ESO should provide strong evidence of innovation and clear leadership in solving operability challenges	We consider that our leadership in using innovation to solve operability challenges is evidenced in the Operability Strategy Report ³⁹ . In particular, projects such as the Pathfinders show evidence of innovation and leadership, as these challenges have not been faced by any other system operator.
More clarity of operational decision making	<p>The ESO should outline when it will make available to market participants to improve understanding of the actions being taken to address certain system needs.</p> <p>Explain rationale for delaying this to Q4 2020-21. The ESO should publish all data as a default, instead of asking stakeholders what data is valuable to them.</p> <p>The ESO should deliver information around the actions being taken to manage the Rate of Change of Frequency, as well as the cost of each action</p>	<p>Actions taken to resolve thermal and voltage constraints are already included on the Data Portal.</p> <p>We agree with the principle of data being presumed open: this is set out in our digitalisation strategy within our RIIO-2 business plan. It is our intention to eventually publish all data, however this is subject to constraints around systems (which will need to be upgraded to facilitate automatic uploads) and sensitivities around data publication (associated with security, commercial and personal data) which we will work towards resolving in RIIO-2. The publication of all data will therefore be delivered incrementally: we therefore welcome stakeholders' views as to the data, and format of data, they would find most useful. The justification for the delay to Q4 2020-21 is given in the 2019-20 Q3 report: this was in order to give stakeholders chance to input.</p> <p>Costs and volumes of actions to manage RoCoF are already published in the constraints section of the Monthly Balancing Services Statement (MBSS)⁴⁰.</p>
Platform for Energy Forecasting (PEF)	Publish more granular information regarding the accuracy of forecasts.	This would represent a significant volume of information, and take time to produce, and it is not clear that this effort would add any value for consumers. The ESO's efforts would be better spent in focussing on improving its forecasts, developing new tools such as those which incorporate machine learning.
Deeper access coordination of 1-2 major infrastructure	Provide more detail about how projects will be identified, how the ESO will enhance workstreams with other parties, what deeper access planning will entail,	This project will no longer be explicitly set out as a deliverable, but any benefits delivered will be reported as consumer

³⁹ <https://www.nationalgrideso.com/document/159726/download>

⁴⁰ <https://www.nationalgrideso.com/balancing-data/system-balancing-reports>

projects to commence in the RIIO-1 period	and what will actually be delivered by 2020-21 (including interim milestones). Ensure that roles and responsibilities of each party are respected.	benefit case studies or stakeholder evidence as part of our reporting process.
Proposed deliverable: Improve information in the Monthly Balancing Services Summary reports	Include commentary on the broad drivers of expenditure in each category.	The MBSS is currently an automated process. Providing commentary on the reports would delay their production, and we have heard from many stakeholders that they value a timely report which consists of data rather than commentary. The daily balancing costs report ⁴¹ on the ESO data portal provides the broad drivers of the expenditure in each category.
Proposed deliverable: Publish information on incidents that are likely to have a material impact on system balancing costs	The ESO should develop a process to notify the industry of incidents likely to have a material impact on balancing costs	We agree that this information is useful: it is currently provided through the BSUoS forecasts ⁴² . We also provide a monthly balancing cost commentary to describe the key drivers of balancing costs.
Proposed deliverable: Publication of Small BMU Dispatch Report	The ESO should publish a dispatch report on the frequency of assets being selected “out of merit” in the Balancing Mechanism (BM) and the factors that contribute to this. The ESO should provide justification for why a certain unit is not being dispatched, despite being more competitive than the unit which was dispatched.	We agree that this data would be of interest to our stakeholders. We are in the process of developing an agreed definition of “skip rate” and a tool to measure this. Once there is an agreed definition, we will capture the data and consider publishing it as part of our RIIO-2 metrics.
Proposed deliverable: Identification of those products most likely to be procured via the BM	The ESO should identify and clearly define those services it is most likely to procure via the BM. The ESO should provide rationale for its decisions where an asset which is out of the merit in the BM is selected instead of procuring that service outside the BM.	The ESO’s choice of whether to procure services via the BM is dependent on system conditions at the time. In some cases, a unit may be selected for more than one reason, taking into account the different operational parameters of the units on offer. Our Roadmap publications set out the long term direction of travel for different types of products.
Metric- balancing costs	Use a simple average of expenditure over the past 5 years, and take account of the fact that the Western Link is now available.	The linear trend is used rather than a simple average as it takes account of the changing nature of operating the system. A lower benchmark would not result in different behaviour, as the ESO will continue to operate the system securely at the lowest possible cost. The availability of the Western Link is already factored in to the benchmark- please refer to the step-by-step guide to calculating the benchmark.
Metric- security of supply	Expand this metric to include excursions that occur for less time (<15 minutes for voltage and <1 minute for frequency)	Our frequency and voltage excursion data is currently published via the National Electricity Transmission System Performance Report (C17) under the licence condition required by Electricity Safety, Quality and Continuity Regulations (ESQCR), Security and Quality of Supply Standard (SQSS) and Grid Code. We also publish post event report for significant incidents or specific queries. The second by second system frequency is also available on our data portal ⁴³ . We believe that this

⁴¹ <https://data.nationalgrideso.com/balancing/balancing-services-use-of-system-bsuos-daily-cost>

⁴² <https://www.nationalgrideso.com/balancing-data/forecast-volumes-and-costs>

⁴³ <https://data.nationalgrideso.com/data-groups/system>

		frequent reporting is more valuable to stakeholders than introducing tighter criteria for reporting. As all excursions which are reported are investigated, introducing tighter criteria would create a significant increase in workload, without adding any value for our consumers or stakeholders. GC0105 proposes modifications in ESO incident reporting; this includes frequency excursions to be reported with a higher resolution. The proposal was voted by the GC review panel and has been submitted to Ofgem for a final decision. ESO has raised an alternative that just continues with the existing report methodology rather than adding to it.
Performance Indicator- CNI system reliability	Use historic data to derive benchmarks. Explain the purpose of reporting this data without setting a benchmark.	During 2020-21, we will start to collect this data more rigorously, distinguishing between planned and unplanned outages, and categorising outages by cause. We will start to publish this data in 2020-21, as we heard in RIIO-2 stakeholder groups that stakeholders wanted to learn more about the health of our systems. The benchmark will go live in RIIO-2 when we have sufficient data collected and analysed to ensure it reflects the right performance that our stakeholders are interested in seeing.
Metric- number and type of parties tendering for restoration services	Estimated restoration time would be a more appropriate measure. If the new black start standard sets an expectation for what this should be then the ESO might reasonably be expected to report on whether that expectation is likely to be met, and if it is not met, by how much.	Once a restoration standard is implemented there will be a requirement to report on estimated restoration time and so it is reasonable to assume that this metric will be developed during the Standard implementation and RIIO-2 period. The drive towards a more diverse and competitive market for Black Start is not measured by restoration times, therefore at this point in time we feel the recommended RIIO-2 metric is most suitable and does not preclude the restoration time metric being developed.
Metric- new metric	Develop new metric which measures the accuracy of constraint cost forecasting, including year-ahead, monthly and weekly measures.	We could consider building this metric into our RIIO2 plans. We will need to ensure that we do not create a methodology which is similar to our previous incentive schemes, which we moved away from due to transparency and complexity concerns.
Proposed deliverable- Clarify remaining requirements in Market Information Reports	Enhance the information included in the Market Information Reports so that outstanding requirements for any given period are presented more clearly. The ESO should develop a performance indicator that compares forecast volumes against those procured and the ESO should provide detailed explanations as to why any differences exist. The ESO should also clearly specify how it determines the volumes to be procured in each tender round, as set out in the Market Information Reports, and how those volumes align with	As a prudent system operator we are constantly reviewing our requirements, and from time to time this will result in a change to our monthly procured volumes. This is to ensure we procure on behalf of the end consumer as economically as possible, so we feel it is appropriate that we can change our requirements to respond to changing system conditions at short notice, and remain committed to being transparent with the market about this. We will communicate all changes to requirements to providers as early as possible along with explanations behind why differences exist. As for how the volumes are changing, this is due to the closer we get to real time, the more confident we are in the many

	<p>system needs presented elsewhere (such as the Operability Strategy and the Future Energy Scenarios).</p>	<p>variables that impact our requirements e.g. demand forecast, system risks, margin levels, contracted volumes from earlier procurement events. Our models for the various publications to communicate these requirements vary to reflect the differences in these inputs, and may operate on different assumptions e.g. the granularity of the FES would be far less than the market information report (i.e. based off snapshots across multiple years rather than EFA blocks across a month).</p>
<p>Metric- delivery of zero carbon operability ambition</p>	<p>Consider including metrics which measure progress towards the ESO's goal of being able to operate a carbon-free system by 2025. Explain how this could be measured or evaluated other than through milestone deliverables in RIIO-2. It would be useful to introduce this now.</p>	<p>As we develop of our RIIO-2 metrics, we will consider how best to measure our progress to being able to operate a zero carbon system. There will not be an opportunity to work with Ofgem and stakeholders to develop a suitable metric in time to introduce before RIIO-2.</p>

Role 2 feedback resulting in changes to the Forward Plan

Topic	Feedback	Changes made
Deliverables	List all deliverables from roadmaps in Forward Plan, and give more commentary around tangible results the ESO plans to deliver in 2020-21, alongside articulation of process and milestones. Provide further justification of delays.	We have added additional milestones added to the deliverable tables, and provided further details where deliverables have been delayed.
Pan-European work packages	Include more coverage about interconnector rules and methodologies, and how incremental changes improve market arrangements Provide more granularity of timelines	In relation to the Pan-EU standard products (TERRE and MARI) additional granularity of milestones and timelines have been added. Under Role 1 deliverables, further details are given for the implementation of IS change programmes required for access to European markets.
Delivery of Power responsive initiative	Give sight of smaller milestones. Explain what the ESO will do to facilitate constructive dialogue.	The high level workplan for Power Responsive is now included in the document. Specific ESO-focused development sessions will be communicated once they have been agreed with the Steering Group and the ESO teams involved.
Improving BM access for Virtual Lead parties	Provide detail of the number of Virtual Lead Parties entering the Balancing Mechanism	This deliverable has been consolidated into "Expand dispatch facility to handle a large number of small Balancing Mechanism Units" which is part of role 1. For context, we have provided the numbers of participants who have entered the BM via this route to date and will continue to keep this under review as we consider scaling our dispatch system.
Improving the way we facilitate code change	Explain how the proposed code administrator annual report will deliver additional benefits, and why this can't form part of incentives reporting. Provide more detail about "improving industry confidence in ESO code governance" deliverable- what the ESO will deliver and when, how it will better articulate its role as a code administrator; how it will make improvements to reports and how the ESO will reach a wider audience. Show how deliverables resulted from feedback received by the ESO, and explain the expected effect of these deliverables. Explain why the ESO has chosen this set of deliverables as a priority. Show how the ESO has made tangible changes to processes.	We have provided additional detail within the deliverables table in role 2.
Implement Targeted Charging Review (TCR) modifications	Provide more milestones.	More specific milestones have been incorporated into the deliverables table.
Lead code modifications	Specify what the ESO will do to lead these modifications, and provide more specific delivery dates.	We have provided more explanation within the deliverables tables.
Introduce new 'new entrant' e-learning on charging	Provide more detail around how the market will be updated, and what will be implemented in the "implementation phase"	An explanation has been provided in the deliverables table.

Capacity Market Modelling –facilitating broader participation in the CM to provide security of supply at best value for consumers	Provide more clarity around what the ESO will do, and why it has been delayed by a year.	An explanation has been provided in the deliverables table.
Capacity Market Cross Border Participation	Add deliverables to specify how the ESO will be demonstrating its progress at the identified milestones, and how it will engage with stakeholders before certain events.	<p>The Clean Energy Package requires ENTSO-E to develop a methodology to calculate the maximum capacity for cross-border participation in capacity markets. The ESO will be taking a leadership role in developing the methodology in line with the ENTSO-E plan.</p> <p>As such, the milestones in the Forward Plan reflect ENTSO-E's current timeline. We have adopted them in our Forward Plan to help provide greater visibility to the GB market of this ENTSO-E activity and propose that we use the Forward Plan tracker on our website as a means of keeping the GB market informed. We also intend to signpost the ENTSO-E activity in our 2020 Electricity Capacity Report published in Q2 2020-21.</p> <p>The methodology is due to be finalised in Q4 2020-21. By taking an active role in this work, it will help to ensure we are set up to implement the methodology in the 2021 Electricity Capacity Report (ECR) and therefore compliant with the Clean Energy Package Regulations. If we don't take an active role, then there is a risk that we are not able to update our processes in time for the 2021 ECR, potentially delaying implementation of this methodology until the 2022 ECR.</p> <p>ENTSO-E currently have an open consultation on this area with more focus on market design with high-level principles on the modelling. A detailed methodology is to be developed later this year.</p>
Optional Fast Reserve	<p>Clarify strategy for Q1 2020-21, and how this strategy was formed. Explain plans for product after Q1 2020-21. Explain how suspension of January's Fast Reserve tender round, and how this will affect the relevant roadmap(s).</p> <p>Update title to show that all Optional Fast Reserve products will eventually be procured competitively. Ensure that FR volumes that are not procured via market-based methods are competitively procured when tendering for FR services is resumed.</p>	<p>In January 2020 we launched a trial to increase our Firm Fast Reserve procurement volumes. The objective was to test the market and explore opportunities to reduce balancing costs by increased competition, providing ESO with more options for optimising costs. Due to potential conflict with Article 6(9) of the recast Electricity Regulation within the Clean Energy Package (CEP) we then took the decision in late January 2020 not to procure any further Firm Fast Reserve (until further notice) whilst awaiting more clarity around the impacts of CEP. We have continued with the trial via the Optional Fast Reserve service where we hope to gain confidence that real time operation of fast energy is available to</p>

		<p>instruct. The timeline for the reform of reserve services remains in line with our Response and Reserve Roadmap where we state that we intend to publish our proposals for the reform of reserve services by March 2021.</p> <p>Optional Fast Reserve is procured by market based methods.</p>
<p>Clarification of the interaction between the BM and other markets for system management services</p>	<p>The ESO should clarify how it will select assets via the BM given the utilisation of short-term operating reserve (STOR) and fast reserve (FR) services can now be priced dynamically. The resulting changes from the Electricity Balancing Guideline and the Clean Energy Package may mean that the distinction between the BM and reserve services is no longer clear from the perspective of the control room when selecting assets.</p>	<p>We use STOR and FR for slightly different purposes than BM actions, so even though prices can change in real-time, the principle of what we use them for should not. In real-time we will always seek to take the least cost action to secure the network.</p>
<p>Market design for reformed reserve products</p>	<p>The suspension of the FR and STOR tender rounds should not trigger further delays, especially since it was previously delayed. The market design for reformed reserve products should continue in order to meet the proposed completion date.</p>	<p>In our recent Response and Reserve Roadmap we stated that we would be looking at the reform of reserve services between now and March 2021. Although we have suspended tenders for STOR and Fast Reserve, our timeline for the reform of Reserve services remains aligned with this Roadmap. We will ensure market participants are kept informed as we assess the implications of the Clean Energy Package and our emerging short and longer term plans for our reserve products between now and March 2021.</p>
<p>Proposed deliverable: Resume Short Term Operating Reserve and Fast Reserve tender rounds having obtained necessary regulatory authorisation.</p>	<p>Secure the relevant derogation from Ofgem to recommence the STOR and FR tender rounds in Q1 2020-21 at the latest, while maintaining proposed time for reformed reserve products.</p> <p>Develop a contingency plan in case derogation is not forthcoming by Q1 2020-21, giving certainty to providers.</p> <p>Continue to develop products which comply with the Clean Energy Package, regularly engaging with market participants.</p>	<p>We continue to engage with Ofgem on our derogation requests and to understand our options on the future procurement of reserve services and develop these services in line with CEP and our roadmap. Whilst we do this we will continue to operate with the existing contracts for 2020-21 and the optional routes for STOR and Fast Reserve as well as the Balancing Mechanism.</p> <p>We will engage providers at key stages during 2020-21 as we progress through the development of our future reserve services.</p>
<p>Engaging with market participants</p>	<p>The ESO should set out how and when it intends to engage with market participants</p>	<p>This is outlined in the deliverables table, and within the roadmap document for each product type.</p>
<p>Frequency response products</p>	<p>Publish evidence supporting product design and allowing as many providers as possible to participate.</p> <p>Demonstrate that chosen options represent best consumer value (considering current and future costs).</p> <p>Focus on those designs that encourage competition across a diverse set of providers.</p> <p>If phasing out a product, develop a roadmap to explain how and when the product will be phased out, any resultant operability challenges, and how the system needs currently being met by the existing product will be met.</p>	<p>We recently ran a webinar and invited views on the development of the Dynamic Containment product, and will be taking those views on board through the next phase of work. For future products we will continue with our engagement through industry forums and other avenues.</p> <p>The design of any new product is driven by operational need in the first instance, however we will look to the industry to provide us with commercial information that will allow us to maximise participation in these new markets.</p>

		The operational needs and how they may change are communicated through the Operability Strategy reports ⁴⁴ .
Integrating intermittent generation into market frameworks	Clarify how this will be achieved in the context of balancing services	We have moved this deliverable into role 1, as it is closely linked to the Upgrade of Information Systems deliverable. We have provided an explanation in the role 1 deliverables table.
Product roadmaps for response and reserve implementation	Highlight interaction between all Balancing Services, both existing and new. Provide overview of how pathfinder projects and initiatives such as Power Responsive will be integrated into updated suite of system services products.	We have published an interactive guidance document explaining all our balancing services and how they fit together ⁴⁵ . We have also published the latest version of the Balancing Principles Statement ⁴⁶ , which explains all the services and how they are used to operate the system. Future services will be added to these documents as they become part of our normal business processes. We note that the Pathfinder projects are testing new concepts and approaches which will change as we learn, and therefore they do not have an unambiguous route to implementation. We will communicate information on the development of these projects as and when it becomes available. We also note that Power Responsive is an engagement initiative rather than a system product.
Product roadmap for reactive implementation	Provide clarity on how the ESO is meeting expectations in this area. Consider holding a technical workshop to work towards holding transparent and competitive tenders.	Please see the role 2 deliverables table, where additional information has been provided. Specific industry events will be held in Q1 2020-21.
Engagement under the Future of Balancing Services project	Add deliverables more specifically outlining engagement under the 'Future of Balancing Services' project to ensure product suitability and to help the ESO overcome barriers and difficulties in design. The ESO should engage meaningfully through technical workshops that address system and market needs outlining the requirements of the product to meet that need, and allow industry to come together to find practical solutions in collaboration with the ESO.	We are committed to engaging with the wider industry in the development of our balancing services products, and recently invited views on the new Dynamic Containment product design. Future product developments will include specific workshops and consultations, and we will be working closely with the Power Responsive campaign to engage better with smaller and non-traditional parties.
Produce plan for widening access to API (Application Programming Interface) system	Extend deliverable to stipulate that access to the web-based API will be widened, and any required industry changes will be made during 2020-21	We have added more details to the deliverable table. This has now been consolidated into the Upgrade of Information Systems deliverable within Role 1.
Implement State of Energy Signal	Take a proportionate approach when defining which assets should provide signals.	We have added more details to the deliverable table to show how we are taking a proportionate approach. This deliverable has now been consolidated into the Support access for Intermittent Generation section of Role 1.

⁴⁴ <https://www.nationalgrideso.com/publications/system-operability-framework-sof>

⁴⁵ <https://www.nationalgrideso.com/balancing-services>

⁴⁶ <https://www.nationalgrideso.com/balancing-services/c16-statements-and-consultations>

Metric- Reform of balancing services markets	Support removal of part 1 Justify how benchmarks calculated for role 2, and why they are sufficiently challenging. Publish procured volumes, as well as market spend and market price in each market. Report expenditure on a more granular basis (e.g. as per MBSS categories) rather than the six categories proposed. Report volumes and numbers of contracts (both absolute number and total MW capacity) that were not procured via competitive methods Provide commentary on changes in expenditure, volumes and number of contracts across the categories. Provide rationale for targets, including historic data. Set a more ambitious target for 2020-21.	Part 1 removed. We have added benchmarks, along with an explanation of how they have been calculated and why they are challenging. Performance is measured using metrics such as total spend and total volume procured. Where possible, we will look to include average market price paid. The intention of the metrics is to give an overview of the level of competition and transparency of our markets, and therefore we do not propose to replicate MBSS information in the Forward Plan. We will share information on competitively procured bilateral contracts at an aggregated level to avoid breaching confidentiality.
Metric- Code Administration Stakeholder Satisfaction	Include benchmarks	We have now included benchmarks, please see the metric table.
Metric- Charging Futures	Update benchmark in line with 2019-20 performance to date	We have updated the benchmarks, please see the metric table.
Metric- Provider Journey Feedback	Consider other ways of getting feedback from providers	We will report on provider feedback in the Stakeholder sections of our mid-year and end-of-year reports. Query management is now business as usual, and as STOR and FR are no longer procured there will be no providers from whom to seek feedback.

Role 2 feedback which has not resulted in changes to the Forward Plan

Topic	Feedback	Rationale for not making changes to Forward Plan
Deliverables	Based on the descriptions provided in this draft forward plan, it appears that over two-thirds of the deliverables are related to publishing plans/strategies or engaging with industry. This doesn't appear to fit with the clear stakeholder sentiment to see actual on-the-ground implementation of improved balancing and ancillary services markets	The deliverables we have chosen for 2020-21 represent important steps in the delivery of reformed products and markets. We disagree with the view that these deliverables don't show commitment to delivering actual on the ground implementation; instead, we believe that they demonstrate the steps and milestones that we will go through to implement change.
Clean Energy Package (CEP)	Include deliverables related to the ESO's activities required to comply with the Clean Energy Package, Provide a plan to show how the ESO will address and remove the derogation and become compliant with the CEP obligations.	We recognise and appreciate the feedback provided on the Clean Energy Package, in response to our draft Forward Plan. We have engaged with industry on the Clean Energy Package through the Joint European Stakeholder Group (JESG) and through publications on specific topics such as Reserve reform. We recognise that there is an industry desire for further clarity, guidance and transparency in this space.

		<p>We are planning to publish information to support industry understanding of the Clean Energy Package, to support their understanding of what is required for GB to be compliant, and to highlight risks and likely impacts. There are also a number of areas where derogations may be requested. We will summarise these areas in our report. We intend to publish this report during Q1 2020-21.</p> <p>That said, we do not believe that this is a Forward Plan deliverable. Compliance with retained EU legislation does not directly contribute toward the ESO vision, but is on par with licence and code compliance, rather than a transformational activity designed to deliver additional consumer benefit</p>
Product roadmaps for response and reserve implementation	Meet original commitments made in roadmap which do not feature in draft Forward Plan to consult and publish an implementation plan on the future frequency response products and to consult and publish a strategy for moving Optional Fast Reserve products into more competitive procurement). The ESO needs to ensure this work aligns its Clean Energy Package requirements.	We are aiming to meet the commitments we made in the Roadmap, and will align our reserve development with the CEP requirements.
Establish a 'cross party' approach to onboarding, mapping out whole industry requirements	Consider whether this could be progressed quicker in order to be more ambitious	Whilst we understand the benefits this deliverable will have and that an improved timescale for delivery would be welcomed, given current challenges faced by the team, we don't feel we can push forward our current expectation of completion (Q4 2020-21) at this time.
Report on auction trial	<p>Recommend the ESO accelerates progression to the daily auction trial, ahead of Q1 2021-22</p> <p>Necessary to enable daily and full market-based procurement of all response services, as required by the Clean Energy Package. Daily auctions provide the ESO with a tool by which response services can be procured instead of utilising MFR services. Alongside the opportunities for 'revenue stacking' that daily auctions will provide, the ESO (and network operators) should allow providers to easily transition between different services as often as they wish (ideally every settlement period).</p>	<p>We are working to understand how we can accelerate our progression to day ahead procurement of all balancing services, including frequency response. We have committed through the RIIO-2 Business Plan to move to a Single Market Platform for all balancing services by 2023, and frequency response will be the first balancing service to transition to this platform.</p> <p>In moving procurement closer to real time, however, complex and operationally critical IT systems and processes that sit behind the auction platform must be changed. These systems are invisible to providers but are essential to ensuring the security and operability of the grid.</p>
Improving customer experience	Many new programmes are targeted at supporting TNUoS charging and billing-consider rolling out these initiatives to wider ESO roles, for example a cross-party approach to on-boarding and mapping could be transposed to participation in balancing services, i.e. on-boarding new market participants with a detailed introduction to the range of products, mapping	Over the last couple of years, the ESO has improved the New Provider Onboarding process for Balancing Services, engaging with external Providers to map our Provider Journey, understand where there are issues, and make improvements.

	<p>out their interactions as well as key contractual and technical requirements or constraints.</p>	<p>One of the key deliverables in the Forward Plan for 2019-20 was to improve onboarding and we developed a Guidance Document⁴⁷, specifically designed to help brand new providers and introduce them to opportunities available to them.</p> <p>We are also currently reviewing the content and layout of our website to ensure that our stakeholders can easily access the information they require.</p>
<p>Metrics- year ahead BSUoS forecast and outturn, month ahead BSUoS forecast and outturn</p>	<p>Further detail required to understand why these metrics are challenging, as they are influenced by factors outside of the ESO's control. Explain how the ESO intends to improve BSUoS forecasts over 2020-21.</p>	<p>Please see the metric table: BSUoS forecast accuracy is important to our customers, and therefore we will continue to publish this metric. As BSUoS may be fixed in the future, we consider it inefficient to invest further in improving the accuracy of BSUoS forecasts.</p>

⁴⁷ <https://www.nationalgrideso.com/document/142161/download>

Role 3 feedback resulting in changes to the Forward Plan

Topic	Feedback	Changes made
Deliverables	Set out why the chosen set of deliverables is the optimal way to deliver most consumer benefits and the ESO's long term vision.	We have added a new introduction section for each role, which provides this information.
Deliverables	Remove deliverables with dates outside of the 2020-21 period. Add interim milestones.	We have taken this on board, and removed dates which are outside of the 2020-21 period. For all deliverables, we have included additional milestones which are within the 2020-21 period.
Early competition plan setting out implementation for models	Include all proposed deliverables from Early Competition Plan. Explain overlap with NOA roadmaps (Pathfinders). Provide commentary regarding the aims of the Early Competition Plan.	We have included high-level deliverables and a link to the Early Competition Plan document in the deliverable tables. The deliverable table also explains how Early Competition work will build on learning from Pathfinders, and explains the aims of the Early Competition Plan.
Whole System solutions	Provide an update and explanation of delay of whole system learning publication. Give a clear definition of Whole System, and explain how the interaction between transmission and distribution systems fits with wider industry changes and incentives (e.g. ENA Open Networks projects, DNO RIIO-ED2 plans) and how this interaction will be managed and co-ordinated.	Since this feedback has been received we have published the relevant paper which explains how the ESO is working with others to deliver whole system outcomes ⁴⁸ .
ENA Open Networks project	Engage with non-network stakeholders to ensure that solutions are appropriate for the whole industry	We have incorporated this feedback into the relevant deliverable. We also note that engagement with non-network stakeholders on whole system outcomes is broader than just through Open Networks and will continue to engage broadly in relevant activities.
Clean Heat	Give more detail around our strategy for Clean Heat. Clarify whether there will be any work around gas and power interactions, as well as consideration of transport sector decarbonisation policies.	We have added some more specific milestones, and further context, to the role 3 deliverables table.
Enhanced systems to facilitate balancing services from DER	Provide more detail to explain delays.	This detail has been provided in the Ongoing Regional Development Programmes section of deliverables tables, where we have re-named this deliverable as "Development of commercial arrangements for Transmission Constraint Management (TCM) service from DER" to provide more clarity of what exactly will be delivered, and provided explanations for delays.
Automated dispatch capability for generation in highly constrained areas	Provide smaller milestones for GEMS. Provide explanation of delay of "Intertripping of DER for transmission fault management" Provide more specification of DNO active network management, and smaller milestones.	We have included additional milestones in the deliverables table for all RDPs deliverables including GEMS. Explanations for delays are included in the deliverables table.
Pathfinder projects (Stability, Mersey Voltage, Pennines)	Provide smaller milestones and reasoning for delays. Make the tender/application process as transparent	Progress on our deliverables, and any delays, are recorded in our Forward Plan Tracker spreadsheet which is updated on a

⁴⁸ <https://www.nationalgrideso.com/document/163026/download>

	as possible. Demonstrate evidence of engagement and collaboration with a wider range of stakeholders.	monthly basis and uploaded to our website ⁴⁹ . Our 2019-20 reporting has explained the rationale for delays to the Mersey Pathfinder. The Constraint Management Pathfinder has been delayed due to the prioritisation of the pathfinder projects to resolve the most immediate system security issues. Visibility of interim milestones will also be given through our usual communication channels, including our newsletter and website, in order to target the appropriate audience. We will use the Stakeholder section of our mid-year and end-of-year reports to explain how we have worked with our stakeholders.
FES and other publications	Explain how the FES informs subsequent publications such as the Operability Strategy Report	We have added an explanation of this to our introduction section.
Whole System Thought Leadership	Explain further what this will mean in practice. Demonstrate how the ESO will work towards facilitating net zero by 2050, how this ambition is captured in the FES publication and other strategy documents, and how the ESO's Role 3 deliverables are linked to this ambition.	We have provided further explanation of this in the deliverables table and introduction section.
Roll out of Loss of Mains protection settings	Expand this deliverable to include actions identified by the Energy Emergencies Executive Committee into the events of 9 August. Keep the costs and the benefits of this project under review.	Any changes in the scope of the programme resulting from E3C actions will be reported in the forward plan updates. The programme already runs in a quarterly cycle with an explicit go/no go decision based on projected costs and benefits.
Network Options Assessment (NOA) process	Link the NOA to proposed market developments, including pathfinders.	We have added an explanation to our introduction section, showing how the NOA is linked to other projects.
Roll out of Loss of Mains Protection Settings	Describe how this work will contribute to consumer benefits. Savings in balancing costs which result from this work should be factored into the balancing cost benchmark. Include interim milestones, and give more visibility of the programme's progress, including implementation costs and delivery of annual benefits.	The consumer benefit associated with the Loss of Mains work is described in the Consumer Benefit section of role 3. We have factored the balancing costs savings into the 2020-21 balancing costs benchmark, please see the explanation of how this benchmark is calculated. Programme performance is reported quarterly and published on the National Grid ESO and ENA web pages: please see the role 3 deliverable table for further detail.
Metrics	Show how the metrics link to the deliverables	We have changed the format of our metrics within the Forward Plan document, so that this information is clearly set out.
Metrics- Customer value opportunities	Clarify below expectations benchmark. Explain how this measures additional value delivered by the ESO.	We have clarified this benchmark, and provided an explanation within the metric table.
Metric- Right First Time Connection Offers	Clarify benchmarks. Be ambitious and aim to get 100% of connection offers right first time.	We have clarified the benchmarks in our metrics table. Exceeding expectations is now defined as the ESO getting 100% of connection offers right first time.
Metric- Connections Agreement Management	Support removal of metric	We have removed this metric.
Metric- Right First Time Connection Offers	It is not helpful to differentiate where an error occurred in the process	The ESO will now report on "ESO" and "other" causes of re-offer, without differentiating between the "other" types. We

⁴⁹ <https://www.nationalgrideso.com/document/162046/download>

		will work with network stakeholders to agree on a suitable metric for RIIO-2.
Metric- capacity saved through operability solutions	Make clear that benefits are jointly delivered by network companies and the ESO working together	We will highlight contributions from third parties in our performance reporting.

Role 3 feedback which has not resulted in changes to the Forward Plan

Topic	Feedback	Rationale for not making changes to Forward Plan
Pathfinder projects (Stability, Mersey Voltage, Pennines)	<p>Explain cause of Mersey pathfinder reprioritisation</p> <p>Give more evidence of engagement with network operators in relation to Pathfinder projects.</p>	<p>We have provided an explanation for this in our 2019-20 Q3 report, published in January 2020.</p> <p>All pathfinders have been discussed with the network owners prior to their launch. This has involved significant discussions through the ENA, primarily on the voltage issues in the Pennines and Mersey areas. Similar discussions have taken place with the TO organisations for the voltage and stability pathfinders. We have seen this collaboration as crucial to the success of the pathfinder projects. We will report on this engagement in the stakeholder sections of our mid-year and end of year reports.</p>
Network Options Assessment (NOA) process	Include deliverables relating to the progression of the NOA process.	Publishing the NOA, and consulting upon the NOA methodology, are licence obligations, and therefore represent business as usual.
Review of engineering standards	Add in a deliverable associated with this	Although it is likely we will have a role in this, the specific requirements are not yet clear. We expect to know more in 2020-21.
Offshore co-ordination	Include deliverables relating to the ESO's role in offshore co-ordination.	Following on from Ofgem's decarbonisation plan and discussions with stakeholders, we are setting up a project to scope out and take forward work on this during 2020-21.
Metrics- Customer value opportunities	Consider whether this should be included as part of the "evidence of benefits" criteria, rather than a metric.	We will consider including a specific case study in the mid-year or end of year report for 2020-21, but believe that quarterly reporting of this metric makes it easier to track performance.
Metric- NOA consumer benefit	<p>Consider whether this should be included as part of the "evidence of benefits" criteria, rather than a metric.</p> <p>It is not clear that the baseline targets are reflective of the right balance of solutions being brought forward. The existence of a baseline may not bring forward the right solutions.</p>	<p>We will include this as a case study in the 2020-21 End of Year Report. As we have also proposed this metric for RIIO-2, we will continue to report it in the 2020-21 Forward Plan for consistency, as we believe that the RIIO-2 metrics should be a way of reporting consumer benefit.</p> <p>Forward Plan metrics are required to have a baseline. Regardless of the existence of a baseline, the ESO will only select options which are in the best interests of consumers.</p>
Metric- Whole system, Unlocking Cross Boundary solutions	Expand this metric to include volume enabled by RDPs. Provide evidence that connections included in this metric would not have happened otherwise.	This metric already measures the outcome of the Regional Development Programmes. It relates to the Appendix G process: we explain within the metric table that this is a trial run by the ESO, and without our new ways of working, the generation wishing to connect would have to wait for network reinforcements to be completed before being able to connect.

Metric- new metric	Report how many generators have had their compliance verified in the last five years	We recognise that this relates to one of the outcomes of the investigation into the events of 9 August. However, at present it is each generator's own responsibility to remain compliant, and NGENSO is only obliged to check compliance when generators first connect. If, once connected, generators are found to be non-compliant, this is dealt with individually via a Limited Operating Notification. Since the events of 9 August 2019, several actions have been identified, including adding a new requirement to the Grid Code for generator compliance to be checked on a 5-yearly basis. Once this requirement forms part of the Grid Code, we could consider introducing such a metric.
Metric- new metric	Introduce a new metric for provision of adequate models and data to other network operators and owners	We can see value in measuring the performance of the ESO in delivering models to customers, licensees and other third parties but don't think it is appropriate to view NGENSO performance in isolation. None of the data within the models is owned by NGENSO. We therefore do not believe it is appropriate to report NGENSO performance on model production at this stage but would support initiatives to improve model and data exchange performance reporting across the industry which might achieve the same result.
Metric- new metric	Add a metric which encourages close working with stakeholders to secure reduced network build solutions.	Through our pathfinder work, we follow a process which delivers the best solution for the consumer, whether this is build, reduced build or no-build. As such, we do not believe that this would be an appropriate metric.

Appendix 2: Calculation of Balancing Costs Benchmark

The following methodology is used to calculate the balancing costs benchmark. Please note that this has been re-calculated in April 2020 to include outturn data for March 2020.

Step 1: create a table of costs over the last 10 years.

Financial Year beginning	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Raw Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	941.9	1139.3	1268.4

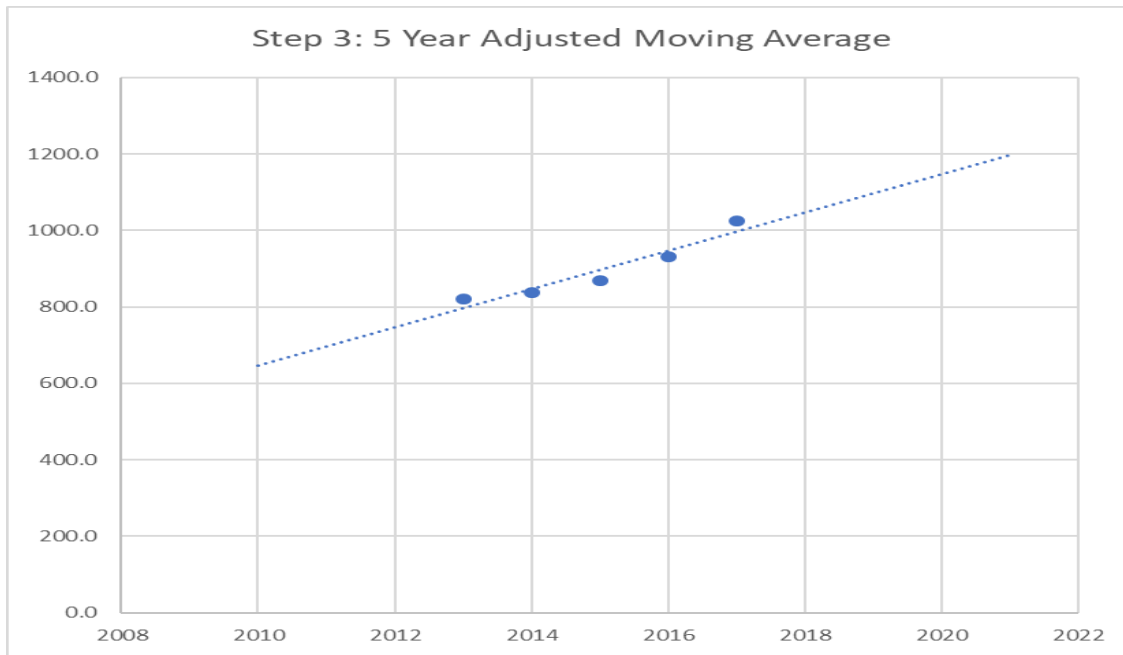
Step 2: The list of balancing costs created in step 1 encapsulates a range of operational conditions. However, when the Western Link was commissioned in 2017, it was expected to have a downwards effect on balancing costs. The raw Balancing Services Costs for each year are therefore adjusted to pre-Western Link levels, for comparison purposes. This is done by estimating the benefit derived from the Western Link. As the Western Link has only been partially operational, we have modelled the benefit it has brought.

The raw costs, the assumed Western Link benefit and the adjusted values are shown in the table below.

Financial Year beginning	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Raw Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	941.9	1139.3	1268.4
WL adjustment (£m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	19.5	26.8
Adjusted Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	945.2	1158.8	1295.2

Step 3: A linear trend line is used to forecast future balancing costs based on recent trends. In order to reduce volatility caused by year on year variability of balancing costs, a central rolling average of 5 years is applied to the data points. This is a compromise between smoothing the data and ensuring that it is not unduly influenced by historical data from time periods before issues such as RoCoF became significant.

Financial Year beginning	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Raw Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	941.9	1139.3	1268.4
WL adjustment (£m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	19.5	26.8
Adjusted Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	945.2	1158.8	1295.2
5 Year Adjusted Moving Average (£m)				821.5	836.8	868.7	930.2	1024.3		



Step 4: Calculate the line of best fit:

Slope	49.9
Intercept	-99627.6

Step 5: Project a linear trend of the 5-year moving average. The five year adjusted rolling average, and the results of projecting that forward using the best fit linear trend, are shown in the fourth and fifth rows of the table below.

Financial Year beginning	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Raw Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	941.9	1139.3	1268.4		
WL adjustment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	19.5	26.8		
Adjusted Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	945.2	1158.8	1295.2		
5 Year Adjusted Moving Average (£m)				821.5	836.8	868.7	930.2	1025.6				
Linear trend projection of 5 year moving average (£m)									1046.0	1095.9	1145.7	1195.6

Step 6: Next, a reverse adjustment is applied to return the forward looking benchmark to post-Western Link conditions: the £136.4m figure is based on the original estimates provided of the full benefit of the Western Link when fully operational. This gives the forward looking benchmark, seen in the eighth row of the table.

Financial Year beginning	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Raw Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	941.9	1139.3	1268.4		

WL adjustment (£m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	19.5	26.8		
Adjusted Balancing Cost (£m)	540.5	796.5	786.0	851.1	824.8	849.2	873.0	945.2	1158.8	1295.2		
5 Year Adjusted Moving Average (£m)			759.8	821.5	836.8	868.7	930.2	1025.6				
Linear trend projection of 5 year moving average (£m)									1046.0	1095.9	1145.7	1195.6
WL re-adjustment (£m)								3.2	19.5	26.8	136.4	136.4
Benchmark (£m)											1009.3	1059.2

Step 7: Now, add the adjustment factors which are not profiled across the year:

Energy Uplift:

Energy Uplift (£m) = Uplifted energy cost – Energy cost uplifted by the 5 year rolling average methodology

= ((Current year energy cost/previous year energy cost)*Current year energy cost) – (Current year energy cost * 5 yr rolling average uplift)

= ((488.30 / 380.82) * 488.30) – (488.3 * 1.0495)

= 626.11 – 512.47 = £113.64m (Round to £114m)

RoCoF uplift:

RoCoF uplift (£m) = ((Current year RoCoF cost/previous year RoCoF cost)*Current year RoCoF cost) – (Current year RoCoF cost * 5 yr rolling average uplift) – Loss of Mains Changes

= ((209.9 / 143.7) * 209.9) – (209.9 * 1.0495) – 10

= 306.6 – 220.29 – 10 = £76.3m (Round to £76m)

This gives a balancing cost benchmark for 2020/21 of **£1009.3m + £114.0 m+ £76.0m = £1199.3m**

Step 8: The yearly benchmark data needs to be apportioned across each month. This is done by assuming that balancing spend will be profiled across the year in a similar way to the 2019-20 spend. As the Western Link was partly unavailable during 2019-20, we remove the additional cost which is anticipated to have resulted from Western Link unavailability during 2019-20, as this should not be expected to impact on balancing costs during 2020-21.

Month	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	total
2019-20 outturn cost (£m)	80.1	60.8	85.8	67.2	105.2	107.4	130.3	86.5	130.0	144.8	148.9	121.4	1268.4
Cost resulting from Western Link	11.3	11.3	1.0	0.0	0.5	1.0	0.0	1.5	0.0	8.1	2.6	0.0	37.3

unavailability (£m)													
Assumed cost if Western Link was available (£m)	68.8	49.5	84.8	67.2	104.7	106.4	130.3	85.0	130.0	136.7	146.3	121.4	1231.1
Proportion of adjusted costs incurred in each month (%)	5.6	4.0	6.9	5.5	8.5	8.6	10.6	6.9	10.6	11.1	11.9	9.9	
Expected distribution for 2020-21 (£m)	67.0	48.2	82.6	65.5	102.0	103.7	126.9	82.8	126.6	133.2	142.5	118.3	1199.3

Step 9: Add in the ElecLink uplift of £16.5m which is profiled across the year as shown below. Eleclink sits within the ESTEX boundary, which is a constraint caused by exporting power out of the group (the South East Coast) to the rest of the system. It can be active when the interconnectors are importing from Europe to the UK in conjunction with output from conventional generation within the group and circuit outages on the ESTEX boundary. The costings are based on ElecLink commissioning in May 2020, generation outages and expected generation profiles as notified in the OC2 submissions as of February 2020 (which are required as part of Operating Code no.2 within the Grid Code). Constraint limits were produced from power flow studies of the system taking account of the 2020-21 system outage plan. The constraint costs are calculated as the Constraint Volume (MW)*£BOA/MWhr* hours the constraint is active, where £BOA is the cost of a balancing action (bid/offer acceptance).

Month	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	total
ElecLink Uplift (£m)	0.0	0.2	1.0	5.8	0.6	0.9	0.9	0.9	0.9	0.9	0.8	3.8	16.5
Benchmark for 2020-21 (£m)	67.0	48.4	83.6	71.3	102.6	104.5	127.8	83.7	127.5	134.1	143.3	122.1	1215.9

Step 10: Define benchmarks for each month, for comparison purposes: below expectations is 10% higher than calculated figure, in line with expectations is within 10% of calculated figure, exceeding expectations is 10% lower than calculated figure.

Month	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	total
Exceeding expectations (£m)	60.3	43.6	75.2	64.2	92.3	94.1	115.0	75.3	114.8	120.7	129.0	109.9	1094.3
In line with expectations (£m)	67.0	48.4	83.6	71.3	102.6	104.5	127.8	83.7	127.5	134.1	143.3	122.1	1215.9
Below expectations (£m)	73.7	53.2	91.9	78.4	112.8	115.0	140.6	92.0	140.3	147.5	157.7	134.3	1337.5

The step by step balancing costs calculation spreadsheet is also available on our website⁵⁰.

⁵⁰ <https://www.nationalgrideso.com/document/166231/download>

Appendix 3: Cost Data

	Outturn costs for 2018-19 (£m)	Forecast outturn costs for 2019-20 (£m)	Planned costs for 2020-21 (£m)
Role 1	26	22	23
Role 2	12	12	12
Role 3	15	13	13
Other costs	8	5	5

All costs in this table are consistent with the RRP 18-19 submission and the Business Plan Data Tables submitted to Ofgem on 9 December 2019. The numbers are in 18-19 prices and are all rounded to the nearest million. These costs represent business Opex costs and exclude Capex and Business Support costs. Each role has a proportion of directors' costs overlaid to represent the true cost of each role. Forecast costs refer to the current financial year (at the time of writing in March 2020), whereas planned costs relate to the activities described in this Forward Plan.

Other costs consist of Business Change, Innovation, Assurance, Regulation and Stakeholder & Customer.

It is important to note that the Regulatory Reporting Pack (RRP) remains the formal cost report for the ESO. The outturn costs for 2018-19 are taken from the 2018-19 RRP published in July 2019. The outturn costs for 2019-20 are only a forecast at this stage, and are subject to change: the final numbers will be formally reported in the 2019-20 RRP which will be published in July 2020. The planned costs for 2020-21 have already been reported in Annex 1 of the RIIO-2 business plan⁵¹, but are included here for completeness.

⁵¹ <https://www.nationalgrideso.com/document/158056/download>

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