Forward Plan Addendum 2020-21

July 2020

Introduction

In March 2020, we published the 2020-21 Forward Plan[1], which set out the ESO's plans for the 2020-21 financial year. This document included context on our long-term strategic goals, the activities we would complete (deliverables), how we would measure our performance (metrics), and how our activities would benefit consumers. The document published in March took into account the feedback we had received from stakeholders on our draft 2020-21 Forward Plan[2]. In May 2020, Ofgem published its Formal Opinion[3], setting out its view of our Forward Plan.

At the time of publishing the Forward Plan in March 2020, the COVID-19 pandemic was already starting to impact the UK, resulting in significant changes to everyone's home and business lives. We set out at the time that we would constantly be reviewing our plans, taking into account changing priorities and new ways of working. However, the plan we published was not changed to account for any impacts of COVID-19.

With the passing of time, we now have more clarity of how COVID-19 will impact our 2020-21 plans. In particular, during the first quarter of this year Ofgem wrote to us providing a framework of regulatory flexibility[4], noting the importance of ensuring that the ESO's Forward Plan is deliverable, and the opportunity provided by an evaluative incentive scheme to take account of extenuating circumstances when assessing performance. We are therefore publishing this Forward Plan Addendum, which sets out our revised view (as of July 2020) of what we will deliver during 2020-21. During the period of regulatory flexibility we shared with Ofgem a number of our deliverables were there were known impacts of COVID-19; these are clearly identified in the Addendum.

The COVID-19 pandemic has impacted on every aspect of the way we work, from how we engage with our stakeholders, to how we collaborate with our colleagues, and how we manage the interactions between our personal and business priorities. This will be equally applicable to the large number of stakeholders upon whom we rely to provide input to our projects. Naturally, this will have consequences for our ability to deliver the goals we set out for the year. Although a number of delays to projects have been specifically identified within this document, we anticipate that COVID-19 will continue to impact on our ability to deliver. As the COVID-19 situation evolves, there is a risk of further changes to project timelines: we will use the Forward Plan Tracker to provide transparency of this during the year.

We hope you find this document useful. We recommend that this is the document that the Performance Panel, Ofgem and stakeholders should use when assessing our performance, and look forward to continuing to work with our stakeholders to deliver our ambitious plan to enable the energy transition.

Fintan Slye

Director of UK System Operator

[1] https://www.nationalgrideso.com/document/166441/download
[2] https://www.nationalgrideso.com/document/164111/download and https://www.nationalgrideso.com/document/164106/download
[3] https://www.ofgem.gov.uk/system/files/docs/2020/05/ofgem_formal_opinion_2020-21.pdf
[4] https://www.ofgem.gov.uk/system/files/docs/2020/05/ofgem_response_to_eso_covid-19_impact_letter_may_2020_0.pdf

Purpose of the Forward Plan Addendum

This document aims to clearly set out what the ESO will deliver during the year, taking into account the impact of COVID-19, but does not completely replace the overall Forward Plan document. We have not made changes to the sections which describe our ESO mission, our priorities, how our activities benefit consumers, or the majority of metrics and performance indicators. This is in line with the guidance set out in the ESORI document[5], which sets out that the Forward Plan document published on 31 March will be final, with any additional changes to the deliverables or performance metrics during the year being set out in an Addendum.

We have updated the deliverables tables, to show how project timings will change as a result of COVID-19. As part of this we have taken the opportunity to address some of the feedback Ofgem provided in the Formal Opinion: Appendix 1 shows how we have done this. For transparency, we have added in a small number of deliverables which we did not complete as anticipated during the 2019-20 plan year. As a result of Ofgem's Formal Opinion, we have also updated some of our metric benchmarks to make them more ambitious. We have also made changes to the descriptions of our Balancing Costs and Energy Forecasting metrics to take account of the effects of COVID-19. Finally, we have committed to provide some additional detail as part of our regular incentives reporting: this is detailed in Appendix 1.

Please note that this document forms a complete list of all deliverables and metrics for 2020-21, and replaces these sections of the original Forward Plan. We have made modifications to the original Forward Plan document[6] to show where the deliverable tables and metric benchmarks listed there are no longer the latest version.

We will continue to use our Forward Plan tracker[7] to update on progress made during the year. The tracker has been updated to take account of the latest list of deliverables as set out in this Addendum.

[5] https://www.ofgem.gov.uk/system/files/docs/2020/03/esori_guidance_document_2020-2021_final.pdf
[6] https://www.nationalgrideso.com/document/166441/download
[7] https://www.nationalgrideso.com/document/162046/download

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Role 1

Control Centre operations

A. Role 1 Control Centre operations

A.1 Role 1 deliverables

In the table below, we set out our revised set of deliverables for this role, and identify several deliverables as priorities. Our introduction sections for each role within the main Forward Plan document explain why particular deliverables have been identified as priorities.

We have made changes since the original Forward Plan to take account of the impact of COVID-19, and where possible we have taken the opportunity to incorporate the feedback received from Ofgem as part of the Formal Opinion.

A.1.1 Summary of Role 1 deliverables

Please see table A.1.2 for a detailed description of each deliverable.

Deliverable	Original delivery date	New delivery date
Widen access to API (Application Programming Interface) system (Priority)	Q1-Q2 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	
Significant upgrading of IT systems to prepare for European Network Codes (Rolled over from 2019-20)	Q3 2019-20	Q3 2020-21
FATE-3 Project (Rolled over from 2019-20)	Q4 2019-20	Q4 2020-21
PI gateway refresh (Rolled over from 2019-20)	Q4 2019-20	Q2 2021-22
Platform for Energy Forecasting (PEF) (Priority)	Q1-Q4 2020-21	
Design Authority	Q3 2020-21	
Improving information access (Priority)	Q4 2020-21 - Q4 2025-26	
Transmission Outages, Generation Availability (TOGA) replacement (Rolled over from 2019-20)	Q4 2019-20	Q3 2020-21
More clarity of operational decision making	Q2-Q4 2020-21	
Publishing the BMU ID for trades	Dependent on P399 code change	
Deliver Power Available Phase 1 (Rolled over from 2019-20)	Q3 2019-20	Q1 2020-21
Deliver second phase of Power Available integration	Q3 2020-21	
Implement State of Energy signal	Q4 2020-21	Q3 2021-22
Inertia measurement	Q2 2020-21 - Q1 2021-22	
Deliver competitively tendered black start contracts	Q2-Q4 2020-21	Q1–Q2 2021-22
Electricity Operational Forum	Q2-Q4 2020-21	Changed format for Q2, Q3 and Q4 2020-21
ENCC visit days	Q1-Q4 2020-21	Changed format for Q1-Q4 2020-21

A.1.2 Role 1 deliverables

The table below sets out our updated view of 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 will work with flexibility across the deliverables for each role 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 tracker[8] which can be found on our website and is updated on a monthly basis.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Upgrade of information systems				
Widen access to API (Application Programming Interface) system	Q1 2020-21 (produce plan) Q2 2020-21 (widen access)		We have reviewed our approach and we are going to widen access to the API[9]. This is going to be done in two ways: • We are reviewing the applicable communication standard and will relax the size threshold (currently 100MW) for use of the API. This document, which requires Grid Code Panel approval, will be completed in September 2020. • We will allow use of the API across all market participant routes subject to the communication standards[10]. API Go-Live is expected in July 2020.	The benefit of this deliverable is to allow providers to choose their preferred communication system, 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. The scaling requirement is an ongoing process to allow a wider range of connections for market participants. Code changes are being progressed to allow for a wider range of connection options.
Expand dispatch facility to handle a large number of small Balancing Mechanism Units, subject to market take-up	Q1-Q4 2020-21		We will continually monitor and report on the number of Virtual Lead Parties (VLPs) entering the BM and will forecast the future volumes of number of market participants, prioritising and delivering the backlog of system changes and identifying system upgrades that are required to ensure the existing systems are capable of handling the increasing number of participants. 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 market participants come forward to participate.	On 23 April, Flexitricity successfully went live as the first VLP unit[11] actively participating in the BM through the Wider Access arrangements which went live in December 2019. In total, we are in conversations with 18 participants who would like to use the VLP route.

[8] https://www.nationalgrideso.com/document/162046/download
[9] https://www.nationalgrideso.com/document/170896/download
[10] https://www.nationalgrideso.com/document/33331/download, *Commissions Standards*, issue 6.
[11] https://www.flexitricity.com/blog/another-flexitricity-first-balancing-mechanism/

Deliverable	Original delivery date	Target delivery date	Description	Further context
	Q1 2020-21		Creation of additional data storage capability for existing BM dispatch system.	We have 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. We will report the number of connected VLPs in our quarterly incentives reports.
	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		Commence 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 Electricity National Control Centre (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		**New Interconnector (IC) connections/ revised IC systems:** The commissioning of each new interconnector is the culmination of several years of work to agree operating processes with the interconnector and connecting TSO, and to deliver the necessary IT systems. There is an IT programme that manages all the interconnector changes, both for new interconnectors and developments to existing ones, such as the introduction of increased intraday gates on Nemo and BritNed last year. Each project in the programme has its own plan and progress is regularly reviewed at programme board meetings. Changes to plans are also managed through these board meetings. We have shared with Ofgem the key milestone summary plan for all imminent connections and planned system changes for existing interconnections. Please note that this plan contains commercially sensitive information. We will deliver Interconnector system changes for IFA2, commissioning in Q3, and other Interconnectors going live in 2021-22, increasing the amount of clean energy the UK can exchange with Europe. We will also introduce updates to aid intraday market changes for one existing interconnector and to set up intraday markets for two	**New IC connections/ revised IC systems:** NGESO has set up a dedicated IT programme team to design, develop and test the IT systems required for a new IC connection, prior to commissioning. The team must also perform substantial coordination with their counterparts from within the Interconnector Owner and System Operator. A corresponding NGESO resource will develop the Framework Agreements in parallel. These agreements define the operating rules and commercial contracts for each interconnector. Examples include the Operating Protocol (OP) and a Balancing and Ancillary Services Agreement (BASA). The task of connecting two different markets is often highly complex and meetings are held at least on a monthly basis. **IC engagement:** For operational interconnectors, each operational and commercial agreement is regularly reviewed with the interconnector owner and connecting TSO, via the Interconnector Operating Panel (IOPs) meetings. Operationally, there are also quarterly trilateral Interconnector Strategy Meetings where we review recent operations and any forthcoming changes, for example

Deliverable	Original delivery date	Target delivery date	Description	Further context
			new interconnectors; this will increase flexibility for market participants We are aiming to introduce efficiencies by aligning processes between interconnectors, enabling new commercial services, and streamlining our IT systems. **IC engagement:** We will hold regular meetings to collect customer feedback and carry out satisfaction surveys to measure our performance. It is also recognised that with the development of each additional cross border project, the role and significance of interconnectors evolves. In order to better understand the future operational impact of interconnectors we will engage further with the industry in Q2 2020 to gather views and work collaboratively to develop a target post-2025 interconnector model. **IC curtailment & consultation:** The European Network codes include methodologies for calculating Net Transfer Capacity (NTC). We continue to develop a commercial mechanism to hold parties neutral at times when NTC must be reduced for system security reasons. NGESO has previously established an industry working group and published a consultation for the methodology to calculate compensation. NGESO intends to complete this work before the go-live of the central European platform for calculating NTC. Ofgem recently rejected proposed changes to the Procurement Guidelines required to implement final arrangements, therefore pausing the process while the points of policy are clarified. The exact implementation timescales will be subject to review with industry stakeholders once Ofgem has clarified to NGESO the outstanding topics. It is anticipated that a more detailed consideration of the wider social and economic impact of capacity management will be one of the required milestones.	new services, outages etc. Any operational concerns will be raised in these meetings. **IC curtailment & consultation:** We regularly review our policy on the use of Intraday Trading Limits (ITLs) - the current tool for managing interconnector capacity for system security (e.g. a Rate of Change of Frequency - RoCoF event). More widely, we are working with the Loss of Mains Protection programme to minimise the frequency of RoCoF issues and reduce the need to manage interconnector capacity. The Stability Pathfinder will also provide alternative solutions to deal with such risks.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Significant upgrading of IT systems to prepare for European Network Codes	Q3 2019-20 (in 2019-21 Forward Plan)	Q3 2020-21	Significant upgrading of IT systems to prepare for European Network Codes.	The ESO was granted a derogation from Ofgem in respect of project TERRE, which was valid until the end of June 2020. **COVID-19 impact:** The impact of COVID-19 has now delayed the forecast go-live to Q3 2020-21 at the earliest.
Frequency and Time Equipment version 3 (FATE-3) Project	Q4 2019-20 (in 2019-21 Forward Plan)	Q4 2020-21	We will improve our frequency monitoring tool and update our current information system to FATE-3.	The FATE-3 project has a dependency on new phasor data infrastructure and establishing a connection to Scottish Power Transmission. Our Inertia Monitoring projects also require this, so we have adjusted the timing of the FATE-3 project such that it will be delivered in line with when the new infrastructure is available to use. The new timing also aligns with the availability of new data centres, hence optimises code development for FATE-3. (Rolled over from 2019-20)
PI gateway refresh	Q4 2019-20 (in 2019-21 Forward Plan)	Q2 2021-22	Upgrading of systems to transfer data from Scottish TOs.	The PI Gateway project has completed software development with our software supplier and has all test environments in place. Delivery was delayed due to difficulties aligning suppliers and stakeholders, and due to the requirement to make changes to equipment, causing a delay from Q4 2019-20 to Q2 2021-22. The existing PI link can be maintained until we further upgrade our systems, hence we have now delayed this project. (Rolled over from 2019-20)
Platform for Energy Forecasting (PEF)	Q1 2020-21 Q2 2020-21 Q3 2020-21 Q4 2020-21		We will publish a new version of the Energy Forecasting Strategic Project Roadmap by 30 June 2020. The previous version, from June 2019, is published on our website[12]. We will publish additional energy forecasts to the market: 2-14 days ahead national demand forecast 2-52 weeks ahead national demand forecasts Within day-14 days wind power forecasts.	We will include our high-level modelling approach, and the methodologies and forecasting accuracy improvements made so far, in the Roadmap. We are fully committed to deliver PEF and the associated deliverables. ESO's strategic forecasting cloud, PEF, is underpinned by scalable and flexible technology hosted on an advanced cloud platform. The team use the advanced cloud computation power to run tens of thousands of concurrent models using some of the latest machine learning, deep learning and reinforcement learning integrated with statistical approaches. Our advanced cloud platform enables us to: • Simultaneously process large datasets, models and computations to make the end to

[12] https://www.nationalgrideso.com/document/145941/download

Deliverable	Original delivery date	Target delivery date	Description	Further context
				end forecasting process ~80% quicker than the earlier non-cloud-based forecasting system. • Make use of latest data by regularly re-training (updating) approximately 10 deep learning & machine learning models for each grid supply point (GSP). • Compute predictions every hour, for each settlement period up to 14 days ahead. This cloud platform enables us to do forecasting on the near future weather data to correct for errors in weather forecasting The use of this technology will enable more accurate energy forecasts to be transparently available to the control room and the open market. This approach is essential for timely delivery of predictions which are as accurate as possible. In a decentralised system, this will be critical to achieving cost- and carbon-efficient residual balancing. This is made more difficult because much of the embedded renewable generation is not controlled centrally, but rather locally by market participants primarily based on cost and weather. Further enhancements to national demand (machine learning) and development of wind power generation forecasting modelling approach and methodologies will be progressed in line with the updated PEF roadmap published in June 2020. In the updated roadmap[13], we have included our high-level modelling approach, methodologies and forecasting accuracy improvements made so far.
Design Authority (DA)	Q3 2020-21		We will launch the DA in Q3 2020-21, in preparation for RIIO-2. This is a key enabler for our zero-carbon and trusted partner ambitions.	Starting the DA this year is a key enabler for successful delivery of our RIIO-2 plans. The DA[14] was proposed in our RIIO-2 Business Plan. It will provide stakeholder input, transparency and accountability into our process, system and technological transformation. 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)[15].

[13] https://data.nationalgrideso.com/backend/dataset/b290ba7c-8076-4122-9e83-de723e1e5425/resource/6573bd88-c17c-41d8-b4d1-6ae89d796e40/download/ngeso-pef-energy-forecasting-strategic-roadmap-june-2020-update.pdf
[14] https://www.nationalgrideso.com/document/158051/download, pp. 43.
[15] https://www.nationalgrideso.com/about-us/business-planning-riio/eso-riio-2-stakeholder-group

Deliverable	Original delivery date	Target delivery date	Description	Further context
				The DA mobilisation has already commenced, and we are looking to establish this group in Q3 as per the original plan. The DA will challenge, guide and steer the mobilisation of the major programmes, the first elements to be presented will be the strategic roadmaps currently being derived.
Improving information access	Q4 2020-21 and ongoing to be delivered in RIIO-2		Foundation work for data analysis platform, involving auditing current data flows and designing new platform for RIIO-2 and making all published ESO data available via the ESO data portal.	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.
Data platform Strategy	Q4 2020-21		The timescales of Data Platform Strategy are: • Digital and Data Strategy – Q3 2020-21 • Data Roadmap and Investment Plan – Q4 2020-21 • Data and Analytics Systems Architecture – Q3 2020-21 • Data Foundation project (begin implementation of the foundational elements of the architecture – Q3 2020-21	Until we have the necessary infrastructure to efficiently publish new datasets at a large volume, we are focusing on the datasets most valuable to our stakeholders as our first step. We are not reliant on stakeholders coming forward, we have been engaging with stakeholders to prioritise new datasets in the short term due to the required infrastructure not being available to efficiently publish all of our data.
Data Portal Enhancements	Q4 2020-21		Improve the existing ESO Data Portal based on stakeholder engagement	Details of how we intend to proceed with this deliverable (including roadmap) are included in annex 4 of the RIIO-2 plan (p40).
Data portal expansion	Q3 2022-23		Further work in the RIIO-2 plan	Informed by stakeholder engagement sessions and Energy Data Taskforce best practices, we will be making several enhancements to the ESO Data Portal in 2020-21. This will include new features such as a subscription service to provide notifications for dataset updates and a data dictionary to support understanding of our datasets. As set out in the RIIO-2 plan[16], where appropriate, we will also be migrating automated data feeds to the ESO Data Portal and converting datasets to a machine-readable format so that they are accessible through the API.
Data platform foundation implementation	Q3 2022-23			
Data platform expansion	Q3-Q4 2025-26			
Master data management implementation	Q4 2021-22			
Transmission Outages, Generation Availability (TOGA) replacement	Q4 2019-20 (in 2019-21 Forward Plan)	Q3 2020-21	Following stakeholder engagement to understand user requirements, we will be developing the TOGA system replacement. This tool incorporates two systems: TOPAM (Transmission Outage Planning And Monitoring) that customers and TOs use to request system access and GOAMP (Generator Outage And Maintenance Planning) that generators use to information the ESO of their availability.	This project is delivering in an agile way. The requirements for TOPAM replacement have expanded in complexity during the design phase and detailed analysis for each release and sprint to incorporate requests from external stakeholders and deliver a minimum viable product. In addition to this, we have been progressing an OC2 code change to support Generator Outage And Maintenance Planning (GOAMP) replacement - GC0130. Go-Live has been delayed to align with internal and external views around operational commitments and the desire to avoid peak

[16] https://www.nationalgrideso.com/document/158051/download, pp. 122.

Deliverable	Original delivery date	Target delivery date	Description	Further context
				outage season. We are now targeting a functional Go-Live date in November 2020 across the TOGA replacement system. (Rolled over from 2019-20)
Transparency of data used by our ENCC in our close-to-real-time decision making				
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. It is an enabler for our trusted partner ambition. 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 system constraints 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. Until we have the necessary infrastructure to efficiently publish new datasets at a large volume, we are focusing on the datasets most valuable to our stakeholders. In addition to publishing the information that will be required by P399, we have identified a number of other options that could help improve the transparency of our trading actions, including changes to the presentation, location and accessibility of existing published information, as well as additional information that is not currently made available. Our intention is to discuss these ideas with wider industry and give our counterparties and market participants the opportunity to tell us what would be most helpful to them. We will use this information to prioritise our actions and to create a timeline for delivery. While social distancing measures due to COVID-19 are in place, we will engage with our stakeholders via regular webinars rather than holding Operational Forums.
	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[17]		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 P399 code change. We will provide updates on this deliverable in our Forward Plan tracker.
Support access for Intermittent Generation				
Deliver Power Available	Q3 2019-20	Q1 2020-21	Integration of Power Available into energy calculations to improve ENCC visibility of Power Park Modules	Testing of the new product revealed additional work to ensure a reliable

[17] https://www.elexon.co.uk/mod-proposal/p399/

Deliverable	Original delivery date	Target delivery date	Description	Further context
integration phase 1	(in 2019-21 Forward Plan)		returning from Bid Offer Acceptances (BOAs) and high-wind shutdown.	product. This required additional time to resolve. (Rolled over from 2019-20)
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.	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. The PA 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. Delays in implementing Phase 1 have caused a knock-on impact to the delivery of Phase 2.
Implement State of Energy signal	Q2 2020-21 Q4 2020-21	 Q3 2021-22	Jointly publish the outcome of the operational trial Define and implement a state of energy signal from limited-energy assets (such as batteries) into the Control Room to give visibility of the remaining energy.	We are continuing to work with Market Participants (MPs) on the information /data they should provide to facilitate their participation in the market. Where framework changes are required to take into account battery and other distributed resource, consideration will be given to preparing the code changes for wider industry roll out. The learning through operational experience and industry dialogue will continue, and be further supplemented by operational trials. We are committed to transparency on the outcomes of the aforementioned work. We have recently conducted an Operational Trial with a Market Participant with BM connected battery technology. The result of the trial will be jointly published in Q2 2020-21 and shared with industry **COVID-19 impact**: This deliverable is delayed as key ENCC and CNI resources are required to implement TERRE and other high priority IT system changes. Thus, this deliverable is delayed due to reprioritisation of the key business areas. Full implementation of this project is now expected in Q3 2021-22.
Whole system operability				
Inertia measurement	Q2 2020-21 (first supplier)		Implement novel tools to measure system inertia in real-time which will significantly improve the accuracy of	Inertia monitoring is the ESO's responsibility, as total system inertia has a direct impact on the ability of the network

Deliverable	Original delivery date	Target delivery date	Description	Further context
	Q1 2021-22 (second supplier)		measurement 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. To increase inertia management accuracy, two suppliers are currently working on different methods to provide the first operational installations. We have experienced programme delays due to issues with integration with existing systems, resulting in an anticipated delivery date of Q2 2020-21 for the first solution. 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 Measurement project (SIM) final report[18].	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. 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. A more accurate and frequently updated inertia measurement will provide additional constraint information which reduces 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. We will use inertia measurement to support and refine our inertia forecasting techniques by validating the existing calculation methods against the measured value.
Product Roadmap for Restoration implementation				
Deliver competitively tendered black start contracts	Q2 2020-21	Q1-Q2 2021-22	Award contracts to successful parties for South West/Midlands tender.	We will be awarding contracts to successful parties for the South West / Midlands and Northern Tenders and then supporting those parties through the process before they start delivering the contracts. 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. **COVID-19 impact**: The tendering process for Black Start contracts cannot be effectively carried out due to assurance requiring site visits which are not possible due to COVID-19. We now expect to complete this deliverable in Q1-Q2 2021-22.
	Q3 2020-21	Q1-Q2 2021-22	Award contracts to successful parties for Northern tender.	
	Q4 2020-21	Q1-Q2 2021-22	Carry out preparatory work for future tender opportunities in South East, in preparation for future tender event.	
Electricity Operational Forum and stakeholder engagement				

[18] https://www.smarternetworks.org/project/nia_ngso0015

Deliverable	Original delivery date	Target delivery date	Description	Further context
Electricity Operational Forum	Q2-Q4 2020-21	Changed format and delivered throughout the year.	This stakeholder event that aims to provide operational information is currently on hold following UK government's advice on COVID-19. We are holding weekly ENCC webinars instead.	This is a baseline activity for the ESO. We will revisit throughout the year and react to the feedback from market participants. The onsite forum is currently on hold during lockdown. To maintain stakeholder engagement and increase information transparency, we will carry out weekly ENCC webinars instead.
ENCC visit days	Q1-Q4 2020-21	Changed format and delivered throughout the year	This stakeholder event aims to monthly open door to market participants to the ENCC to learn about system operation. While social distancing requirements are in place, we will hold weekly ENCC webinars instead.	We recognise that this is a routine activity, but we note that stakeholders have found these sessions valuable. The onsite visits are currently on hold during lockdown. To maintain stakeholder engagement and increase information transparency, we will carry out weekly ENCC webinars instead.

A.2 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

For metrics 1a (Balancing cost management) and 1b (Energy forecasting accuracy), our performance will be impacted by the measures implemented by the ESO to manage the changes in energy demand resulting from the COVID-19 pandemic. We explain this within the descriptions of these metrics.

We have also updated the benchmarks for metric 1e (Customer Value Opportunities) to take into account the feedback provided within Ofgem’s Formal Opinion.

A.2.1 Role 1 metrics for 2020-21

Metric Name	**1a Balancing costs**[19]
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: • Lower bills than would otherwise be the case
How is performance measured? How will this metric show performance above baseline expectations?	We note that, during the period where demand is impacted by the COVID-19 pandemic, the ESO's balancing costs spend is expected to be significantly higher than the benchmarks stated here. During this period, we will continue to report our performance in comparison to the benchmark, but will focus on providing a detailed narrative which explains the costs we have incurred. We also welcome Ofgem's review of costs incurred over the summer period, and will be as transparent as possible with our stakeholders about the actions we have taken. We note Ofgem's comments on the way our benchmarks are constructed, and would welcome the opportunity to work with Ofgem to create a revised benchmark which can be applied in the future. 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. 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. 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

[19] The metric benchmark has been reviewed due to the delayed commissioning of Eleclink, and the description has been updated to refer to the expected impact of COVID-19.

	as Connect and Manage, renewable support schemes and faults 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 Balancing Services Incentives Scheme (BSIS) model, which stakeholders did not find to be sufficiently transparent. 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. 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. We also make adjustments for significant changes 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 new trends in market behaviour. For 2020-21, we have applied the following adjustment factors: • **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 Short Term Operating Reserve (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. 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 calculations[20]. Please note that the benchmarks were re-calculated in July 2020 to remove the ElecLink adjustor since the interconnector go-live date has been delayed.
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.

[20] https://www.nationalgrideso.com/document/166231/download

	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 / Oct** Exceeding expectations (£m): 60.3 / 43.4 / 74.4 / 58.9 / 91.8 / 93.3 / 114.2 In line with expectations (£m): 67.0 / 48.2 / 82.6 / 65.5 / 102.0 / 103.7 / 126.9 Below expectations (£m): 73.7 / 53.0 / 90.9 / 72.0 / 112.2 / 114.0 / 139.6 **Month / Nov / Dec / Jan / Feb / March / Total** Exceeding expectations (£m): 74.5 / 114.0 / 119.9 / 128.3 / 106.4 / 1079.4 In line with expectations (£m): 82.8 / 126.6 / 133.2 / 142.5 / 118.3 / 1199.3 Below expectations (£m): 91.1 / 139.3 / 146.5 / 156.8 / 130.1 / 1319.3
Benchmark- exceeding expectations	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. 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.
Benchmark- in line with expectations	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. 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.
Benchmark- below expectations	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. 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.

Benchmark calculations and comparison to previous years.	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. 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. Please see Appendix 2 for details of how the benchmark and adjustments are calculated. Historic data[21] for 2019-20 is provided here:

	Apr	May	Jun	Jul	Aug	Sep	Oct
Benchmark cost (£m)	83.2	97.5	75.3	85.6	87.4	96.6	103.3
Additional cost forecast due to WHVDC fault (£m)	11.3	11.2	1	0	0.5	1	0
Benchmark adjusted for WHVDC (£m)	94.5	108.7	76.3	85.6	87.9	97.6	103.3
Outturn cost (£m)	80.1	60.8	85.8	67.2	105.2	107.4	130.3

2019-20 Monthly balancing cost benchmark and outturn.

	Nov	Dec	Jan	Feb	Mar	Total
Benchmark cost (£m)	98.4	91	82.6	81.9	81.1	1063.9
Additional cost forecast due to WHVDC fault (£m)	1.5	0	8.1	2.6	0	37.2
Benchmark adjusted for WHVDC (£m)	99.9	91	90.7	84.5	81.1	1101.1
Outturn cost (£m)	86.5	130.0	144.8	148.9	121.4	1268.4

[21] The diagram was updated on 21 April 2020.

Metric Name	**1b Energy Forecasting Accuracy[22]**
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?	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: • Lower bills than would otherwise be the case • Reduced environmental damage
How is performance measured? How will this metric show performance above baseline expectations?	Day Ahead Demand forecasting: • 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 accurately, and this has become one of the biggest causes of error in daytime demand forecasts. As installed Solar PV capacity increases, daytime 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 accuracy seen in previous years. • Demand forecast errors are driven by many different factors such as the weather forecast error and society factors. The some of 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). Weather forecast error has been an increasing factor because of the increasing amount of renewable generation installed both at the distribution level and the transmission level. The error in the demand forecast comes from a combination of these factors. The magnitude of the demand forecasting error is not proportional to the level of demand seen on the transmission system, and so a forecasting performance metric that measures forecasting error as a percentage of demand is not appropriate because it would put greater emphasis on forecasting accuracy during times of low demand. In addition, a percentage error measure would incentivise the ESO to focus

[22] The metric has been reviewed due to COVID-19 impact.

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.

The COVID-19 pandemic has caused the demand levels to be unprecedently low. ESO has designed a new product, Optional Downwards Flexibility Management (ODFM) which, when enacted, increases transmission connected demand by curtailing distribution connected generation.

At the time of the day ahead demand forecast calculation (8:45am), no decision has been taken on whether ODFM will be used on the following day.

When the demand outturn occurs, the exact volume of ODFM is known, and the outturn demand is higher than it would otherwise have been, with the difference being the volume of ODFM that was enacted.

Moreover, even if the decision on ODFM had been known at the time of the morning day ahead forecast, it would be counter-productive to include the volume in the day ahead forecast, as it would give a false signal to the market on the tightness of downward flexibility.

Therefore, ESO will retrospectively account for the ODFM volumes in the day ahead forecast on the days when ODFM was used (for the relevant Cardinal Points).

When monthly mean absolute error is reported for the purpose of indicative performance monitoring, ESO will account for the ODFM volumes in the following way:

Days on which ODFM not used	No change to the current reporting
Days on which ODFM used	In calculating the error, retrospectively add the volume of ODFM (in the relevant half hours and Cardinal Points) to the national demand forecast. This will increase the adjusted forecast relative to the published forecast, bringing it into line with the national demand outturn, which itself was increased by the ENCC action.

Day Ahead BMU Wind Generation forecasting:

- 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.
- 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.

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

<table>
<tr><td></td><td>forecasts. We have defined criteria for exceeding, in line with and below expectations with reference to these annual benchmarks.

To provide an indication of the ongoing performance of the energy forecasting metrics, each month we will publish the monthly mean absolute 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.

Each month, we will report our performance for the previous month as detailed above, and against the benchmark for the year to date.

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.</td></tr>
<tr><td>Benchmark- exceeding expectations

Benchmark- in line with expectations

Benchmark- below expectations</td><td>Energy forecasting benchmark metrics:

• Day ahead demand annual mean absolute error: 571MW[23]

• Day ahead wind annual percentage error: 5.27%[24]

<table>
<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>

This translates into the following criteria for exceeding, in line with and below expectations[25]:

<table>
<tr><td>Energy forecasting metric</td><td>Day ahead demand forecasting</td><td>Day ahead wind forecasting</td></tr>
<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>
</table>
</td></tr>
<tr><td>Benchmark calculations and comparison to previous years.</td><td>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).</td></tr>
</table>

[23] Updated in April 2020 to take into account March 2020 outturn figures.
[24] Updated in April 2020 to take into account March 2020 outturn figures.
[25] Updated in April 2020 to take into account March 2020 outturn figures.

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[26]

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

[26] Updated in April 2020 to take into account March 2020 outturn figures.

Feb	6.16	5.46	4.63
Mar	5.35	5.44	5.82[27]

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[28]

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[29]

There appears to be some evidence that some wind farms, especially the ones 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

[27] Updated in April 2020 to take into account March 2020 outturn figures..
[28] Updated in April 2020 to take into account March 2020 outturn figures.
[29] Updated in April 2020 to take into account March 2020 outturn figures.

	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.

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?	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: • Improved safety and reliability • Benefits for society as a whole
How is performance measured? How will this metric show performance above baseline expectations?	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. <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. <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. 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.
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.	*Table 4 – Voltage and Frequency excursions* 2014-15 / 2015-16 / 2016-17 / 2017-18 / 2018-19 Voltage excursions: 6 / 0 / 0 / 3 / 2 Frequency excursions: 0 / 0 / 0 / 0 / 0 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.

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?	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. 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: • 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?	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. 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. 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.
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[30]
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?	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. 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 Distribution Network Operators (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: • Lower bills than would otherwise be the case
How is performance measured? How will this metric show performance above baseline expectations?	This metric captures the customer savings from the following ESO activities: • 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. 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. The MWh values of energy saved are calculated as follows: • 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)

[30] The metric has been reviewed following the feedback in Ofgem's Formal Opinion and further conversation with Ofgem on 23 June 2020.

	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. We note that there are some aspects of this metric where NGESO 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.
Benchmark- exceeding expectations	Total savings >15,000GWh
Benchmark- in line with expectations	Total savings between 12,500GWh and 15,000GWh
Benchmark- below expectations	<12,500GWh
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%. Ofgem's Formal Opinion feedback indicated that some of our metric benchmarks should be more ambitious. We have reviewed the feedback provided by Ofgem, and made changes to our benchmarks for metric 1e (Customer Value Opportunities) to take account of last year's performance, and make the benchmarks more challenging. The total outturn customer value created from both direct and indirect savings in 2019-20 was 11,518 GWh. We add a 10% increment of 11,518 GWh to work out our baseline of 12,500 GWh. We further stretched this target to 15,000GWh as the benchmark for exceeding expectations.

A.2.2 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: • Improved safety and reliability • Improved quality of service

How is performance measured?	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 ± 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. 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.

Planned CNI System Outages (mins)				
	Q1	Q2	Q3	Q4
BM				
IEMS				
Unplanned CNI System Outages (mins)				
	Q1	Q2	Q3	Q4
BM				
IEMS				

Role 2

Market development and transactions

B. Role 2 Market development and transactions

B.1 Role 2 deliverables

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

We have made changes since the original Forward Plan to take account of the impact of COVID-19, and where possible we have taken the opportunity to incorporate the feedback received from Ofgem as part of the Formal Opinion.

B.1.1 Summary of Role 2 deliverables

Please see table B.1.2 for a detailed description of each deliverable.

Deliverable	Original delivery date	New delivery date
Implement the first new frequency response product (priority)	Q1 2020-21	Date is being revised
Consult on future frequency response products (priority)	Q1 2020-21	Date is being revised
Report on auction trial (priority)	Q2-Q3 2020-21	
Market design and implementation plan for reformed reserve products (priority)	Q1-Q4 2020-21	Date is being revised
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 - Q2 2021-22	
Power Potential trial with UKPN (priority)	Q1-Q4 2020-21	Q3-Q4 2020-21
Review learning from Power Potential (priority)	Q3-Q4 2020-21	
Deliver innovation projects to unlock demand flexibility (Rolled over from 2019-20)	Q4 2019-20	Q2 2020-21
Incorporation of all 14 Code Administrator Code of Practice (CACoP) Principles (Rolled over from 2019-20)	Q3 2019-20	Ongoing
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	Q1-Q4 2020-21	

Deliverable	Original delivery date	New delivery date
Supporting the Access Significant Code Review (SCR)	N/A	Q3 2020-21 and ongoing
Lead code modifications	Q3-Q4 2020-21	
Balancing Services Charges Task Force	Q1 2020-21	Q2 2020-21
Capacity Market Modelling - Cross-border participation in capacity markets	Q1-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.1.2 Role 2 deliverables

The table below sets out our updated view of 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 will work with flexibility across the deliverables for each role 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 tracker[31], which can be found on our website and is updated on a monthly basis.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Product Roadmaps for Response and Reserve implementation				
Implement the first new frequency response product	Q1 2020-21	Date is being revised	Buy Dynamic Containment.	**COVID-19 impact**: we announced delays to Dynamic Containment in our 'Update on impact of COVID-19 on ESO projects' document[32] in March. Experts working on the project needed to be redeployed to focus on short term operability challenges. We are currently reviewing our plan for Dynamic Containment and aim to share a re-baselined plan with industry in July when the project team reconvene. The re-baselined plan will take into account further engagement on the product design and allow sufficient time for participant onboarding.
Consult on future frequency response products	Q1 2020-21	Date is being revised	Consult with the industry on the design of future frequency response products beyond Dynamic Containment.	**COVID-19 impact**: as this deliverable is dependent on the plan and delivery of Dynamic Containment, this has also been delayed. The outcomes from our engagement on the design principles for Dynamic Containment will be applied across the new suite of frequency response services. Providers will have the opportunity to engage with us further on the design of the new suite of response services in the coming months. The publication of an implementation plan for the final suite of services is dependent on ESO resource availability due to COVID-19 impacts, and the outcome of feedback from stakeholders on Dynamic Containment. A revised date will be shared with industry when the Dynamic Containment project team reconvene.

[31] https://www.nationalgrideso.com/document/162046/download
[32] https://www.nationalgrideso.com/document/168216/download

Deliverable	Original delivery date	Target delivery date	Description	Further context
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.	We continue to see the 100MW cap met in many Electricity Forward Agreement (EFA) blocks, and higher prices than in Firm Frequency Response (FFR), as expected in a new market. Analysis and a review of the first six months, along with a review of the 20MW cap, will be shared externally in Q2 2020-21.
	Q3 2020-21		Trial separate procurement of low frequency (LF) and high frequency response (HF) services.	
	Q3 2020-21		Publish plan for day ahead procurement and consult on enduring auction design.	
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.	**COVID-19 impact:** we are expecting a delay to the reserve reform work. We have previously communicated that we are 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. As TERRE go live has been delayed until October 2020 in response to COVID-19, this has had a knock-on impact on the delivery of reformed reserve products. Skilled subject matter resource in commercial, operational and technical teams that would have been involved in the analysis, modelling, market engagement and detailed technical development work for the new reserve products have necessarily been called upon to support with the development and delivery of immediate operational solutions to meet the challenges of unprecedented low demands, such as Optional Downwards Flexibility Management (ODFM). This has had a consequential impact on the resource available to take forward this deliverable. We will progress this deliverable once we have more clarity on these areas.
	Q1 2020-21	Date is being revised	Consult on strategy for more competitive procurement of optional fast reserve.	
	Q4 2020-21		Study impact of completed reforms and consult on further development of reserve services.	
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 and MARI to allow Great Britain parties to participate.	**COVID-19 impact**: we have advised the industry that because of the COVID-19 pandemic we cannot proceed with the TERRE go live in June 2020. To ensure the safety of our employees and the focus on the continual delivery of our core operations, we have segregated the shift teams across the control rooms and returned expert control users from projects to operational duties. As a result, we have reduced availability for User Acceptance Testing and Go-live transition. We now anticipate going live in October 2020.
	Q2 2020-21	Q3 2020-21	TERRE go live.	

Deliverable	Original delivery date	Target delivery date	Description	Further context
			MARI external milestones we are following: • Grid Code and Balancing and Settlement Code changes • Start of parallel run • Go live	For MARI, we are starting the process of code modifications and fully participating in the central project.
	Q1 2020-21 Q3 2020-21 Q2 2022-23			
Product Roadmap for Reactive implementation				
Publish our strategy for the future of reactive power	Q3 2020-21 Q2 2021-22	.	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. Procurement publication, communicating the next steps on reactive procurement.	Due to COVID-19, engagement will now take the form of webinars to progress the future of reactive power during Q2 – Q3 2020-21. 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. 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. Our product roadmap will outline our approach to reactive procurement and the timelines to achieve this. Based on the lessons learned across projects that involve voltage and reactive power, engagement with the industry, and the publication of a strategy, we will provide further updates on how reactive power procurement may develop during 2021-22. .
Power Potential trial with UKPN	Q1-Q4 2020-21	Q3-Q4 2020-21	Innovation project in partnership with UKPN aiming to create a new reactive power market for Distributed Energy Resources (DER) and generate additional capacity on the network.	**COVID-19 impact**: NGESO and UKPN have confirmed to the project participants that the Power Potential trial calendar has been delayed to a September start date. This reflects the need to re-plan site visits for installation and commissioning of DER equipment in light of COVID-19 priorities.
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 NGESO and UKPN will decide if and how this project could evolve into Business as Usual.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Power Responsive				
Deliver innovation projects to unlock demand flexibility	Q4 2019-20 (in 2019-21 Forward Plan)	Q2 2020-21	Work with industry stakeholders through collaborative projects to understand the role of smaller scale assets and technology innovation in unlocking greater flexibility, to identify and unlock barriers to entry and maximise opportunities for accessible, competitive markets	We have been working with a number of companies through the Residential Response Network Innovation Allowance (NIA) Project. This project is looking at the various barriers to providing frequency response from domestic assets, such as metering, prequalification, and portfolio management. The project team recently presented the work and initial findings at the ENA Innovation Forum in February 2020. (Rolled over from 2019-20).
Improving the way we facilitate code change				
Customer focussed communications	Q1 2020-21 Q1 2020-21 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: • Launching easier to read industry emails with a subscription tool that enables users to quickly manage their communication preferences • Publish a Code Administrator annual report; a report for our stakeholders providing more detail on how we're performing, our improvements and what changes mean for them	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 Connection and Use of System Code modifications, 22 Grid Code modifications, 1 System Operator Transmission Owner Code modifications & 3 Security and Quality of Supply Standard modifications (total 72). We were disappointed in the Code Administration Code of Practice (CACoP) survey results published in October 2019. We summarised our views and findings in a communication to industry in November 2019, which can be found on our website[33]. 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

[33] https://www.nationalgrideso.com/document/156551/download

Deliverable	Original delivery date	Target delivery date	Description	Further context
				industry. We have carefully selected the deliverables, as these are the areas that industry told us they wanted us to improve on.
Incorporation of all 14 Code Administrator Code of Practice (CACoP) Principles	Q3 2019-20 (in 2019-21 Forward Plan)	Ongoing	Adoption of all 14 CACoP principles in a robust manner whilst supporting the development of modifications.	Two modifications were raised in March to facilitate the 14th CACoP principle; sandboxing. Due to congestion from high priority modifications, they were given a low priority. The modification will proceed in line with the Panel's decision on where it sits in terms of a priority against other modifications. We anticipate that this will not be progressed with any urgency at this stage. We therefore do not have any control over the speed in which it progresses. (Rolled over from 2019-20).
Onboarding process for new industry parties	Q2-Q3 2020-21 Q2 2020-21 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: • 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 • 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.	

Deliverable	Original delivery date	Target delivery date	Description	Further context
			We will deliver the following incremental improvements to our service:	
	Q1 2020-21		• Better articulating the 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	
			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:	
	Q1 2020-21		• 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		• The whole team capable of writing our documents in Plain English reinforced though documented feedback from industry.	
	Q3 2020-21		• All web pages refreshed to reflect Plain English style.	
	Q4 2020-21		• 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	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: • Regular Forums • Webinars • Podcasts • Summary notes • Charging Futures website.	

Deliverable	Original delivery date	Target delivery date	Description	Further context
Services Charges				
Transform the customer experience for network charging				
Publications and guidance of the impact of charging reform to our customers	Q4 2020-21 Q3 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. Provide industry with regular updates on the changes and impact that TCR will have to processes and deliverables, and ensure that guidance and publications are aligned to any changes.	
Introduce new 'new entrant' e-learning on charging	Q1-Q4 2020-21 Q1 2020-21 Q2 2020-21 Q3 2020-21 Q4 2020-21		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 BSUoS and TNUoS methodologies introduced through TCR. We aim to complete the following milestones: • Publish an updated webinar for connection charges • Publish an updated webinar for BSUoS charges • Develop workshops on the topics selected by the customers as part of the Charging Forum event • Publish an updated webinar for TNUoS charges with a focus on new charging methodologies introduced by TCR.	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.
Improve the digital customer experience for TNUoS, BSUoS and Connection Charging Data; including improvements to existing NGESO billing system to	Q1 – Q4 2020-21 Q1 2020-21		We are investigating options for updating our systems, and have a clear drive to put customer functionality at the heart of any new products. Our intent is to deliver the following milestones: • We will complete the review of the current	We note that this work 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.

Deliverable	Original delivery date	Target delivery date	Description	Further context
improve user experience			systems, data requirements and the information we currently provide externally, taking into account the TCR decisions. • 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. • Enter the implementation phase.	
	Q2 – Q3 2020-21 Q4 2020-21			
Establish a 'cross party' approach to onboarding, mapping out whole industry requirements	Q1 – Q4 2020-21		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.	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 RIIO-2 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.
	Q1 2020-21		Agree the approach and scope for the joint-up onboarding guidance with ELEXON	
	Q2 2020-21		Engage with customers, seeking their feedback and suggestions on the onboarding process.	
	Q3 2020-21		Begin drafting the guidance documents.	
	Q4 2020-21		Finalise and publish the guidance, incorporating the finalised new TNUoS and BSUoS charging methodologies.	
Transform industry frameworks to enable decentralised, decarbonised and digitised energy markets				
Implement Targeted Charging Review (TCR) decision in conjunction with DNOs	Q4 2020-21 Sub milestones delivery dates are information only		Raise and implement Connection and Use of System Code (CUSC) modifications to support the TCR. The key milestones for delivering the TCR are:	In order to prepare for TCR implementation in 2021 and 2022, modifications have been raised for the TCR. We have proactively been engaging with DNOs, Elexon and industry to create a delivery plan. This has been done bilaterally, and through webinars and workgroups, which will continue into 2020-21.
	Q1 2020-21		• Working groups complete development of modifications and submit to Ofgem	
	Q1 2020-21		• ESO to produce preliminary cut of bands	
	Q1 2020-21		• CUSC and DCUSA modifications approved by Ofgem	
	Q2 2020-21		• Designated party set final bands	
	Q4 2020-21		• TNUoS go-live.	

Deliverable	Original delivery date	Target delivery date	Description	Further context
Supporting the Access Significant Code Review (SCR)	Q4 2022-23 Q1 - Q2 2020-21 Q1 - Q2 2020-21 Q1 - Q3 2020-2021 Ongoing		Supporting the Access SCR by: • Providing modelling for TNUoS related reforms • Providing data to feed into Ofgem's consumer benefit analysis • Leading on various elements of the Access SCR subgroups • Supporting Ofgem in their policy development.	This deliverable was omitted in error from our original Forward Plan. Our support for the Access SCR has continued through from last year. There has been an increase in support in recent months to provide TNUoS modelling and inputs to Ofgem's CEPA modelling. The SCR is to be implemented in April 2023.
Lead code modifications	Q3 - Q4 2020-21		Leading and implementing code modifications on key areas, such as: • 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. The target delivery date for these modifications refers to when the modifications are expected to conclude, including the relevant regulatory decisions.	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. 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). 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.
Balancing Services Charges Task Force	Q1 2020-21	Q2 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. **COVID-19 impact:** We have agreed with Ofgem to pause the BSUoS Task Force for three months due to industry resource already being stretched while responding to COVID-19. We expect to resume the task force in July 2020 and conclude in September 2020.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Capacity Market Modelling - Cross-border participation in capacity markets	Q4 2020-21		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:	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.
	Q1 2020-21 Q2 2020-21 Q3 2020-21 Q4 2020-21		• ENTSO-E (European Network of Transmission System Operators) Task Force begins • Draft methodology will be developed • ENTSO-E consultation. • Methodology will be finalised.	ENTSO-E currently have an open consultation on this area, with more focus on market design and high-level data on modelling. A detailed methodology is to be developed later this year.
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	Q1-Q4 2020-21 Sub milestones delivery dates are indicative only		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.	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 was delayed as the working group had to resolve legal concerns regarding the provision of the data. 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. This is separate from the EMR portal, which is impacted by COVID-19.
	Q1 2020-21		DCUSA approve DCP350 and recommend it is approved by the Authority.	
	Q2 2020-21		Expect the Authority to approve the modification.	
	Q2-Q3 2020-21		Expect data to be published. We will then need to assess, process and analyse the data to determine potential options for evaluating embedded generation de-rating factors directly from embedded data.	
	Q3 2020-21		Agree with BEIS, Ofgem and the Panel of Technical Experts (PTE) on whether it is appropriate to change how we determine de-rating factors for embedded generation using this data.	
	Q4 2020-21		Consult on potential changes with industry as required in the Capacity Market rules.	
	Q4 2020-21		Implement for the 2021 Electricity Capacity Report. Note – The indicative timeline may be revised when we develop and agree project scopes with BEIS, Ofgem and the PTE as part of the EMR development project process. Potential risks have been set out in	

Deliverable	Original delivery date	Target delivery date	Description	Further context
			Appendix 1. We will provide updates to the industry via the Forward Plan tracker.	
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.	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 website[34].
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.	Due to restrictions on movement and large gatherings, we are looking to develop and run alternative virtual content in the absence of physical events.

[34] http://powerresponsive.com/category/events/

B.2 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.

We have made changes to the benchmarks within metrics 2a and 2b, and the descriptions within metrics 2a, 2b and 2c, since the original Forward Plan which was published in March 2020. This is to take account of the feedback received from Ofgem in its Formal Opinion. These changes are explained within the metric tables.

B.2.1 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	• 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: • 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. It is important to note that the volume of balancing services that we procure is generally fixed, and therefore for those products which are almost entirely competitively procured (e.g. frequency response), there is very little scope to shift more volume into those markets. This means that any increase in competition in those markets will lower the ESO spend, and therefore reduce the percentage. This is why we have set benchmark percentages for highly competitive markets as we have, to allow for a level of movement. We will present the data in a similar format to the 2019-20 reporting, but will include targets. In response to Ofgem's Formal Opinion, we have updated our benchmarks for the procurement of reserve. The benchmarks are in line with proposals from Ofgem's RIIO-2 consultants. More information can be found in Appendix 1.

Benchmark- exceeding expectations

Benchmark- in line with expectations

Benchmark- below expectations

	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 50% and less than 60%	50% 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%

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, with the exception of Reserve where we have subsequently adjusted the targets in response to Ofgem's Formal Opinion.

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 RIIO-2?	Continuation of 2019-21 metric
Relevant deliverables	• 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?	This metric measures whether we are improving the Code Administration service we provide to industry. This is linked to the following consumer benefit outcome: • Improved quality of service
How is performance measured? How will this metric show performance above baseline expectations?	We measure our performance through: • Ofgem annual Code Administration Code of Practice (CACoP) survey • ESO led stakeholder surveys benchmarked with our previous scores 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. We have updated our CACoP benchmark to align with average code administration performance in the 2020 CACoP survey to mitigate against any future market wide trends, therefore the exact benchmark score will not be available until the 2020 survey is completed. For illustration, based on 2019 CACoP survey, average stakeholder satisfaction across the ESO's 3 codes would need to be within the range of 58-65 to be in line with expectations.
Benchmark- exceeding expectations	• CACoP – Performance above 5% of the average stakeholder satisfaction score across all code administrators for the 2020 CACoP survey, across all our three codes. • ESO led stakeholder surveys – increased performance by at least 5% above our baseline score.
Benchmark- in line with expectations	• CACoP - Performance (within +/-5%) of the average stakeholder satisfaction score across all code administrators for the 2020 CACoP survey, across all three of our codes. • 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	• CACoP – Performance below 5% of the average stakeholder satisfaction score across all code administrators for the 2020 CACoP survey, across all our three codes. • ESO led stakeholder surveys – performance below our baseline score by at least 5%.
Benchmark calculations and comparison to previous years.	Historic CACoP scores for our codes:

Year	CUSC	Grid Code	STC
2019	43	46	44
2018	65	66	58
2017	47	59	49

Historic ESO led stakeholder survey scores -

Workgroup score for 2019-20: 7.34

Workgroup score for 2018-19: 6.93

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 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	• 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: • 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	• Average scores from surveys undertaken throughout the year are more than 5% higher than the baseline score. Stakeholder satisfaction score of 8.3 or above.
Benchmark- in line with expectations	• Average scores from surveys undertaken throughout the year are within the range of +/-5% of the baseline score. Stakeholder satisfaction score of between 7.4-8.2.
Benchmark- below expectations	• Engagement scores achieved throughout the year fall more than 5% below the baseline score. Stakeholder satisfaction score of 7.3 or below.
Benchmark calculations and comparison to previous years.	The baseline score for 2020-21 is the average feedback score received throughout the performance year 2019-20, not including survey results for webinars where the main content is not led by National Grid ESO[35]. 2020-21 baseline stakeholder satisfaction score (based on 2019-20 performance) – 7.8 2019-20 baseline stakeholder satisfaction score (based on 2018-19 performance) – 7.3

[35] These stakeholder satisfaction scores have been updated to reflect the finalised scores, as published in the 2019-20 end of year report. The end of year report can be downloaded from our website here: https://www.nationalgrideso.com/our-strategy/forward-plan/how-were-performing

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?	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 premium 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: • 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?	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. 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. 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. 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. 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. Next year's BSUoS forecast is £3.52/MWh.
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.	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%. For 2019-20 we forecast a BSUoS charge of £3.07/MWh.

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?	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 how to price their generation. The better the forecast, the lower the risk premium that needs be added to the wholesale price, and therefore accurate forecasts lower the cost for the end consumer. This is linked to the following consumer outcomes: • 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 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. 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. Our monthly BSUoS forecasts are published on our website[36] two to three weeks ahead of the start of the month to which they refer. We produce the monthly reports 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.
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%.

[36] 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 Role 3 deliverables

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

We have made changes since the original Forward Plan to take account of the impact of COVID-19, and where possible we have taken the opportunity to incorporate the feedback received from Ofgem as part of the Formal Opinion.

C.1.1 Summary of Role 3 deliverables

Please see table C.1.2 for a detailed description of each deliverable.

Deliverable	Original delivery date	New 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	Q4 2020-21
Defining roles and responsibility for voltage management across the transmission-distribution interface (Rolled over from 2019-20)	Q3 2019-20	Q3 2020-21
Stability pathfinder (priority)	Q4 2020-21	Q2 2021-22
Mersey Voltage pathfinder: Project recommendations (priority)	Q1 2020-21	
Pennines Voltage pathfinder (priority)	Q2-Q4 2020-21	
Constraint Management Pathfinder (priority): Complete the request for information	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, including completion of work with WPD and UKPN	Q2-Q4 2020-21	
RDPs: Develop the Generation Export Management Scheme (GEMS) in South West Scotland to manage transmission constraints	Q2-Q4 2020-21	
Support BEIS and industry in developing a strategy for clean heat	Q1-Q4 2020-21 and ongoing	
Active engagement in the development of DSO and co-ordinated flexibility markets including cross-sector considerations	Q3 2020-21	

Deliverable	Original delivery date	New delivery date
Voltage needs identification tools/ processes	Q4 2020-21 and 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.1.2 Role 3 deliverables

The table below sets out our updated view of 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 will work with flexibility across the deliverables for each role 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 tracker[37] which can be found on our website and is updated on a monthly basis.

Deliverable	Original delivery date	Target delivery date	Description	Further context
Whole system operability				
Lead the Loss of Mains Protection setting programme	Q2 2020-21 and ongoing		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 (ENA) webpages. This will include 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 and Ofgem reports 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 Power Disruption Implementation Group.	We will address all 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. Once all actions as described in the reports are completed at the end of April 2020, we will progress the industry codes actions through the normal industry code governance processes.
Implement approach for efficient reactive power flows between networks	Q1 2020-21	Q4 2020-21	Having worked with network owners to design a whole system approach to managing reactive power flows between networks, implement that approach.	**COVID-19 impact**: resources have been allocated to higher priority short term operability, which included additional work due to COVID-19. Once resource can be re-allocated, higher priority medium to long term operability work which will deliver greater consumer value, specifically voltage and stability pathfinders, will be progressed ahead of this work. At this point the earliest realistic date for a conclusion is Q4 2020-21. Further updates will be provided in the Forward Plan tracker. 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

[37] https://www.nationalgrideso.com/document/162046/download

Deliverable	Original delivery date	Target delivery date	Description	Further context
				reactive power management would look like, and how it may be implemented.
Defining roles and responsibility for voltage management across the transmission-distribution interface.	Q3 2019-20 (in 2019-21 Forward Plan)	Q3 2020-21	Working with DNOs to optimise voltage on a whole system basis: • Short-term operational solutions • Transmission – distribution reactive power performance measures	Proposals have been developed for additional information exchange and action in the planning process. Agreement on some issues is outstanding, meaning conclusions have been delayed to 2020-21. (Rolled over from 2019-20)
Pathfinder projects				
Stability pathfinder	Q4 2020-21	Q2 2021-22	Assessing a range of commercial and network solutions to meet system stability needs. We will 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.	**COVID-19 impact**: Our ability to deliver a complex tender is being tested by remote working. The pace and continuity that we maintain with the TO organisations and in support of customers is more difficult and slower than would otherwise be the case. We recognise that is also likely to be the case for those participating in the tender, hence some delay time has been introduced by COVID-19. Also, with resources stretched across the industry, we want to understand if the timeline for this project still allows stakeholders sufficient opportunity to participate. On 17 June, we issued an RFI[38] to invite feedback on the proposed process and timelines. Responses are requested by 15 July 2020. 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 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 Q2 2021-22.
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	**COVID-19 impact:** There is little or no COVID impact to date, but that may change when the tender starts and participation in the tender increases. The date of the second milestone is

[38] https://www.nationalgrideso.com/research-publications/network-options-assessment-noa/network-development-roadmap

Deliverable	Original delivery date	Target delivery date	Description	Further context
			publish the invitation to tender and award contracts to successful parties.	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-Q2 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's consumers as the electricity network evolves.	We will complete the request for information (RFI) stage of the Constraint Management pathfinder during Q1-Q2 2020-21; this allows other pathfinders resolving system security issues to be prioritised. Taking into account the results received from the RFI, we will then make a decision as to whether it is in the best interests of consumers to run a tender process. 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		Consult with industry on detailed models for Early Competition.	Further supporting our ambition of competition everywhere, throughout 2020-21 we will be developing our Early Competition Plan[39]. This follows on from Ofgem's ask in the May RIIO-2 Sector Specific Methodology Decision[40] and their further letter[41].
	Q2 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).	The Early Competition Plan will facilitate competition to meet system needs from parties delivering asset-based solutions in 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.
	Q3 2020-21		Provide written update to Ofgem on progress to date.	
	Q4 2020-21		Submission of final Early Competition Plan to Ofgem,	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. The interim milestones for this deliverable have been amended since we published the Forward Plan in March to allow us to provide timely updates to Ofgem. The date for the submission of the final Early Competition Plan has not changed.

[39] https://www.nationalgrideso.com/document/164036/download
[40] https://www.ofgem.gov.uk/system/files/docs/2019/05/riio-2_sector_specific_methodoloy_decision_-_eso.pdf
[41] https://www.ofgem.gov.uk/system/files/docs/2019/09/electricity_system_operators_early_competition_plan_letter_0.pdf

Deliverable	Original delivery date	Target delivery date	Description	Further context
NOA: Enhanced communication				
Improve accessibility of Electricity Ten Year Statement (ETYS) and Network Options Assessment (NOA) publications	Ongoing		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 will be through RFI packs, which are supported by webinars.	
	Ongoing		Enhancements to information in ETYS, to include requirements for a wider set of system needs and more detail on existing system needs.	
	Ongoing		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.	
Regional Development Programmes (RDPs)				
Development of commercial arrangements for Transmission Constraint Management (TCM) service from DER	Q3 2020-21		Commercial framework for DER TCM developed with UKPN.	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 Distributed System Operator (DSO) and distribution flexibility markets. This will be developed in co-ordination with the work undertaken in Open Networks work stream 1A in 2020. 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. They are therefore subject to delays, as 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[42].
	Q4 2020-21		Delivery plan for DER TCM within UKPN RDP area published.	
	Q2 2020-21		Commercial framework for DER TCM developed with WPD.	
	Q3 2020-21		Delivery plan for DER TCM within WPD RDP area published.	

[42] https://www.nationalgrideso.com/publications/regional-development-programmes

Deliverable	Original delivery date	Target delivery date	Description	Further context
Co-ordinated DER inter-tripping functionality for transmission fault management. Including completion of work with WPD and UKPN.	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 projects, 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. There are three projects ongoing which have a range of delivery dates depending on the 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 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 Active Networks Management (ANM) 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	This phase will trial service conflict principles between ESO and DNO ANM operation. Design and implementation are 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. They are therefore 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[43].
Whole System thought leadership				
Support BEIS and industry in developing a strategy for clean heat	Q1-Q4 2020-21 Ongoing		Hold meetings at least quarterly to advise BEIS on the implications of clean heat pathways for the operation of the Whole Energy System. Develop a fuller understanding of how the Whole Energy System	We will provide updates as part of our quarterly reporting when engagement begins again with BEIS. Building on our work to define a Clean Heat goal, we have re-defined this part of our

[43] https://www.nationalgrideso.com/publications/regional-development-programmes

Deliverable	Original delivery date	Target delivery date	Description	Further context
	Q3 2020-21		might be operated under different clean heat pathways; working with the Gas System Operator. Share and test thinking on Clean Heat pathways with networks and industry.	mission of “A whole system strategy that supports net zero by 2050”. How are we working with BEIS? 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. 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. How do the dates align with legislation? We work closely with BEIS to understand their timeframes, so that our work provides as much value as possible to the policy development process. 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 programme of work to achieve that. This aligns with the goal stated by BEIS to have a clean heat strategy by 2025. 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 Future Energy Scenarios (FES) work we explore different deployment scenarios, and through our Clean Heat work we explore the implications of these for system operation. What different technologies are we considering? 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. How does this link to other sectors? 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.
Active engagement in the development of DSO and co-ordinated flexibility markets including	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 we will continue to ensure a cross-sector representation including non-network stakeholders.	This deliverable reflects the Open Networks 2020 work programme. Ofgem’s work on DSO is expected to continue throughout 2020-21. Ofgem’s consultation on the electricity distribution sector methodology (RIIO-ED2) is currently expected in July 2020.

Deliverable	Original delivery date	Target delivery date	Description	Further context
cross-sector considerations			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 Ongoing		Document and test voltage needs identification tools / processes for inclusion in the NOA methodology. Identify up to three geographic areas for further evaluation. Continuous improvement of the tools & processes.	Further milestones identified are: • 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. Should the proof of concept be successful, further work will be required during RIIO-2 to embed this into business as usual.
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. This deliverable was previously referred to as Customer Connections Portal: its new title provides a clearer description of what will be delivered.
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.

Deliverable	Original delivery date	Target delivery date	Description	Further context
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[44], the Summer Outlook, Winter Outlook and Winter Review and Consultation will be published by National Grid Gas Transmission. National Grid ESO will contribute to these publications.
Winter Outlook	Q3 2020-21		We will contribute to this National Grid Gas Transmission publication, providing our data and analysis for the upcoming winter.	
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.	As a result of travel restrictions, this year's launch conference will become a virtual event.

[44] https://www.nationalgridgas.com/news/changing-our-gas-transmission-organisation-arrangements

C.2 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:

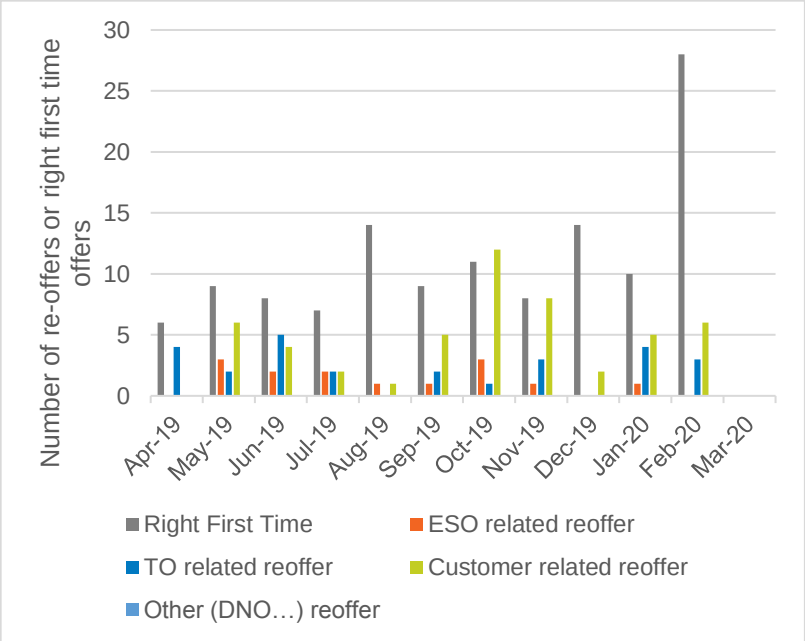
- 3a: Right first time connection offers
- 3b: NOA consumer value
- 3c: Customer connections- customer satisfaction

Performance indicators:

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

C.2.1 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?	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. This is linked to the following aspects of consumer benefit: • 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?	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.
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.	The graph below shows our performance to date during 2019-20. Our year to date performance is now 92%.


Number of re-offers or right first time offers
30
25
20
15
10
5
0
Apr-19
May-19
Jun-19
Jul-19
Aug-19
Sep-19
Oct-19
Nov-19
Dec-19
Jan-20
Feb-20
Mar-20
Right First Time
ESO related reoffer
TO related reoffer
Customer related reoffer
Other (DNO…) reoffer

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?	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: • 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?	Although running the NOA is a licence obligation, the extent to which we seek alternatives to TO-led solutions exceeds baseline activities. 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: • ESO exclusive options • ESO collaborative options • TO exclusive options 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. 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. 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.

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 comparison to previous years.	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 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?	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. This is linked to the following types of consumer benefit: • 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?	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. 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.
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.2.2 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?	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. 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. 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. 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. This is linked to the following types of consumer benefit: • Reduced environmental damage • Lower bills than would otherwise be the case • Improved quality of service • Benefits for society as a whole 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.

<table>
<tr><td></td><td>However, Performance Indicator 3d only measures the outcome of the Appendix G process.</td></tr>
<tr><td>How is performance measured?</td><td>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.

<table><tr><td>Grid Supply Point (GSP)</td><td>MW</td><td>Commentary on DER technology types</td></tr><tr><td></td><td></td><td></td></tr><tr><td>Total</td><td></td><td></td></tr></table></td></tr>
<tr><td>Comparison to previous years</td><td>Last year’s outturn figures (in MW) were:

<table><tr><td></td><td>Q1</td><td>Q2</td><td>Q3</td><td>Q4[45]</td></tr><tr><td>UKPN</td><td>49</td><td>5.5</td><td>N/A</td><td>-166.34</td></tr><tr><td>WPD</td><td>367.17</td><td>746.52</td><td>147.31</td><td>-0.7</td></tr></table></td></tr>
</table>

[45] Q4 figures added in since the original publication of the Forward Plan

<table>
<tr><td>Performance Indicator Name</td><td>3e Future balancing costs saved by operability solutions</td></tr>
<tr><td>Reporting frequency</td><td>Quarterly</td></tr>
<tr><td>Role</td><td>3</td></tr>
<tr><td>Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?</td><td>New performance indicator from RIIO-2</td></tr>
<tr><td>Relevant deliverables</td><td>• Pathfinder Projects
• Regional Development Programmes
• Whole System Operability</td></tr>
<tr><td>Link to ESO ambitions</td><td>• An electricity system which can operate carbon free</td></tr>
<tr><td>How does it benefit consumers?</td><td>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:

• Constraint management pathfinder
• Voltage pathfinder
• Stability pathfinder

This metric will therefore relate to the following category of consumer benefit:

• Lower bills than would otherwise be the case</td></tr>
<tr><td>How is performance measured?</td><td>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.

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.

<table>
<tr><td>Year</td><td>2021-22</td><td>2022-23</td><td></td><td></td><td></td></tr>
<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>
</table>
</td></tr>
</table>

	Total savings (£m)					

<table>
<tr><td>Performance Indicator Name</td><td>3f Capacity saved through operability solutions</td></tr>
<tr><td>Reporting frequency</td><td>Quarterly</td></tr>
<tr><td>Role</td><td>3</td></tr>
<tr><td>Continuation of 2019-21 performance indicator, or new performance indicator from RIIO-2?</td><td>New performance indicator from RIIO-2</td></tr>
<tr><td>Relevant deliverables</td><td>• Regional Development Programmes</td></tr>
<tr><td>Link to ESO ambitions</td><td>• An electricity system which can operate carbon free
• Competition everywhere</td></tr>
<tr><td>How does it benefit consumers?</td><td>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.

We are 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.

This metric will therefore relate to the following category of consumer benefit:

• Lower bills than would otherwise be the case
• Benefits for society as a whole
• Reduced environmental damage</td></tr>
<tr><td>How is performance measured?</td><td>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.

<table>
<tr><td>Year</td><td>2021-22</td><td>2022-23</td><td></td><td></td><td></td></tr>
<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>
</table>
</td></tr>
</table>

Appendix 1: Our response to Ofgem's Formal Opinion

We have reviewed the feedback given by Ofgem in their Formal Opinion[46]. In many cases, we will address this feedback via our regular incentives reports. In other cases, we have taken the opportunity to amend the deliverables and metrics tables to accommodate the feedback received. However, there are also some cases where it is not practical to make a change resulting from the Formal Opinion feedback: in these cases, we explain our rationale within this appendix. In order to reduce the length of this document, Appendix 1 is contained in a separate document, which can be found on our website[47].

[46] https://www.ofgem.gov.uk/system/files/docs/2020/05/ofgem_formal_opinion_2020-21.pdf
[47] https://www.nationalgrideso.com/document/173111/download

Appendix 2: Calculation of Balancing Costs Benchmark

The following methodology is used to calculate the balancing costs benchmark. Please note that this was re-calculated in April 2020 to include outturn data for March 2020, and subsequently in July 2020 to reflect the delay to the Eleclink interconnector.

We note that the ESO's balancing costs spend is expected to be significantly higher than the benchmarks stated here during the period where demand is impacted by the COVID-19 pandemic. During this period, we will continue to report our performance in comparison to the benchmark, but will focus on providing a detailed narrative which sets out the costs we have incurred.

We note Ofgem's comments on the way our benchmarks are constructed, and would welcome the opportunity to work with Ofgem to create a revised benchmark which can be applied in the future.

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 unavailability (£m)	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
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: 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	43.4	74.4	58.9	91.8	93.3	114.2	74.5	114.0	119.9	128.3	106.4	1079.4
In line with expectations (£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
Below expectations (£m)	73.7	53.0	90.9	72.0	112.2	114.0	139.6	91.1	139.3	146.5	156.8	130.1	1319.3

The step by step balancing costs calculation spreadsheet is also available on our website[48].

[48] https://www.nationalgrideso.com/document/166231/download

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