

## **RIIO-2 Draft Determinations – Electricity System Operator**

### **Technical Annex: Updated ESO Delivery Schedule**

## **Purpose of this document**

We requested further information from the ESO as part of our assessment of its Business Plan. This document, referenced in chapter 3 of the RIIO-2 Draft Determinations – Electricity System Operator Annex (ESO Annex), sets out two tables provided by the ESO. These cover: (1) the breakdown of its costs at an activity level; and (2) the ESO's updated Delivery Schedule. This has been used to provide an initial grading of the ESO's Delivery Schedule for the first business plan period from March 2021 to April 2023. Please see Chapter 3 of the ESO Annex for more details.

The ESO noted that following the submission of the RIIO-2 Business Plan in December 2019, they had begun detailed delivery planning. As part of that process it was looking across all aspects of delivery planning including project dependencies, technology, people and capability, external engagement and dependencies, frameworks and codes changes and process changes. For the ongoing (continuous) activities in the business plan it does not have year-by-year deliverables.

The ESO also noted that delivery planning has been adversely affected by current Covid-19 working arrangements and the resulting operational priorities of the experts in the ESO who are required to contribute to the planning process. However, it aimed to have further outputs from this process to share in Summer 2020. In addition, the ESO noted that all delivery milestones in the RIIO-2 Business Plan will be under review in the delivery planning process to assess any impacts of Covid-19-related delays to projects that are scheduled for delivery in 2020-21.

## Activity Cost Data

Sub activity		21/22		22/23		Role
		Opex	Capex	Opex	Capex	
A1.1	A1.1 Commercial operations and strategy - Commercial Operations	1.84	0.00	1.82	0.00	Role 1
	A1.1 Commercial Operations and Strategy - Commercial Strategy	1.69	0.00	1.66	0.00	Role 1
	A1.1 Commercial operations and strategy - Modelling and Insight	1.83	0.00	1.80	0.00	Role 1
	A1.1 Control centre architecture and systems - ongoing	22.79	5.30	22.57	6.28	Role 1
A1.2	A1.2 & A1.4 Control centre architecture and systems - transformational	3.04	14.60	4.58	19.23	Role 1
A1.3	A1.3 Control centre architecture and systems - transformational	0.45	3.35	1.35	9.10	Role 1
A10	A10 Support decision making for investment at distribution level	0.00	0.00	0.08	0.00	Role 3
A11	A11 Enhance our analytical capabilities to support these activities (A8 & A11)	0.91	3.04	1.08	3.04	Role 3
A12	A12 Review SQSS	0.17	0.00	0.25	0.00	Role 3
A13	A13 Leading the debate (Ongoing Activities - A13.1 and A13.3)	1.21	0.00	1.19	0.00	Role 3
	A13 Leading the debate (Ongoing activity A13.2 re providing energy analysis and market insights to drive the energy transition)	1.30	0.00	1.29	0.00	Role 3
	A13 Leading the debate (Transformational - A13.4 and A13.5)	1.15	0.00	1.30	0.00	Role 3
A14	A14 Take a whole electricity system approach to connections (A14.4 connections hub)	0.72	0.72	0.77	0.72	Role 3
	A14 Take a whole electricity system approach to connections (Ongoing Activities - A14.1 and A14.2 )	3.37	0.00	3.32	0.00	Role 3

	A14 Taking a whole system approach to connections (A14.3 Customer experience)	0.34	0.00	0.34	0.00	Role 3
A15	A15 Taking a whole energy system approach to promote zero carbon operability (Ongoing Activities - A15.1 to A15.5)	3.97	2.93	4.31	3.15	Role 3
A15.10	A15.10 Develop a regime for Integrated offshore grid	0.23	0.00	0.38	0.00	Role 3
A15.6	A15.6 Transform our capability in modelling and data management	0.30	1.20	0.32	0.80	Role 3
A15.7	A15.7 Deliver an operable zero carbon system by 2025	0.44	3.95	1.06	5.19	Role 3
A15.8	A15.8 Provide technical support to DSO and whole electricity system alignment	0.19	0.00	0.19	0.00	Role 3
A15.9	A15.9 Identify future operability needs across the whole energy system	0.01	0.00	0.01	0.00	Role 3
A16	A16 Delivering consumer benefits from improved network access planning (Ongoing Activities - A16.1)	4.54	0.00	4.47	0.00	Role 3
A16.2	A16.2 Enhance the NAP process with TOs	0.07	0.00	0.07	0.00	Role 3
A16.3	A16.3 Working more closely with DNO's and DER to facilitate network access	0.00	0.00	0.15	0.00	Role 3
A16.4	A16.4 TOGA/Outage notification	0.10	0.40	0.11	0.40	Role 3
A17	A17 Open data unlocking zero carbon system operation and markets	1.76	1.26	1.86	1.26	Open Data
A2	A2 Control centre training and simulation (Transformational)	2.08	0.00	2.63	0.00	Role 1
A3	A3 Restoration Ongoing	0.66	0.00	0.65	0.00	Role 1
	A3 Restoration Transformational	0.10	0.90	0.77	2.25	Role 1
A4.1	A4.1 Manage existing balancing services markets - Ongoing	4.06	2.10	2.81	0.18	Role 2
A4.2	A4.2 Power Responsive - Ongoing	0.63	0.00	0.62	0.00	Role 2
A4.3	A4.3 Deliver a single day-ahead response and reserve market - Transformational	4.89	0.00	3.46	0.00	Role 2
A4.4	A4.4 Deliver a single, integrated platform for ESO markets - Transformational	2.23	3.12	2.80	3.12	Role 2

A5.1	A5.1 EMR Stakeholder, CM and CfD auctions	3.46	1.25	3.17	0.86	Role 2
A5.3	A5.3 Improve our security of supply modelling capability	0.78	0.00	0.75	0.00	Role 2
A6.1	A6.1 Code management / market development and change	3.58	2.70	3.61	2.70	Role 2
A6.2	A6.2 EU code change and relationships	5.98	10.24	6.01	7.61	Role 2
A6.3	A6.3 Industry revenue management	3.17	2.55	1.80	0.48	Role 2
A6.4	A6.4 Transform the process to amend our codes	0.50	0.00	1.50	0.00	Role 2
A6.5	A6.5 Work with all stakeholders to create a fully-digitalised, whole system grid code by 2025	0.00	0.00	1.12	0.00	Role 2
A7.1, A7.2 & A7.3	A7.1, A7.2 & A7.3 Network Development	2.46	0.00	2.43	0.00	Role 3
A9	A9 Extend NOA approach to end of life asset replacement decisions and connections wider works	0.00	0.00	0.12	0.00	Role 3
No deliverables	A Sandbox, experimental market environment	0.15	0.00	0.15	0.00	Role 2
	A single, integrated platform for ESO markets	4.10	0.00	2.61	0.00	Role 2
	Build the future balancing service and wholesale markets transformational activity	0.64	0.00	0.69	0.00	Role 2

### Explanation of what Ofgem require in each column

Sub activity: Please list the sub activities as set out in Annex 1

Opex (Year): Please outline the Opex costs for each sub activity. Please break Opex down by investment where possible.

Capex (Year): Please outline the Capex costs for each sub activity. Please include a breakdown of Capex by investment where possible.

## Deliverables

Explanation of what we want in each column

1. Sub activity: As in the current table in Annex 1 please state the Sub activity that the deliverable is linked to.
2. Deliverable: Please outline in detail what is being delivered being specific about what it is that you will be doing to achieve the goal.
3. Related IT Investment: If a deliverable is linked to an IT Investment please list what investments and explain how it links to the deliverable.
4. Project or Continuous: Please state whether this is a deliverable that has no set end and is therefore continuous or if there is a set final outcome. Where it is a project please explain when in RIIO-2 it is expected to be delivered. Explain the final deliverable.
5. RIIO-1 End Point: If this deliverable has a link to any RIIO-1 deliverables please state the expected status at the end of RIIO-1. Where possible also list the final deliverable of RIIO-1.
6. Year Milestones: Please outline the key millstones you expect to reach in the respective year. These should be detailed and clear enough that it will be obvious whether or not these milestones were met. There should be at least one milestone in each year unless the project is not expected to be started at this point. Where this is the case please state it.
7. Year Success: Please detail what success would look like for each deliverable in each given year. This should be detailed and clear enough that it will be obvious whether or not these milestones were met. – Not necessarily the specifications of what will be delivered but what will be achieved.
8. Expected final delivery date and what success looks like: Please outline when the final project will be delivered and explain what success looks like for the final delivery of the deliverable.

## Role 1

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A1 Control Centre architecture and systems									
A1.1 Ongoing activities	D1.1.1 Balance Great Britain's demand for energy with supply from generators around the clock	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A1.1 Ongoing activities	D1.1.2 Maintain security of supply in real time and the ability to restart the system in the event of a partial or total loss of power	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A1.1 Ongoing activities	D1.1.3 Maintain the integrity of the transmission network, while manage the economical operation of the system	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A1.1 Ongoing activities	D1.1.4 Liaise with ENTSO-E (European Network for Transmission System Operators – Electricity) and Coreso on the ESO's European operations	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A1.1 Ongoing activities	D1.1.5 Upgraded legacy balancing	210 Balancing Asset Health	Continuous	N/A	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	and situational awareness tools to deliver continued service levels whilst new tools are being development	<p>Along with building the enhanced balancing capabilities we need to ensure we continue providing at least the same level of service as now. We will need to carry on with lifecycle upgrades, enhancement for near term requirements and transition to new capabilities. Once we have implemented new systems and tools it will be necessary to invest periodically throughout their life cycle in order to maintain their reliability and usability, and to keep them up to date and minimise cyber security risks.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report Supplement (ESO_SQ_CA_5 response)</p>							

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>240 Electricity National Control Centre (ENCC) Asset Health</p> <p>To operate the grid system, and to handle unforeseen events and emergency situations, we need to invest in maintaining our stand-alone specific tools and resilient bespoke communication links.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report Supplement (ESO_SQ_CA_5 response)</p>							
A1.1 Ongoing activities	D1.1.6 Assessment of future operability challenges communicated through the Operability Strategy Report published frequently. Using the strategy to ensure the control centre has the	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	appropriate management tools and plans								
A1.1 Ongoing activities	D1.1.7 Produce and publish detailed forecasts and analysis, for both demand and generation, published at day-ahead and other timescales. Forecasts will be enhanced using detailed statistical and machine learning Provide data and insight to inform control centre decision making and performance review, and integrate relevant IT projects into business as usual	260 Forecasting Enhancements Continuing with the investment made under RIIO-1, to enhance our mathematical forecasting models and refresh the forecasting system in line with our policies.  For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report Supplement (ESO_SQ_CA_5 response)	Continuous	Deliver strategic forecasting solution (Forward Plan)	N/A	N/A	N/A	N/A	N/A
A1.1 Ongoing activities	D1.1.8 Trading solutions to deliver a safe, secure and economical strategy for the Control Centre	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A1.2 Enhanced Balancing Capability	D1.2.1 Enhanced balancing tool built and developed in a modular fashion that will incorporate machine learning and artificial intelligence. It will enable us to schedule and dispatch a greater number of market participants than today	<p>180 Enhanced balancing capability</p> <p>We will develop our core balancing systems and processes in a modular fashion to deliver dispatch and scheduling improvements. Our scheduling solution will be in line with the market gate closure1, flexible for any market change, including a new suite of ancillary services, and close to real time auction markets.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p> <p>480 Ancillary Services Dispatch</p> <p>Continue integration of the ancillary services dispatch platform (ASDP) capabilities developed in RIIO-1 into the core balancing</p>	Project	Strategic design options and high-level conceptual design base developed	<p>Q1 - engage with design authority on requirements and design</p> <p>- begin agile build of modular design</p> <p>Q2 - continue agile build of modular design</p> <p>Q3 - continue agile build of modular design</p> <p>- investigate procurement options</p> <p>- engage with design authority on procurement</p> <p>Q4 - continue agile build of modular design</p> <p>- finalise project scope</p>	<p>Q1 - continue agile build of modular design</p> <p>- check in with design authority</p> <p>Q2 – continue agile build of modular design</p> <p>Q3 – continue agile build of modular design</p> <p>- check in with design authority</p> <p>Q4 – continue agile build of modular design</p>	<p>Key decisions on architectural design made incorporating feedback from the external design authority</p> <p>Priority technology identified and sourcing decisions made</p> <p>Potential code changes required to support operation of the tool identified and timeline agreed with codes team</p> <p>Expected development timeline agreed and roadmap published</p> <p>Incremental targets for Metric 2 – CNI system reliability met</p> <p>Incremental benefits identified in cost-</p>	<p>Technology sourcing decisions for further application development completed</p> <p>Scaled agile approach to development underway and on track against roadmap</p> <p>Initial modules integrated with new control centre architecture (Activity A1.4)</p> <p>Updated roadmap published</p> <p>Incremental targets for Metric 2 – CNI system reliability met</p> <p>Incremental benefits identified in cost-benefit analysis realised</p>	<p>By March 2024</p> <p>Control Centre engineers can schedule and dispatch a far greater number of market participants at once than they can in 2020, which is a key enabler of our ability to operate the network carbon free. Using increased automation provides market participants with greater confidence in our decision-making. ASDP has become one module of the whole 180 Enhanced balancing capability, integrated with other operational tools</p> <p>Benefits identified in cost-benefit analysis realised</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>capabilities and processes and expanding it to cover any new ancillary services. This will also be integrated with the single market platform so new ancillary services can be consistently managed and dispatched.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report Supplement (ESO_SQ_CA_5 response)</p>					benefit analysis realised		
A1.2 Enhanced Balancing Capability	D1.2.2 Develop inertia monitoring capabilities and other tools to address emerging technology and system management issues (as required), as outlined in future Operability Strategy Reports.	<p>130 Emergent Technology and System Management</p> <p>This investment will allow us to tackle new operational challenges more quickly and efficiently throughout RIIO-2. It will use our foundation work, such as the IT investment 220 Data and analytics platform, being built on</p>	Project	Inertia monitoring tool delivered (Forward Plan)	Q1 – Continue enhancement of inertia monitoring capabilities Q2 – Operability Strategy Report published - Develop and implement tools as required	Q1 – continue developing tools as required Q2 – Operability Strategy Report published - Develop and implement tools as required Q3 – continue developing tools as required	<p>Business processes developed to fully utilise monitoring tool outputs in control centre</p> <p>Lessons learned from development and operation of monitoring tool used to inform design of inertia forecasting tool</p>	<p>Inertia forecasting tool go-live</p> <p>Business processes developed to fully utilise monitoring and forecasting tools outputs in the Control Centre</p> <p>Ability to rapidly respond to changing operational environment.</p>	<p>By March 2024 User developed tools integrated with enhanced balancing capability during development.</p> <p>By March 2026 Improvements identified and developed for inertia modelling tool</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>a modular basis like IT investment 180</p> <p>Enhanced balancing capability to allow its integration with any other required tool. It will enable control centre users to manage changes to the system in real time, securely and economically.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>			<p>Q3 – continue developing tools as required</p> <p>Q4 – Operability Strategy Report published</p> <p>- Develop and implement tools as required</p>	<p>Q4 – Operability Strategy Report published</p> <p>- Develop and implement tools as required</p>	Ability to rapidly respond to changing operational environment		including asset refresh
A1.2 Enhanced Balancing Capability	D1.2.3 Projects running, using innovation funding, to consider how greater automation, machine learning and use of artificial intelligence can be used across our activities to handles increases in the amount of data and the number of expected actions	<p>450</p> <p>Future Innovation Productionisation</p> <p>This investment covers future Network Innovation Allowance (NIA) projects only. This funding is needed to enable us to respond to challenges as they appear. The ongoing nature of the NIA pipeline requires funding to be available for NIA</p>	Continuous	N/A	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>productionisation. We are evaluating several projects that would mature towards the end of the RIIO-1 period and may require funding early in RIIO-2. This investment also includes an opex element to cover IT support for new innovation projects.</p> <p>Known Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) projects are covered by their own investment lines, included elsewhere in the RIIO-2 submission</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>							
A1.3 Transform Network Control	D1.3.1 Develop and deliver new real-time situational awareness tool, so	110 Network Control The new capabilities will integrate with IT investment 220 Data	Project	Forward Plan - Control capability development, including life	Q1 - engage with design authority on	Q1 – continue agile build of modular design	Life extension of current systems continued including development work	Life extension of current systems continued including development work where necessary to	By March 2025 Business process implemented ensuring

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	Control Centre engineers can better understand changing network limitations, leading to a more efficient risk-based operation of the system	and analytics platform, ensuring a single network model for Control Centre operators. Although not switching or moving transformers, i.e. no large-scale asset control, the new tool will still need to send signals to ask for services (e.g. sending instructions to the DSOs' automated network management (ANM) systems). In a similar way, we will still need to see substation configurations even if we have no need to receive all the detailed alarms.  For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report		extension of current system, capability requirements understood between SO-TO in prep for separation of systems, user stories for new product  Outputs from project RecorDER available	priority requirements Q2 - scope and identify requirements Q3 - confirm high-level modular design - Check in with design authority Q4 - start developing some modules - further requirements scoping work on other modules	- check-in with design authority Q2 – continue agile build of modular design Q3 – continue agile build of modular design - check-in with design authority Q4 – continue agile build of modular design	where necessary to manage changing network  Incremental targets for Metric 2 – CNI system reliability met  Project scope for new tools developed through stakeholder engagement (e.g. design authority) and finalised.  Potential code changes required to support operation of the tool identified and timeline agreed with codes team  Supplier engagement and sourcing strategy in action  Expected development timeline agreed and roadmap published	manage changing network  Scaled agile approach to development begun. Early modules starting to test for integration with new Control Centre architecture (Activity A1.4)  Evidence of ongoing, constructive, planned engagement with stakeholders ensuring their requirements are fully considered.  Incremental targets for Metric 2 – CNI system reliability met  Updated roadmap published  Incremental benefits identified in cost-benefit analysis realised	Control Centre engineers can manage and visualise far greater volumes of data than in 2020 which is a key enabler of our ability to operate the network carbon free. This information is used to better understand the operating envelope, allowing Control Centre engineers to run a more efficient system safely and at lower cost to consumers.  Benefits identified in cost-benefit analysis realised

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
							Incremental benefits identified in cost-benefit analysis realised		
A1.3 Transform Network Control	D1.3.2 Enhanced network modelling capabilities with online analysis of voltage and power flow profiles closer to real time	<p>150 Operational Awareness and Decision Support Enhanced look ahead capability will be required to predict transmission problems in a more volatile operating environment. Apart from new tools or enhancements to current tools, we will need greater alignment between real-time online and offline tools to allow for a more efficient control centre operation. These tools will be integrated via the IT investment 220 Data and analytics platform</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4</p>	Project	<p>Restructured internally to bring modelling into more efficient structure and processes</p> <p>Lessons learned from investigation into system events such as 9 August 2019</p>	<p>Q1 – project start up</p> <ul style="list-style-type: none"> <li>- Engage with design authority on priority requirements</li> <li>- Start scope and requirements work</li> </ul> <p>Q2 – continue scope and requirements work</p> <p>Q3 – engage with design authority on tools for priority design</p> <ul style="list-style-type: none"> <li>- Commence design and development on priority tools</li> </ul> <p>Q4 – continue design and development work</p>	<p>Q1 – check in with design authority on development work and requirements for additional tools</p> <ul style="list-style-type: none"> <li>- Continue scope and development work</li> </ul> <p>Q2 – agile build of modular design</p> <p>Q3 – agile build of modular design</p> <p>Q4 – agile build of modular design</p> <ul style="list-style-type: none"> <li>- Deliver first set of tools</li> </ul>	<p>Modelling strategy developed, agreed and implemented with stakeholders</p> <p>Project scope and prioritisation for development of new tools developed through stakeholder engagement (e.g. design authority) and finalised.</p> <p>Roadmap produced for named priority tools</p>	<p>Progress on track against previous roadmap with first set of tools delivered and integrated with data platform</p> <p>Project scope and prioritisation for development of new tools developed through stakeholder engagement (e.g. design authority) and finalised.</p> <p>Updated roadmap produced for named priority tools</p>	<p>By March 2026: we will have enhanced network modelling capabilities delivering consistent and accurate outputs which support better operational decision making across all time scales.</p> <p>Our modelling systems will have the option to be interoperable with DNO/DSO systems, allowing two-way data exchange to enhance whole system decision making</p>

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		- Technology Investment Report							
A1.3 Transform Network Control	D1.3.3 Upgraded Control Centre video walls and operator consoles, with a single interface giving an overall state of the power system. This will allow Control Centre engineers make better and quicker decisions	140 ENCC Operator Console This will also give an overall view of the state of the power system in one place enabling Control Centre managers to make better and quicker informed decisions. In emergency cases, the silver command team will also be able to have faster reaction times and give the most up to date and relevant information to external stakeholders. Control Centre users will get all data from our IT investment 220 Data and analytics platform. Critical modules and applications will be delivered by IT investments 180 Enhanced balancing capability and 110 Network control.	Project	Current Control Centre facilities maintained	N/A	Q1 – start user experience (desks and graphical user interface) project Q2 – scope requirements Q3 - begin design work Q4 – continue design work	Current Control Centre facilities maintained	Current Control Centre facilities maintained  Requirements for new Control Centre visualisation tools understood and scope agreed  Understand technology required to enable IEMS tool to drive the video wall  Delivery timeline agreed and progress tracked  Design work commenced on schedule	By March 2026 Our enhanced Control Centre video walls and operator consoles will integrate all of the tools developed to ensure Control Centre engineers can visualise the real-time state of the network. Using these tools, they will be able to understand and analyse the increased data coming into the Control Centre and use it to make optimal decisions



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		For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report							
A1.3 Transform Network Control	D1.3.4 Increased operational liaison with DNOs	none	Project	Optional Downward Flexibility Management (ODFM) learning; rudimentary work on managing voltages, learning from DNOs, info sharing	N/A	N/A	Key concepts from Regional Development Projects identified and utilised to demonstrate better ways for whole network to work together in real-time	N/A	By March 2022 See First Year success
A1.4 Control Centre Architecture	D1.4.1 Creation of a data and analytics platform that will act as the foundation for our new Control Centre architecture. It will house all ESO internal data, including from the Control Centre systems, and allow users to access it in the timescales they need. External stakeholders will be able to access it	220 Data and Analytics Platform The data and analytics platform will retire many of our data legacy systems. It will include analytics capability, so we can access, share and shape any type of data we store. This is critical to allow quicker, accurate operational decisions and give our customers value added information.	Project	Data portal in operation with application planning interfaces (APIs) available  Learning captured from data portal use of APIs and data management for use with data platform work	Q1 – engage with design authority on requirements and design - Commence project on data platform foundation and management system, Q2 – conduct work on requirements and design of data platform foundation and	Q1 – Check in with design authority - Continue data platform foundation development testing Q2 – Continue data platform foundation development and testing Q3 – Check in with design authority - Deliver data platform foundation	Evidence of ongoing, constructive, planned engagement with stakeholders ensuring their requirements are fully considered.  Code changes identified and roadmap of activity for next 12 months agreed	Master data management system completed  Data platform foundation delivered including successful testing of plug-and-play approach with modules in development/delivery phase  Stakeholder able to submit and access single version of the truth data for an agreed subset of data.	By March 2023 Data is available in a common environment accessible via APIs. All parties can use and harvest data  The completed communications architecture allows new systems to be integrated seamlessly in a 'plug-and-play' or 'app-like' way. This allows our plan, and future

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	through the data portal	For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report			management system Q3 – check in with design authority - Finalise requirements and design work for data platform foundation - Data management system development and testing Q4 – commence data platform foundation development - Deliver management system	Q4 – Integrate data platform with digital engagement platform and single markets platform	Incremental benefits identified in cost-benefit analysis realised	Digital engagement platform and single markets platform migrated to data platform, providing a single point of access for participation in ESO balancing services  Planned code change activity completed. Further code changes identified and roadmap of activity for next 12 months agreed  Evidence of ongoing, constructive, planned engagement with stakeholders ensuring their requirements are fully considered.  Incremental benefits identified in cost-benefit analysis realised	system upgrades, to flex with the need to meet the challenges of facilitating the transition to net-zero.  By March 2026 All systems are integrated a single version of the truth becomes available for all data, providing accessibility and transparency for stakeholders. Control centre engineers are using a consolidated graphical user interface allowing them to better visualise and analyse the operational data.  Demonstrated efficiencies from internal process through availability of single complete and consistent data set  Benefits identified in cost-benefit analysis realised

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A1.4 Control Centre Architecture	D1.4.2 Creation of the ESO design authority, open to external stakeholders, who we will work with on the development of new balancing and control tools	none	Continuous	External design authority set up to inform the overall direction and provide input into the design, development and testing phases of our solution development.	N/A	N/A	N/A	N/A	From April 2021: The ESO will work with a cross-sector design authority to guide the digital and technological transformation. The design authority will provide stakeholder input, transparency and accountability into the development of new systems and markets.
Control Centre training and simulation									
A2.1 Ongoing activities	D2.1.1 Develop and drive control centre strategic resource planning, scheduling and training	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A2.1 Ongoing activities	D2.1.2 Incident analysis and investigations of abnormal events, implementing improvements where needed	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A2.1 Ongoing activities	D2.1.3 Monitoring and reporting of system performance to regulatory bodies and ENTSO-E	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A2.1 Ongoing activities	D2.1.4 Guidance on operational policies	none	Continuous	N/A	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	for use in the control centre produced								
A2.2 Enhanced training material	D2.2.1 Development of new modules and (based on feedback) new qualifications in system operation formed via an enhanced partnership with academic institutions	none	Project	Building relationship with selected universities to understand what is possible and plan how best to encourage development and inclusion of course content on electricity system operation	Q1 – complete work with academia and industry on defining future skillsets Q2 – complete design of new modules - Refresh existing courses Q3-4 – run new university modules	Q1 – run new university modules Q2 – explore appetite for enhanced courses Q3 – run university modules - Develop enhanced course Q4 – run university modules - Develop enhanced course	Skillset for future power system operation agreed across industry.  Partnership with selected universities to design and deliver optional electricity system operation modules for existing university courses which provides an overview of all elements of system operation, including power system engineering, market operation and commercial and regulatory frameworks  ESO supports delivery of new module content delivered within university courses during academic year 21/22	Delivery and evaluation of new module content continues  More academic partnerships built to deliver new module content  Support the dissertation process of existing university courses, allowing candidates to work on an ESO-relevant project and gain experience of the ESO as part of the development of their project  Selected candidates on these courses offered future employment opportunities. This could be in the form of summer placements and / or post-qualification permanent positions  First cohort of new starters join the ESO	By March 2023 See Second Year success  By March 2026 UK institutions that already offer courses in relevant subjects such as power system engineering, data science and energy systems have been given the option partner with the ESO to ensure that existing qualifications remain relevant  Exploring potential for use of future training simulators in support of university projects and courses  Regular recruitment from graduates of these courses supports workforce planning by providing a secure pipeline of

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								<p>after completion of new modules</p> <p>Feedback from and continuing appetite for the modules analysed. If there is demand and clear benefit, develop timeline to run further modules or develop a new qualification or degree in electricity system operation.</p>	high quality talent joining the ESO (and wider industry) who are developed through a recognised career track to fill business critical roles.
A2.2 Enhanced training material	D2.2.2 Enhanced training and simulation with DNOs and wider industry	none	Project	Engage with industry to identify and develop cross-sector secondment opportunities to improve whole system decision-making, by better understanding the needs of other parties	Q1- Implement industry secondments	Q1-4 – explore requirements with industry on possible training using enhanced ESO simulators	<p>Cross-industry secondments to and from the ESO are a new normal, with best practice being regularly shared.</p> <p>Team set up and liaising with external parties to understand DNO needs and appetite to work together on wider industry training in ED2.</p>	<p>Positive engagement with industry on whole electricity system training. An appetite to develop future opportunities for training which reflects and is in response to wider energy needs</p>	<p>By March 2026, whole electricity system training and joint exercises will be standard across industry.</p> <p>ESO capable of providing training to meet the needs of other parties reflects the needs, in particular working together to enable the DNO to DSO transition</p> <p>Best practice will be continuously shared. This will lead to optimal decision</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
									<p>making and increased levels of safety and reliability.</p> <p>Potential for use of future training simulators in support of whole electricity system training is being explored, in particular enabling the DNO to DSO transition</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A2.3 Training simulation and technology	D2.3.1 Upgrades to current simulators, including annual scenario snapshot refreshes, ahead of developing new training simulation capability, including end-to-end bespoke training scenarios and simulated operational systems using live data	<p>200</p> <p>Future training simulator</p> <p>We will use our new simulation capabilities to deliver a training suite that includes end-to-end scenario simulations. The training simulator will also integrate capabilities from IT investment 400 single markets platform to easily create complex scenarios.</p> <p>The same capabilities can be used to use different data sets and train DSOs and other industry stakeholders, if such need arises, as well as our own teams.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>	Project	<p>Annual refreshment of existing simulator snapshot scenario completed to reflect key changes to the energy landscape</p> <p>Development of BM DTS to support energy and strategy training for control centre engineers</p>	<p>Q1 – begin exploring best practice training and simulation technology</p> <p>Q2 – continue exploring best practice training and simulation technology</p> <p>Q3 – update existing simulators with scenario snapshots – continue exploring best practice training and simulation technology</p> <p>Q4 – continue exploring best practice training and simulation technology</p>	<p>Q1 – continue exploring best practice training and simulation technology</p> <p>Q2 – continue exploring best practice training and simulation technology</p> <p>Q3 – update existing simulators with scenario snapshots – continue exploring best practice training and simulation technology</p> <p>Q4 – continue exploring best practice training and simulation technology</p>	<p>Annual refreshment of existing simulator snapshot scenario completed to reflect key changes to the energy landscape</p> <p>BM DTS supports energy and strategy training for control centre engineers</p>	<p>Annual refreshment of existing simulator snapshot scenario completed to reflect key changes to the energy landscape</p> <p>BM DTS supports energy and strategy training for control centre engineers</p> <p>Control Centre engineers are training on new balancing and network control capabilities as they are developed and implemented, meaning the can fully utilise the tools’ capabilities, leading to optimal decision making</p>	<p>By March 2025</p> <p>Control Centre engineers will be using training simulators which accurately reflect the changing energy landscape. This will allow them to learn from a range of past and future scenarios, including using real-time data as opposed to the current snapshots used in 2020.</p> <p>Our training capabilities will be fully aligned with the new balancing and network control tools, and any future updates, providing fully integrated training and simulation capability on energy and transmission.</p> <p>Potential for use of future training simulators in support of university courses and whole electricity</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
									system training is being explored, in particular enabling the DNO to DSO transition
A2.3 Training simulation and technology	D2.3.2 New training methods and platforms, including online and e-learning, introduced to support training and new starters and continued development of existing staff	None	Project	Training for some roles moved into classroom and becomes less reliant upon shadowing Control Centre colleagues and learning "on the job"	Q1-4 - use new video and e-learning training enhancements Q2 – incorporate use of new video and e-learning training enhancements into design of	Q1-4 - use new video and e-learning training enhancements Q3-4 – incorporate use of new video and e-learning training enhancements into design of	Delivery via video and e-learning evaluated against success criteria including student experience.  Continued exploration of ways to reduce reliance upon shadowing	Delivery via video and e-learning evaluated against success criteria including student experience.  Continued development and implementation of training materials and approaches which reduce reliance upon shadowing	By March 2023 Control Centre engineers will be trained on a variety of platforms to meet individual and organisation training needs, reducing the specialised resource needed to support each individual



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				<p>Potential alternative options explored, initially video and E-learning including costs and timelines</p> <p>Learning from E-Learning trialled for Project TERRE</p>	academic modules	enhanced academic course	Control Centre colleagues and learning "on-the-job" with different options such as classroom, video, E-learning, etc including NG Academy platform. Next steps identified and planned	Control Centre colleagues and learning "on-the-job"	
A2.4 Workforce and change management	D2.4.1 Personalised updates and automated shift logins, allowing for learning and operational investments to made available on different platforms and updated to a user's profile, giving better training and operational decision making	<p>190 workforce and change management tools</p> <p>We will integrate these management tools with our IT investments 180 Enhanced balancing capability and 110 Network control tools to enable personalised updates. They will be linked to the rota and change management tools to allow for relevant updates to be given as required, for example, when a Control Centre user returns from a day off to perform a specific role.</p> <p>Automation of workforce related</p>	Project	<p>Review of rotas to ensure protection of staff wellbeing while providing efficient Control Centre staffing levels</p> <p>Rota management automation project completed</p>	N/A	<p>Q1 - Review of rota automation - document management improvements project start up</p> <p>Q2 - Scope requirements for document management improvements</p> <p>Q3 - start design work for document management improvements</p> <p>Q4 - Start rota management improvements project</p> <p>- Continue design work for document management improvements</p>	N/A	<p>Rota management process reviewed, improvements identified and specified</p> <p>Design work for automation of workforce related processes including development personalised updates and automated shift logins underway</p>	<p>By March 2025 Control Centre engineers' wellbeing and development is supported by the use of greater automation in producing rotas and personalised training packages. The enhanced user experience will provide flexibility to both the trainee and the trainers through their authorisations and training needs</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>processes will allow for more flexible rota planning as well as ensuring all users have the most up to date information to do their job.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>							
A2.4 Workforce and change management	D2.4.2 Content and infrastructure for personalised training plans designed, developed and delivered	None	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A3 Restoration									
A3.1 Ongoing activities	D3.1.1 Control Centre has fully tested skills, processes, plans and tools to support incident management and disaster recovery.	None	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A3.1 Ongoing activities	D3.1.2 Restoration plans for GB with the necessary stakeholders, developed,	None	Continuous	N/A	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	maintained and validated.								
A3.1 Ongoing activities	D3.1.3 Engage and collaborate with industry to plan and develop the new GB restoration standard, including the annual assurance framework, consistent with our licence obligations	None	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A3.1 Ongoing activities	D3.1.4 Advice and oversight of Black Start and restoration strategy for the future provided	None	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A3.1 Ongoing activities	D3.1.5 Fully competitive Black Start procurement process with submissions from a wide range of technologies connected at different voltage levels on the network, with DNOs playing a more active role in the restoration approach.	None	Continuous	N/A	N/A	N/A	N/A	N/A	Final delivery fully implemented competitive process

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A3.2 Restoration standard	D3.2.1 Facilitate and compile, on behalf of the GB industry, the annual assurance process for GB Black Start	None	Project	<p>[Based on the GB standard go-live in October 2020]</p> <p>Implementation of GB restoration standard has begun.</p> <p>Detailed plans in place to complete implementation within 12 months after licence condition; including training, industry agreements, code modifications, and changes to processes and systems required</p>	<p>[These timescales are based on the GB standard go-live in October 2020, with ESO have 12 months to implement]</p> <p>Q1 – continue implementing GB restoration standard licence conditions</p> <p>Q2 – continue implementing GB restoration standard licence conditions</p> <p>Q3 – restoration standard in place (12 months after licence condition)</p>	<p>Q2 – complete annual assurance framework data collection and validation</p> <p>- use outputs to recommend improvements</p> <p>Q3 - implement improvements</p>	<p>Control centre engineers, ESO leaders and staff and wider industry fully prepared to deliver GB restoration standard supported by necessary industry agreements, code modifications, processes and systems</p> <p>A communicated implementation plan, with all necessary code changes fully consulted on and passed to support the standard.</p>	<p>First annual assurance framework data collection and validation successfully completed and identified improvements implemented</p>	<p>By December 2022 GB industry has successfully completed the first annual assurance process for GB Black Start readiness, including agreeing and implementing improvements</p>
A3.2 Restoration standard	D3.2.2 Validate restoration timelines for GB using the assurance data	None	Project	See D3.2.1	[These timescales are based on the GB standard go-live in October 2020, with ESO having 12	Q3 – begin validation of restoration timelines	Statement of restoration timescales (i.e. what restoration times are nationally & zonally) to be produced to establish the current	Confirmation provided new restoration timescales can be met across the industry, leading to faster system restoration (should the need ever arise).	ESO have produced a standard statement of restoration to demonstrate the year on year improvement to the Restoration Standard

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
					<p>months to implement]</p> <p>Q1 – continue implementing GB restoration standard licence conditions</p> <p>Q2 – continue implementing GB restoration standard licence conditions</p> <p>Q3 – restoration standard in place (12 months after licence condition)</p>		status in 2021 of restoration timescales and to enable future monitoring of standard effectiveness	Statement of restoration timescales to demonstrate that restoration timescales are decreasing (if all industry codes & supporting measures in place)	
A3.2 Restoration standard	D3.2.3 Maintain obligations and requirements against the new standard for Black Start capability provision	none	Project	Compliance with current black start obligations	<p>[[These timescales are based on the GB standard go-live in October 2020, with ESO having 12 months to implement]</p> <p>Q1 – continue implementing GB restoration</p>	N/A	ESO has maintained its licence and code obligations whilst designing the necessary frameworks to implement a GB Restoration Standard, including design and training towards application of the Assurance Framework	ESO has maintained its licence and code obligations whilst facilitating the annual validation of the GB standard via the Assurance Framework	Obligations under the standard become BAU compliance obligations once in force, and implementation period across the industry is completed

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
					standard licence conditions Q2 – continue implementing GB restoration standard licence conditions Q3 - restoration standard in place (12 months after licence condition)				
A3.2 Restoration standard	D3.2.4 Restoration decision making support tool designed and developed to aid faster restoration times in line with stakeholder expectations	510 Restoration decision support tool We will implement a tool that runs live with the latest network configuration, providing a dynamic decision tree for the best route to restoration. It will change its output every time the network configuration changes and update live in a restoration situation if the initial recommendation is overruled. It will be flexible to accommodate learnings from restoration	Project	N/A	N/A	Q1 – start up restoration decision support tool project - Engage with design authority on project requirements Q2 - Scope requirements Q3 – engage with design authority on design - Commence design work Q4 – continue design work	N/A	Engagement with stakeholders on the requirements and design for the restoration decision support tool (e.g. input data needed from across industry)  Tool design underway	By March 2024 Control Centre engineers have the ability to have a dynamic tool with current advice on the best route to restoration and are enabled to manage potentially hundreds of restoration providers. Plans can respond immediately to changes in the restoration situation,

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>innovation project and meet Government restoration standards, including user defined scenarios for multiple Restoration strategies.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>							
A3.3 Innovation project in restoration	D3.3.1 Trial case studies based on different technology types	None	Project	Innovation project ReStart ongoing: With process for restoration defined; control systems design and power engineering live trials have begun	Q2 – select 2 or 3 case studies to confirm feasibility and cost – start running case studies Q3 – case studies continue Q4 – End of innovation project	N/A	Case studies selected, implemented and concluded  Relevant learning gathered and used to determine distributed restart feasibility and go/no go decision for D3.3.1	N/A	By March 2022 (see First Year Success), we will have established proof of concept for distributed restart, including an understanding of the challenges to implementation
A3.3 Innovation project in restoration	D3.3.2 (Subject to project findings) Proof of concept findings implemented and new system and communication	460 Restoration We will support for the innovation project for technological solutions and procurement recommendations. From these, put in place changes ranging	Project	N/A	N/A	Q1 – begin assessment of learning from innovation project, working with stakeholders across the industry	N/A	Roadmap published for delivery of the collaborative and comprehensive solution developed jointly by the ESO and DNOs to allow DER to participate in the restoration market	By March 2026 (subject to proof of concept findings), distributed resources are able to participate fully in restoration services. This will include

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	methods implemented	<p>from secure communication links to distributed energy resources (DERs), to creating auctions for restoration services.</p> <p>For further information see the ESO RIIO-2 Business Plan Annex 4 - Technology Investment Report</p>				<p>Q2 – continue assessment of learning from innovation project</p> <p>Q3 - engage with industry on productionisation</p> <p>Q4 - produce roadmap for productionisation</p>			completion of necessary framework, market, system and infrastructure work.



## Role 2

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A4.1 Manage existing balancing services markets	<p>D4.1 Balancing and ancillary services efficiently procured to deliver security of supply at optimal cost</p> <p>We manage an end-to-end process to ensure that balancing services are procured to deliver security of supply at lowest cost to consumers. We manage relationships and contracts with the growing volume and diversity of service providers.</p>	410 Ancillary services settlements refresh: required to ensure we have the capability to perform settlements for much higher volumes of market participants.	Continuous	N/A	N/A	N/A	N/A	N/A	N/A
A4.2 Power Responsive	D4.2.1 Regular and specific metrics and publications across Distribution System Operator (DSO) development and co-development of local flexibility markets through a variety of innovation projects	N/A	Continuous	Power Responsive will have raised awareness of Demand Side Response (DSR) opportunities, and shaped the growth of the DSR market through extensive engagement with businesses including, regular Flexibility Forums and the annual publication of	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				<p><i>Power Responsive Annual Report.</i></p> <p>We will have extended our engagement to provide a direct route for dialogue between the demand side community and the ESO subject matter experts. This will ensure that the views of the demand side community are reflected in the development of new products and markets.</p>					
A4.2 Power Responsive	D4.2.2 Regular and specific metrics, and publications for multi sector approaches focusing on opportunities for household, community energy, small business participation, zero carbon technologies, and electrification of heat in Demand Side Flexibility (DSF)	N/A	Continuous	<p>Power Responsive will have raised awareness of DSR opportunities and shaped the growth of the DSR market through extensive engagement with businesses including, regular Flexibility Forums and the annual publication of <i>Power Responsive Annual Report.</i></p>	N/A	N/A	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				We will have extended our engagement to provide a direct route for dialogue between the demand side community and the ESO subject matter experts. This will ensure that the views of the demand side community are reflected in the development of new products and markets.					
A4.3 Deliver a single day-ahead response and reserve market	D4.3.1 We will work with stakeholders, including Distributed Network Owners (DNO), to ensure that ESO markets are consistent and coordinated with other markets	400 Single markets platform: Will ultimately provide a platform providing a full end-to-end customer journey, allowing market participants to access the data relating to: how to become a provider (obligations, sign up, test, application progression), contract tender ( to see contracts status and manage	Project	Some initial alignment of distribution and transmission flexibility markets will have been agreed including completion of relevant ENA Open Networks WS1A activities to promote coordination and cooperation.	Q1 – Day Ahead market for frequency response Q2 - Control and dispatch solutions for reserve Q3 – Provide input into ED2 business plans to promote alignment of ESO and DSO markets Q3 - Standard contract terms for reserve Q4 - New reserve products go live	Q4 - Single day-ahead response and reserve market go live	Alignment of ESO and DSO services as appropriate to the maturity level of DSO service procurement.	Alignment of ESO and DSO services as appropriate to the maturity level of DSO service procurement.	As per year 2

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		contracts), unit management ( to see what units are registered for, see and change aggregation configurations), dispatch ( to access instructions), performance monitoring ( to see how units behaved under instructions), payment.  420 - Auction capability: This investment will provide extension of the auction capability developed for frequency response in RIIO-1 to all relevant services.							
A4.3 Deliver a single day-ahead response and reserve market	D4.3.2 Day Ahead market for frequency response	410 Ancillary services settlements refresh: required to ensure we have the capability to perform settlements for much higher volumes of market participants.	Project	Full functionality of frequency response weekly auction trial deployed and learnings shared with market.	Q1 – Day Ahead market for frequency response operational Q1 - Day Ahead response market integrated with foundational market platform	D4.3.2 Day Ahead market for frequency response evolves into D4.3.4 Full co-optimised auction for response and reserve at day ahead or even closer to real time.	- Auction trial complete with learnings applied to day ahead market for response. Day ahead market for response	D4.3.2 Day Ahead market for frequency response evolves into D4.3.4 Full co-optimised auction for response and reserve at day	As per year 1

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>420 Auction capability: This investment will provide extension of the auction capability developed for frequency response in RIIO-1 to all relevant services.</p> <p>400 Single markets platform: Experience of participation in frequency response markets will be enhanced by the capabilities of the single market platform.</p>			<p>Q3 – End of auction trial</p> <p>Q4 – Phase out monthly tenders for Firm Frequency Response (FFR)</p>	Please see D4.3.4 for further frequency response developments beyond year 1.	operational and procuring volumes for use in control room.	ahead or even closer to real time. Please see D4.3.4 for further frequency response developments beyond year 1.	
A4.3 Deliver a single day-ahead response and reserve market	D4.3.3 New Reserve products Development and introduction of a new suite of products to provide reserve to the control room.	<p>410 Ancillary services settlements refresh: required to ensure we have the capability to perform settlements for much higher volumes of market participants.</p> <p>420 Auction capability: This investment will provide extension of</p>	Project	Market design for reformed reserve products published. ( <i>Forward Plan</i> )	<p>Q2 - Control and dispatch solutions for reserve</p> <p>Q3 - Standard contract terms for reserve</p> <p>Q4 - New reserve products go live</p>	<p>D4.3.3 New Reserve products evolve into D4.3.4 Full co-optimised auction for Response and Reserve at day ahead, or even closer to real time.</p> <p>Please see D4.3.4 for further frequency response developments beyond year 1.</p>	New reserve products operational and procuring volumes for use in control room.	<p>D4.3.3 New Reserve products evolve into D4.3.4 Full co-optimised auction for Response and Reserve at day ahead, or even closer to real time.</p> <p>Please see D4.3.4 for further frequency</p>	As per year 1

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>the auction capability developed for frequency response in RIIO-1 to all relevant services.</p> <p>400 – Single markets platform: Experience of participation in reserve markets will be enhanced by the capabilities of the single market platform.</p>						response developments beyond year 1.	
A4.3 Deliver a single day-ahead response and reserve market	D4.3.4 Full co-optimised auction for Response and Reserve at day ahead or even closer to real time	<p>410 Ancillary services settlements refresh: required to ensure we have the capability to perform settlements for much higher volumes of market participants.</p> <p>420 Auction capability: This investment will provide extension of the auction capability developed for frequency response in RIIO-1 to all relevant services.</p>	Project	See D4.3.1 and D4.3.2 for relevant RIIO1 deliverables and milestones end state.	D4.3.4 Full co-optimised auction for Response and Reserve at day ahead or even closer to real time evolves from D4.3.1 and D4.3.2. Please see D4.3.1 and D4.3.2 for relevant year 1 deliverables and milestones.	Q4 - Single day-ahead response and reserve market go live	D4.3.4 Full co-optimised auction for Response and Reserve at day ahead or even closer to real time evolves from D4.3.1 and D4.3.2. Please see D4.3.1 and D4.3.2 for relevant year 1 deliverables and milestones	- Market participants will be able to participate in a day ahead co-optimised Response and Reserve Market -Business processes for response and reserve products integrated through single markets platform. (see D4.4.1 below for more detail)	- Auction capability integration with Single markets platform will be in early 2023-24 - Market participants able to participate in market auctions through interface of Single markets platform (alongside other processes such as contracts and settlements).

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>This will include algorithms for co-optimised response and reserve day-ahead auction which also considers impact on DSOs.</p> <p>400 Single markets platform: Will ultimately provide a platform providing a full end-to-end customer journey, allowing market participants to access the data relating to: how to become a provider (obligations, sign up, test, application progression), contract tender (to see contracts status and manage contracts), unit management (to see what units are registered for, see and change aggregation configurations), dispatch (to access instructions),</p>							

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		performance monitoring (to see how units behaved under instructions), payment.							
A4.3 Deliver a single day-ahead response and reserve market	D4.3.5 Auction capability	420 - Auction capability: This investment will provide extension of the auction capability developed for frequency response in RIIO-1 to all relevant services. This will include algorithms for co-optimised response and reserve day-ahead auction.	Project	Auction capability tested for weekly frequency response. Understanding of options available for wider implementation of auction capability in RIIO-2.	Q1-Q3 - Auction capability development and testing Q4 - Auction capability implementation	Q4 – Electricity Market Reform (EMR) and Contracts for Difference (CfD) integration	- Auction capability implemented supporting Day Ahead frequency response procurement. - Market participants will access all ESO auctions through one single auction platform	- Auction capability implemented supporting co-optimised day ahead response and reserve procurement.	- Auction capability integration with Single markets platform will be in early 2023-24 - Market participants able to participate in market auctions through interface of Single markets platform (alongside other processes such as contracts and settlements).
A4.4 Deliver a single, integrated platform for ESO Markets	D4.4.1 (shared with D5.2) A market platform through which market participants will be able to participate in balancing and capacity markets. The markets platform will cover the end to end process for market participation	400 Single markets platform: Will provide a platform providing a full end-to-end customer journey, allowing market participants to access the data relating to: how to become a provider (obligations, sign up, test,	Project	This project will not have started in RIIO-1.	Q1 - Day Ahead response market integrated with foundational market platform for subset of processes Q4 – Single markets platform requirements and design	Q3 – Single markets Platform Development and testing Q4 - Procurement of all ESO balancing and ancillary services through single markets platform for full range of processes	- Market participants will be able to manage upstream processes for participation in frequency response markets integrated through foundational market platform.	- Market participants will be able to access all ESO balancing services markets through Single markets platform - Business processes for all ESO balancing services products	- Auction capability integration with Single markets platform will be in early 2023-24 - Market participants able to participate in market auctions through interface



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	including: communications, data input and management, messaging and validation	application progression), contract tender (to see contracts status and manage contracts), unit management (to see what units are registered for, see and change aggregation configurations), dispatch (to access instructions), performance monitoring (to see how units behaved under instructions), payment. Inclusion of sandbox functionality will allow us to test new products and services, reducing the time and cost to deploy them into market whilst ensuring they meet both commercial and operational needs.			Q4 Reserve products integrated with foundational market platform for subset of processes  Q3 - Asset register requirements and design Q4 - Asset register development and testing	Q1 - Asset register implementation	- Asset register requirements and design and development and testing phases complete.	integrated through single markets platform. -Asset register implemented providing one place for market participants to register for ESO markets, accessed through Single markets platform.	of Single markets platform (alongside other processes such as contracts and settlements).
A4.4 Deliver a single, integrated	D4.4.2 Common standards, including interoperable systems, a common data model	400 – Single markets platform: Development of this investment should be	Project	This project will not have started in RIIO-1.	Q1 - Day Ahead response market integrated with foundational market	Q3 – Single markets platform Development and testing	- Single markets platform requirements and design aligned with	Single market platform implementation coordinated with	As per year 2.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
platform for ESO Markets	and shared minimum specifications between ESO and other flexibility platforms as well at the distribution level	aligned with DSO services procurement platforms where possible.			<p>platform for subset of processes</p> <p>Q3 – Provide input into ED2 business plans to promote alignment of ESO and DSO markets and platforms</p> <p>Q4 – Single markets platform requirements and design</p> <p>Q4 Reserve products integrated with foundational market platform for subset of processes</p> <p>Q3 - Asset register requirements and design</p> <p>Q4 - Asset register development and testing</p>	<p>Q4 - Procurement of all ESO balancing and ancillary services through single markets platform for full range of processes</p> <p>Q1 - Asset register implementation</p>	<p>developments of other platforms including those for DSO markets as appropriate to maturity of distribution level markets.</p> <p>- Asset register design aligned with developments of other markets including DSO as appropriate to maturity of distribution level markets.</p>	DSO platforms development as appropriate to maturity of distribution level markets.	
A5 Transform access to the capacity market									
A5.1 EMR Delivery Body	<p>D5.1 Continuation of EMR Delivery Body obligations</p> <p>As EMR Delivery Body, we will deliver the prequalification and</p>	N/A	Continuous	The CM is an annual process. By the end of the RIIO-1 period, we will have completed the 2020-21 auctions round, subject to any	<p>Q2 – CM Prequalification opens; CfD Prequalification</p> <p>Q3 – CM Prequalification closes; CfD Auction</p>	<p>Q2 – CM Prequalification opens</p> <p>Q3 – CM Prequalification closes</p>	The quality of our decision-making during the prequalification process is key to promoting high	As per year 1.	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	<p>auction processes for the Capacity Markets (CM) and CfD. We will also deliver our agreement management obligations for the CM. In the changing energy landscape, we will support new and existing participants that wish to compete in evolving capacity and CfD markets. We will do this through the provision of guidance documents, customer briefings and responding to customer queries. We will also ensure that our processes and systems comply with all EMR rules and regulations, and we will support customers to help ensure they are compliant through the EMR processes.</p>			<p>changes in response to the Coronavirus pandemic. As in previous years, we will use the lessons learnt from the 2020-21 auctions process to inform the planning for, and delivery of, subsequent auction rounds, including improvements to processes, guidance and systems.</p>	Q4 - Capacity Market auctions	Q4 - Capacity Market auctions	<p>levels of participation in auctions that are efficient. At the same time, we make sure that applications meet the standards set by Government and Ofgem to ensure fairness and minimise delivery risks. A key measure of success is therefore the number of Delivery Body decisions that get overturned by Ofgem during the Tier 2 disputes process compared to the overall number of applications.</p>		
A5.2 Deliver an enhanced platform for	D5.2 (shared with D4.4) IT system to allow all participants in	400 Single markets platform: Will provide a platform providing	Project	We are running a project to improve the EMR portal	Q1-Q4 – Further enhancements to the EMR portal /	Q1-Q4 – Further enhancements to the EMR portal /	- We will have delivered a significant amount	- We will have ensured that the portal continues	- Auction capability integration with

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
the Capacity Market within the single, integrated ESO markets platform	ESO markets (including CM and CfD) a single point of access for services and data	a full end-to-end customer journey allowing market participants to access the data relating to: how to become a provider (obligations, sign up, test, application progression), contract tender (to see contracts status and manage contracts), unit management (to see what units are registered for, see and change aggregation configurations), dispatch (to access instructions), performance monitoring (to see how units behaved under instructions), payment. 420 Auction capability: This investment will provide extension of the auction capability developed for frequency response		significantly by end of March 2021. This aims to improve the customer experience and deliver a significant amount of regulatory change, including to implement the Government's CM commitments.	implementation of ongoing regulatory change in parallel to development of EMR requirements for Single markets platform  Q2- Q4 - Markets platform requirements and design for full integration and roll out of full range of processes  Q3 - Asset register requirements and design Q4 - Asset register development and testing  Q2-Q4 – Auction capability requirements and design Q3 - Auction capability development and testing	implementation of ongoing regulatory change in parallel to ensure compliance with all BEIS and Ofgem requirements  Q1 - Asset register implementation  Q2 - Q3 – Design and test processes for CM and CfD procured through Single markets platform  Q3 - Markets Platform Development and testing for full integration and roll out of full range of processes  Q4 – EMR integration into Single markets platform	of regulatory-driven change to ensure compliance with all BEIS and Ofgem requirements - Asset register development aligned with other market asset registers as appropriate to maturity of markets and systems	to comply with changing regulatory requirements - CM auctions are accessed through Single markets platform - CM participants are able to register, manage contracts, and receive performance and settlement notifications through single market platform interface	Single markets platform will be in early 2023-24 - Market participants able to participate in market auctions through interface of Single markets platform (alongside other processes such as contracts and settlements).

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		in RIIO-1 to all relevant services.			Q4 - Auction capability implementation				
A5.3 Improve our security of supply modelling capability	<p>D5.3 Use of enhanced modelling and more granular data sets to improve security of supply modelling.</p> <p>In a world of rapidly evolving energy systems, we will need to deploy the latest modelling techniques to ensure we can keep pace with these changes. We will need to develop new data sets, models and methods to correctly model the growing interactions of new generation and the demand side. This will ensure their contributions to security of supply remain appropriate and help to ensure the GB Reliability Standard is met.</p>	<p>220 Data and analytics platform: It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth. It will underpin our advanced data analytics capability that is critical for the data capture and modelling required to improve our security of supply modelling.</p>	Project	<p>- Modelling methodology to calculate available capacity for cross-border participation in capacity markets on a consistent basis across Europe will have been developed in conjunction with ENTSO-E.</p> <p>- The various sources of technology type and capacity data that would enable a robust method to be developed and implemented into the future will have been investigated. In particular information available on embedded generation from implemented Distribution Connection and System Use Agreement (DCUSA) modification is</p>	<p>Q1 - Production of the Electricity Capacity Report</p> <p>Q4 – In line with the prioritisation agreed with the Panel of Technical Experts (PTE), BEIS and Ofgem enhancements will be made to our modelling. Priorities are expected to include;</p> <p>enhancements to the modelling for distributed generation, duration-limited storage and demand response, maximising the use of the data from the DCUSA modification in RIIO-1; and</p> <p>enhancements of European market modelling, as level of interconnection increases over RIIO-2 period.</p>	<p>Q1 - Production of the Electricity Capacity Report</p> <p>Q4 – In line with the prioritisation agreed with the PTE, BEIS and Ofgem enhancements will be made to our modelling. Priorities are expected to include;</p> <p>improved modelling of security of supply for intermittent technology and DSR; support modelling changes to the review of the reliability standards, in particular around the implementation of the clean energy package; and review and continued enhancements of European market modelling, as level of interconnection</p>	The PTE continue to endorse our analysis in response to the changing energy landscape in their published reports	The PTE continue to endorse our analysis in response to the changing energy landscape in their published reports	We will continue to deliver ongoing improvement projects in line with the prioritisation of the PTE, BEIS and Ofgem.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	<p>With growing interconnection across Europe and between Great Britain and other countries, our pan-European modelling needs to be able to better model different markets. We will improve our pan-European modelling in 2021 and 2022. This will include participation of interconnectors and/or European generators in the CM.</p> <p>It will require significant development of the model and data collection to correctly model the interactions of future plant mixes within Europe. It will have to factor in the different operating regimes and security of supply standards across the various European capacity markets.</p>			expected be in use by the end of the period.		increases over RIIO-2 period.			
A6 Develop code and charging arrangements that are fit for the future									

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A6.1 Code management / market development and change	D6.1 Continued facilitation of industry changes to the Grid Code, Connection and Use of System Code (CUSC), System Operator Transmission Owner Code (STC) and Security and Quality of Supply Standards (SQSS). Also, delivery of Great Britain (GB) driven regulatory change	280 - GB regulation: This investment allows us to deliver mandatory GB regulatory and market-driven change which impacts across ESO systems, particularly market operation.	Continuous	N/A	Q1 - IT investment 280 system requirement and design stage Q3 - IT investment 280 development and testing stage Q4 - IT investment 280 implementation stage	Q1 - IT investment 280 system requirement and design stage Q3 - IT investment 280 development and testing stage Q4 - IT investment 280 implementation stage	N/A	N/A	N/A
A6.2 European Union (EU) code change and relationships	D6.2 Continued facilitation of EU driven code changes into GB market. Over RIIO-2, we will increase the size of the team supporting this area to step up our presence in the key working groups and ensure we respond to consultations where we can influence on behalf of GB's consumers. This activity is highly dependent on our overall European	270 EU regulation: This investment enables the mandatory EU regulatory driven change which impacts across ESO systems, particularly market operation.	Continuous	N/A	Q2 - IT investment 270 Capacity Allocation and Congestion Management (CACM) /Common Grid Model (CGM) development and testing Q2 - IT investment 270 Manually Activated Reserves Initiative (MARI) development and testing Q3 - IT investment 270 CACM/CGM implementation	Q3 IT investment 270 clean energy package development and testing Q4 - IT investment 270 clean energy package implementation	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	strategy which will impact our approach and its delivery.				Q3 - IT investment 270 MARI implementation Q4 - IT investment 270 clean energy package requirements and design Q4 - IT investment 270 Project TERRE (Trans European Replacement Reserve Exchange) post go live changes implementation				
A6.3 Industry revenue management	D6.3 Continued managing, collecting and disbursing charges relating to the operation of the transmission system. Also delivering a refresh of charging and billing IT system and changes to the charging regime for CUSC	290 The Charging and Billing (CAB) system manages TNUoS charges, BSUoS charges and connection charges. It generates invoices for market participants to pay the ESO. TNUoS charges go to the TOs, BSUoS charges to ESO, and connection charges are shared. This investment completes the re-engineering of the	Continuous	N/A	Q2 - IT investment 300 access & forward-looking charges changes requirements and design Q3 - IT investment 290 Revenue 21 (CAB Replacement) development and testing Q3 - IT investment 290 targeted charging review changes development and testing	Q3 - IT investment 300 access & forward-looking charges changes development and testing Q4 - IT investment 300 access & forward-looking charges changes implementation	N/A	N/A	N/A



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		<p>charging and billing system, making it much more flexible than the current system, reducing the lead time and cost for change to manage and accommodating the increased number of market participants.</p> <p>300 Charging regime and CUSC changes: This investment enables mandatory market-driven change to the CUSC and/or the charging regime. There are two Ofgem Significant Code Reviews (SCRs) in progress: the Targeted Charging Review and the Access and Forward Looking Charges Review which are expected to drive system changes.</p>			<p>Q4 - IT investment 290 Revenue 21 (CAB Replacement) implementation</p> <p>Q4 - IT investment 290 targeted charging review changes implementation</p>				

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A6.4 Transform the process to amend our codes	<p>D6.4 Change from a code administrator to a code manager</p> <p>Create and own a strategic and incremental industry change plan for our codes.</p> <p>Seek more explicit powers to assess and prioritise code change to ensure the delivery of more strategic change which is expected to be of benefit to consumers.</p> <p>Seek more explicit powers for managing the change process.</p> <p>This will help ensure change is delivered at pace, relevant modelling is undertaken if not available, and we have more ownership of change development and delivery throughout the process.</p> <p>Place more emphasis on engagement with wider stakeholders</p>	N/A	Project	<p>Improvements to code administration implemented including:</p> <p>Easier to read industry emails and processes allowing users to better manage their communication preferences</p> <p>Updated onboarding documentation for new industry parties for ease of access and use</p> <p>Web pages refreshed with plain English content</p>	<p>Q1 - Dedicated ESO legal support for code changes</p> <p>Q2 - Recruit people and set up new teams and investigate the methods to transform the process to amend our codes</p> <p>Q3 - Stakeholder engagement and consultation on the process to amend our codes</p> <p>Q4 - Investigate licence changes required to transform the process to amend our codes</p> <p>Q4 – Create plan to deliver the transformed codes process</p> <p>Q4 – Consult stakeholders on plan to deliver the transformed codes process</p>	<p>Q1 – Initiate licence change to support transform the process to amend our codes</p> <p>Q2 - Begin detailed scoping and prioritising work for new process go live</p> <p>Q3 - Transform the process to amend our codes - Go live (subject to outcome of Energy Codes Review and scope of change required</p> <p>Q4 Strategic and incremental industry change plan implemented</p> <p>Q4 Greater emphasis on larger and more coordinated programmes of work for our codes</p>	<p>Resource in place to deliver transform the process to amend our codes</p> <p>Stakeholder supported plan for transformed codes process in place.</p> <p>Discussion with Ofgem and BEIS initiated on how to deliver change</p>	<p>Prioritisation of strategic change has begun with a new process in place.</p> <p>ESO has created and owns a strategic and incremental industry change plan for our codes.</p> <p>ESO has more explicit powers to assess and prioritise code change and seek necessary amendments to the management of the change process.</p> <p>- Clarity on objectives for remaining years</p>	<p>Strategic change is systematically being prioritised and delivered by year 3 Q1.</p> <p>Part way towards our vision for code manager</p> <p>By year 2 we will not have reached our vision for code manager</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	outside our standard working groups. Make better use of technology through initiatives such as code digitalisation, a more customer-friendly and accessible website, and better information management and communication channels. Provide better user guidance and supporting documents that support self-service, but also have a service-focused and well-resourced team available to be a great critical friend where stakeholders require.								
A6.5 Work with all stakeholders to create a fully digitalised, whole system Grid Code by 2025	D6.5 The Grid code combines transmission and distribution codes in an IT system with AI-enabled navigation and, document and workflow management tools.	330 - Digitalised code management: Investment to transform the stakeholder experience of the code management process through artificial intelligence enabled navigation,	Project	The Grid Code at the transmission level and Distribution code at the distribution level are separate and static documents from a user-experience perspective.	Project not initiated	Q1 - Recruit people and set up project team Q2 - Scope detailed project work plan Q4 - Engage and consult industry, in particular distribution stakeholders, on whole system Grid	Project not initiated	- Detailed project work plan in place - Scope, objectives and capabilities for digitalised whole system Grid Code agreed with stakeholders	Go live of digitalised whole system Grid Code in year 5, 2025/26. The whole system Grid Code will focus on providing

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		and document and workflow management tools.		No work is proposed on this initiative in the RIIO-1 period.		Code and digitalised capability		- IT requirements defined	minimum standards to allow safe and secure operation of the electricity systems. The latest data technologies will support navigation of the codes, tailored to each code user's individual needs. Supporting documents will provide examples of how the requirements might be met. The digitalised, whole system Grid Code will provide users with a more user-friendly, inclusive and tailored experience.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A6.6 Look at fully or partially fixing one or more components of Balancing Services Use of System (BSUoS) charges	<p>D6.6 Delivery of the recommendation from the BSUoS taskforce around reducing the volatility of BSUoS forecasting.</p> <p>This requires the collection of BSUoS to change from an arrangement in which charges are set after the costs have been incurred, to one whereby charges are set on the basis of an ESO forecast. This, in effect, transfers forecasting risk from industry to the ESO. It also fixes the charge in a given period, with any under or over-recovery being accounted for in a subsequent chargeable period.</p>	N/A	Project	<p>This deliverable is highly dependent on the outcome of the Balancing Services Charges Task Force.</p> <p>In November 2019 the first Task Force concluded that Balancing Services Charges should be treated as cost-recovery charges. In order to develop this work further, Ofgem requested a second Balancing Services Task Force, led by National Grid ESO. By the end of RIIO-1 the Task Force is expected to have answered the following questions: Who should be liable for Balancing Services Charges, and; How should these charges be recovered?</p> <p>Further progress is dependent on Ofgem</p>	Q1-Q4 – Continue the process to modify industry codes to allow for a fixed BSUoS – including industry engagement, project implementation and ESO financing arrangements	Q1 - Proposed Go live of fixed BSUoS	Code modifications raised and approved to implement fixed BSUoS.	BSUoS is being charged on a fixed basis.	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				direction following the conclusion of this work.					

### Role 3

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A7 Network Development									
A7.1 Analyse and communicate future network needs	D7.1 <i>Electricity Ten Year Statement (ETYS)</i>	Rely on <i>Network Options Assessment (NOA)</i> tools with no direct IT investments. <i>NOA</i> enhancements investment 390. Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.	Continuous	N/A	N/A	N/A	Enhancements to <i>ETYS</i> .  Approved enhancements to <i>ETYS</i> that results in an increased number of stakeholders leading and engaging with this process.	Enhancements to <i>ETYS</i> .  Approved enhancements to <i>ETYS</i> that results in an increased number of stakeholders leading and engaging with this process.	Continuous  Measurement of consumer value realised because of the <i>NOA</i> process.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A7.2 Advise on economic efficient ways to address networks needs	D7.2 <i>NOA</i> Annual Report	<p>Rely on <i>NOA</i> tools. No direct IT investment.</p> <p>Relies on <i>NOA</i> enhancements investment 390</p> <p>Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.</p>	Continuous	N/A	N/A	N/A	<p><i>NOA</i> methodology evolution.</p> <p>Approved enhancements to the <i>NOA</i> methodology which results in more participants involved in the <i>NOA</i> process.</p> <p>The <i>NOA</i> process document is examined by stakeholders and approved by Ofgem which determines how we will do network options assessment and outlines which recommendation or investments will be taken over the next twelve months.</p>	<p><i>NOA</i> methodology evolution.</p> <p>Approved enhancements to the <i>NOA</i> methodology which results in more participants involved in the <i>NOA</i> process.</p>	<p>Continuous</p> <p>Measurement of consumer value realised because of the <i>NOA</i> process.</p>



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A7.3 Undertake ad hoc analysis in response to external requests	D7.3 Strategic Wider Works projects, Connections and Infrastructure Options Note and Cost Benefit Analysis (CBA) for small schemes	<p>Rely on <i>NOA</i> tools. No direct IT investment.</p> <p>Relies on <i>NOA</i> enhancements investment 390</p> <p>Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.</p>	Continuous	N/A	N/A	N/A	<p>Ad hoc support of Strategic Wider Works projects.</p> <p>Successfully take projects through strategic wider works process.</p> <p>Consulting on Strategic Wider Works.</p> <p>The Strategic Wider Works process will be replaced with the Large Onshore Transmission Investments (LOTI) process. The expectation is to deliver the change to LOTI in Q3.</p>	<p>Ad hoc support of Strategic Wider Works projects.</p> <p>Successfully take projects through the Strategic Wider Works process or LOTI.</p> <p>Consulting on strategic wider works.</p>	<p>Continuous</p> <p>Measurement of consumer value realised because of the <i>NOA</i> process.</p>
A8 Enable all solution types to compete to meet transmission needs									

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A8.1 Rollout of pathfinder approach and optimise assessment and communication of future needs	D8.1 New areas of need identified, and 3-6 tenders run	None	Project	<p><i>Forward Plan:</i></p> <p>Q1: Stability pathfinder outputs have been incorporated into the <i>NOA</i> methodology.</p> <p>Q1: Pennines voltage pathfinder Request for Information (RFI) has been issued, followed by a tender.</p> <p>Q1: Constraints management pathfinder - Stakeholder engagement and commercial aspects are complete.</p> <p>Q3: Pennines voltage pathfinder outputs /recommendation is available.</p> <p>Q4: Constraint management pathfinder outputs are incorporated into the <i>NOA</i> methodology.</p> <p>Status:</p>	N/A	N/A	First year success will result in Stability phase 2 and Pennines voltage tenders being complete.	N/A	<p>The measure of success is that we contract for solutions that are cheaper than if the tender was not run.</p> <p>Measurement of consumer value realised because of the <i>NOA</i> process.</p> <p>Success is having a broader range of options to assess considering that we may use existing solutions if these were the most optimal after further evaluation.</p> <p>Measured by taking the actual balancing mechanism costs compared to actual contract costs.</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				Completed: Short term Mersey; Stability phase 1; Contracts have been released. Underway with: Mersey voltage long term tender (Announced in May 2020); RFI for second phase of stability pathfinder; Evaluating the benefits of the Constraint management pathfinder. Expected: Pennines voltage pathfinder outputs for September 2020.					This facilitates finding solutions to transmission problems from sources other than transmission owners. i.e. Market solution or Distributed Network Operator (DNO) solutions in line with introducing competition into the market and enabling market participants.
A8.2 Enhance tendering models	D8.2 Improved tender approaches that enable more participants to enter the market	None	Project	N/A	Q4: New areas of need identified that will be tendered	Q4: Tenders prepared and run on 2021-22 work	N/A	N/A	D8.2.3 RIIO-2, year 3: year 2023-24: Improved tender approaches that enable more participants to enter the market.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
									<p>Successfully attracted more participants.</p> <p>We have captured feedback that more people are aware of the process and are considering participating.</p>
A8.3 Support Ofgem establish enabling regulatory and funding frameworks	D8.3 Frameworks based on competitive regime not monopoly regime	None	Project	<p><i>Forward Plan</i></p> <p>Q4: Support Ofgem to consider RIIO-2 TO funding implications of competition; identify any other framework changes that may support competition.</p> <p>Status:</p> <p>Completed:</p> <p>Short term Mersey; Stability phase 1; Contracts have been released.</p> <p>Underway with:</p> <p>Mersey voltage long term tender</p>	Q4: Adapt processes to accommodate any new funding arrangements	Q4: Work with industry to implement any other framework changes that may be needed; support Ofgem to consider ED2 funding implications	Complete one Voltage pathfinder and one Stability pathfinder.	Complete one Voltage pathfinder and one Stability pathfinder.	<p>Measure processes and frameworks.</p> <p>Be able to recommend funding solutions.</p> <p>Enable a more levelled playing field for all participants in tender process.</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				(Announced in May 2020); RFI for second phase of stability pathfinder; Evaluating the benefits of the Constraint management pathfinder.  Expected: Pennines voltage pathfinder outputs for September 2020.					
A9. Extend <i>NOA</i> approach to end of life asset replacement decisions and connections wider works									
A9.1 Expand network planning processes to enable more connections wider works to be assessed	D9.1 Developed and trialled connection wider works processes with TOs	Relies on <i>NOA</i> enhancements investment 390  Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between	Project	N/A	Q3: Review existing network planning processes and identify where and how to extend	N/A	N/A	More of the transmission network will be evaluated under <i>NOA</i> processes resulting in reaping the benefits identified in the cost benefit analysis.  Overall objective is to yield benefits for consumers.	Q3: RIIO-2 year 1  Recommendation of network solutions which are outside of historic defined boundaries. Larger portion of the Great Britain (GB) network being assessed through <i>NOA</i> .  Extending <i>NOA</i> and increasing the

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.							defined set of boundaries.  Measurement of consumer value realised because of the <i>NOA</i> process.
A9.2 Trial assessment of all connection wider works in one region	D9.2 Completed and published connection wider works trials, in selected regions, in <i>NOA</i>	Relies on <i>NOA</i> enhancements investment 390  Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we	Project	N/A	N/A	Q4: Complete and publish connection wider works trials	N/A	Connection wider works trials have been included in <i>NOA</i> .	Q4: RIIO-2 year 2  Recommendation of network solutions which are outside of historic defined boundaries. Larger portion of the GB network being assessed through <i>NOA</i> .  Extending <i>NOA</i> and increasing the defined set of boundaries used in the assessment.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.							
A9.3 Expand to all connections wider works	D9.3 Make recommendations on all connections wider works in <i>NOA</i> 2026	<p>Relies on <i>NOA</i> enhancements investment 390</p> <p>Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support</p>	Project	N/A	N/A	N/A	N/A	N/A	<p><i>NOA</i> 2026</p> <p>Recommendation of network solutions which are outside of historic defined boundaries.</p> <p>Larger portion of the GB network being assessed through <i>NOA</i>.</p> <p>Extending <i>NOA</i> and increasing the defined set of boundaries.</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		delivery of all the NOA activities described in the Theme 3 chapter.							
A9.4 Develop process with TOs to input into ESO analysis of end of life asset replacement decisions	D9.4 Efficient planning process agreed with TOs  NOA 2024 makes recommendation on future end of life asset replacement	Relies on NOA enhancements investment 390  Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support	Project	None	N/A	Q4: NOA expertise shared with DNOs  This activity relies on engagement with TOs to determine and agree the eligible set of criteria that will be used to identify equipment that will be included. Identify areas to be evaluated Run through NOA if sensible to do so.	N/A	RIIO-2 year 2 we will start to talk about developing the process and understanding the criteria we will use for defining which equipment will go through the process with TOs. The network development team will facilitate and establish the criteria list.	NOA 2024  Measurement will take place at the end of the RIIO-2 period. Options not historically looked at will go through a cost benefit analysis and be included in NOA. Establish criteria and agreement with TOs on scope of this activity.



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.							
A10. Support decision making for investment at distribution level									
A10.1 Support DNOs to develop <i>NOA</i> type assessment processes	D10.1 <i>NOA</i> expertise shared with DNOs	None	Project	N/A	N/A	Q4: Engage with DNOs to help them develop <i>NOA</i> type proposals for the ED2 business plans	N/A	N/A	<p>Assist DNO to create similar processes by giving them information on our existing <i>NOA</i> processes.</p> <p>Support DNOs who wish to develop their networks in the future.</p> <p>Contingent on DNOs wanting to implement similar <i>NOA</i> type assessment processes.</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A11 Enhance analytical capabilities									
A11.1 Refresh and integrate economic assessment tools to support future network modelling needs	D11.1 Improved identification of when is the most economical time to invest and the most efficient solution	NOA Enhancements investment 390 Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the NOA activities described in the Theme 3 chapter.	Project	Q4: Identify up to 3 new areas for further evaluation.	Q1: Start Economic Assessment (EA) tool refresh Q2-3: Gather requirements and design EA tool	Q4 2021-22-Q3 2022-23: Develop and test EA tool Q4: Implement EA tool	Enable efficiencies Quicker evaluations  Lower cost.  More network being evaluated;  Identify issues.	Enable efficiencies Quicker evaluations  Lower cost.  More network being evaluated  Identify issues.	RIIO-2 year 4; 24/25: Started EA tool refresh (D11.1.5)  This can be measured by measuring savings or efficiencies from NOA that is comparing costs, network coverage, speed of evaluation before and after implementation of each tool enhancement.
A11.2 Implement probabilistic modelling	D11.2 Improved identification of network needs	NOA Enhancements investment 390 Our modelling capabilities underpin all our deliverables in Theme 3 and many in	Project	None	Q1: Gather requirements and design Probabilistic Model (PM) Q2: Develop and test PM		Enable efficiencies  Quicker evaluations  Lower cost.	Enable efficiencies Quicker evaluations  Lower cost	RIIO-2 year 4; 24/25: Developed and implemented online portal (D11.2.4)

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.			Q4: Implement PM		More network being evaluated  Identify issues.	More network being evaluated  Identify issues.	This can be measured by measuring savings or efficiencies from <i>NOA</i> that is comparing costs, network coverage, speed of evaluation before and after implementation of each tool enhancement.
A11.3 Build voltage assessment techniques into an optimisation tool	D11.3 Improved assessment of voltage requirements, and ability to look across a range of network needs at the same time	<i>NOA</i> enhancements investment 390 Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by	Project	None	Q4: Start full Voltage Optimisation (VO) tool development	Q1-Q2: Gather requirements and design VO tool Q3-Q4: Develop and test VO tool	Enable efficiencies  Quicker evaluations  Lower cost  More network being evaluated  Identify issues	Enable efficiencies  Quicker evaluations  Lower cost.  More network being evaluated  Identify issues	RIIO-2 year 3; 23/24: Implemented VO tool and identified further enhancements (D11.3.4) This can be measured by measuring savings or efficiencies from <i>NOA</i> that is

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.							comparing costs, network coverage, speed of evaluation before and after implementation of each tool enhancement.
A11.4 Build stability assessment techniques into an optimisation tool	D11.4 Subject to modelling tools, online portal available allowing stakeholders to see visual representation of network needs	<i>NOA</i> enhancements investment 390 Our modelling capabilities underpin all our deliverables in Theme 3 and many in Theme 4, enabling us to unlock significant benefits. We need to manage the increasing number of scenarios and modelling complexity driven by the growing interaction between different network needs. The better we understand likely needs, the better we can identify where and	Project	N/A	N/A	Q2: Start full Stability Assessment (SA) tool development Q3-Q4: Gather requirements and design SA tool	N/A	Enable efficiencies  Quicker evaluations  Lower cost  More network being evaluated  Identify issues.	RIIO-2 year 4; 2024-25: Implemented SA tool (D11.4.4)  Enable efficiencies, greater insights into the future network requirements and how to meet them. This can be measured by measuring savings or efficiencies from <i>NOA</i> that is comparing costs,

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		when to invest most efficiently. These investments are necessary to support delivery of all the <i>NOA</i> activities described in the Theme 3 chapter.							network coverage, speed of evaluation before and after implementation of each tool enhancement.
A12 Review Security and Quality of supply standard (SQSS)									
A12.1 Scope project, building on the BEIS recommendations	<p>D12.1.1 SQSS review fully scoped and target issues agreed – use and build upon recommendations from the BEIS review of technical standards</p> <p>D12.1.2 Engaged with relevant stakeholders to validate scope, identifying and agreeing target issues to be addressed</p>	N/A	Project	Evaluation of recommendations from BEIS review of technical standards	<p>Q1: Engage key stakeholders and initiate scope review</p> <p>Q2: Establish and publish initial review scope including evaluation of options for greater levels of co-ordination / consistency between Transmission &amp; Distribution standards.</p> <p>Q4 Engage with stakeholders re scope and target issues</p>	N/A	Key stakeholders engaged on the review; Scope published and views sought from key stakeholders.	N/A	2021-22 Key stakeholders have engaged on the review and their views have been captured in the scoping process. Initial review scope published.
A12.2 Identify solutions	D12.2.1 Potential solutions identified	N/A	Project	Evaluation of recommendations	N/A	Q1 – Q4: Work with industry	N/A	Industry forums used to progress the	2024-2025 Potential solutions

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	to the issues in scope and future direction of the review established			from BEIS review of technical standards		forums to identify potential solutions and discuss direction (plan) of the review including timeframes; seek opportunities to undertake process changes and /or quick wins ahead of SQSS change		review, engage key stakeholders and identify potential solutions; meeting outcomes are published for wider industry transparency.	identified to the issues set out in the scope.
A12.3 Implement changes to the SQSS	D12.3 Key changes made to the SQSS or are in progress in line with proposed solutions	N/A	Project	Evaluation of recommendations from BEIS review of technical standards	N/A	Q2-Q4: Use industry forum meetings to progress against the plan and publish meeting outcomes; seek opportunities to undertake process changes and /or quick wins ahead of SQSS change	N/A	Industry forums used to progress the review, engage key stakeholders and identify potential solutions; meeting outcomes are published for wider industry transparency	2025-2026 Proposed changes agreed and implementation planned; ESO-related changes implemented; key stakeholders actively engaged throughout the review and agreed initial scope maintains direction of the review.
A13. Leading the debate									
A13.1 Carry out analysis and scenario modelling on future energy demand	D13.1 Published <i>Future Energy Scenarios (FES)</i> , <i>Winter Outlook</i> and <i>Review, Summer</i>	N/A	Continuous	N/A	Q1: <i>Winter Review</i> Q2: <i>FES</i> Call for Evidence Q2: <i>FES</i> Launch	Q1: <i>Winter Review</i> Q2: <i>FES</i> Call for Evidence Q2: <i>FES</i> Launch Q2-Q3: <i>FES</i>	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	<i>Outlook</i> and other thought pieces				Q2-Q3: <i>FES</i> Network Forum (new) Q3: <i>FES</i> Stakeholder Feedback Document Q3: <i>Winter Outlook</i> Q4: <i>Summer Outlook</i>	Network Forum (new) Q3: <i>FES</i> Stakeholder Feedback Document Q3: <i>Winter Outlook</i> Q4: <i>Summer Outlook</i>			
A13.2 Conduct mathematical and modelling and market research on local and wider geographic demand information	D13.2 Created pan-European and country level electricity and energy demand models	N/A	Continuous	N/A	Q1: Gather new data and information inputs and cleanse Q2: Identify model improvement requirements Q3: Implement improvements Q4: Conduct modelling	N/A	N/A	N/A	N/A
A13.3 Maintain external communication channels with consumers and stakeholders	D13.3 Shared insights on future energy expectations and requirements	N/A	Continuous	N/A	Q1: Develop a communication strategy aligned to target audiences Create future energy insights content to share through selected channels	N/A	N/A	N/A	N/A
A13.4 <i>FES: Bridging the gap to net zero</i>	D13.4 Provided insights and analysis beyond <i>FES</i> to	N/A	Project This work will require a project to	N/A	Q3: Establish broader industry engagement and events	Q3: Establish broader industry engagement and events	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	inform energy policy development		mobilise and embed the new changes into the existing process, however there are no specific deliverables related to this project besides enabling the existing process.		Q4: Published focussed and deeper whole energy system reports	Q4: Published deeper whole energy system reports			
A13.5 <i>FES</i> : Integrating with other networks	D13.5.1 Replaced electricity demand model, within Whole system/net zero modelling	Investment 220. Data and analytics platform. The data and analytics platform will be delivered under D1.4.1 Creation of a data and analytics platform. Key milestones relevant to this deliverable are: Data platform foundation delivered including successful testing of plug-and-play approach with modules in	Project	(FP) Publication: Identify and progress the actions that need to happen to meet the net zero target (Q3-4). Publication is available on the ESO Website. Successfully published RIIO-1 Q4.	Q2: Completed electricity demand modelling requirements gathering and design work.	Q2: Developed and tested model  Q4: Implemented model	Electricity demand modelling requirements compiled and well understood by stakeholders.	Model built, tested and delivered. New models have replaced existing models.	N/A



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		development/delivery phase							
A13.5 <i>FES</i> : Integrating with other networks	D13.5.2 Developed new energy demand model	Investment 220. Data and analytics platform. The data and analytics platform will be delivered under D1.4.1 Creation of a data and analytics platform. Key milestones relevant to this deliverable are: Data platform foundation delivered including successful testing of plug-and-play approach with modules in development/delivery phase	Project	N/A	Q3: Completed review of available energy data and established stakeholder modelling requirements	Q1: Developed energy demand model plan, including pilots and full scale development.  Q3: Built, tested and validated model  Q4: Implemented model	Electricity demand model completed. Review of available energy data and established stakeholder modelling requirements.	Developed energy demand model plan, including pilots and full scale development. Built, tested and validated model Implemented model.	Provides longer term forecasting by incorporating annual profiles and vectors while integrating currently separate models such as transport.
A14 Take a whole electricity system approach to connections									
A14.1 Provide contractual expertise and management of connection contracts including provision of connection offers to customers	D14.1.1 Managing an increasing volume of connection offers for customers  D14.1.2 Contract management of connection agreements	N/A	Continuous	N/A	As required	As required	N/A	N/A	N/A

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A14.2 Ensure Grid Code compliance of new connections	D14.2.1 Compliance monitoring of new connections in accordance with Grid Code provisions	N/A	Continuous	N/A	As required	As required	N/A	N/A	N/A
A14.3 Further enhance the customer connection experience, including broader support for smaller parties	D14.3.1 Establish dedicated Distributed Energy Resource (DER) account management function – this is to support smaller parties who may have transmission-related issues with their connection applications.	N/A	Continuous	N/A	Q1: review DER internal processes; engage customers and foster closer working relationships with DNOs on new proposed function  Q2: establish DER management function; engage with customers on the new function  Q4: request feedback from customers and DNOs	Continue to deliver function and make improvements using customer feedback	Function established  Positive feedback from DER customers and DNOs on our service	Demonstrable changes in line with customer feedback.  Further positive feedback from DER customers and DNOs on our service	Positive feedback from DER customers and DNOs on our service
A14.3 Further enhance the customer connection experience, including broader support for smaller parties	D14.3.2 Deliver first whole electricity system connections seminar – these seminars will incorporate DNO input in addition to existing involvement from the TOs to the customer seminars	N/A	Project	Deliver customer seminars using current approach.	Q4: engage with DNOs on new approach to forthcoming seminar	Q1: prepare and plan for whole system seminar; engage DNOs and TOs on approach and content  Q2: engage TOs and DNOs on seminar	N/A	Positive feedback from customers who attend the seminar and DNOs on the development and preparation process	Q2 2022 / 23; success measured by positive feedback from customers on the first whole electricity system seminar and extent to which DNOs have

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	that we already offer to customers					preparation and content; deliver first whole system seminar  Q3: gather and process feedback on seminar			engaged with seminar delivery.
A14.3 Further enhance the customer connection experience, including broader support for smaller parties	D14.3.3 Whole electricity system connection seminars on an ongoing basis having delivered the first one in the previous deliverable	N/A	Continuous	N/A	N/A	Q4: refine seminar planning and engagement process from first seminar; deliver second whole system seminar	N/A	Demonstrable changes to seminars in line with customer feedback  Further positive feedback from customers who attend the seminar	Ongoing; success measured by demonstrable changes in line with customer feedback and ongoing positive feedback from customers on the seminars and attendance rates.
A14.4 Facilitate development of the customer connections hub	D14.4.1 Implement first phase of the ESO connections hub, including online account management and integration with other network organisation websites	IT investment ref 380 Connections Portal – this is the IT investment that will enable delivery of the connections hub and electronic management of the connections contracting process, providing an interface for customers, TOs and (ultimately) DNOs.	Project	Agreed way forward with TOs (on their respective portal proposals) on coordinated delivery of portal functionality, including outline plan for delivery.	Q1: commence project start up; engage the TOs on their portal proposals  Q2: conduct work on requirements & design; engage with key stakeholders and TOs  Q3: develop & test NGESO portal;	Ongoing agile developments of the portal:  Q1: further development & testing; engage with customer focus group and TOs;  Q2: implementation of updates to NGESO portal	We are aligned with TOs on our respective proposed portal solutions  We have engaged with customers to develop and test key outward-facing aspects of the portal  We have reached the first	Phase 1 of connection hub complete, enabling Transmission customers to view and manage their connection contracts online and providing central point for the GB connections process Connection process runs smoothly and efficiently for customers	Phase 2 of connection hub to be complete in Q4 2025 / 2026, helping to navigate customers and providing a seamless connection process to transmission & distribution electricity networks across

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
					<p>establish a customer focus group for testing &amp; engage TOs to align with their portals</p> <p>Q4: implementation; check in with key stakeholders</p>	<p>Q3: further development &amp; testing; engage with customer focus group and TOs to further align with their portals</p> <p>Q4: implementation of phase 1 of the connections hub</p>	implementation phase of agile development		GB; demonstrated through positive customer feedback
A14.4 Facilitate development of the customer connections hub	D14.4.2 Phase 2 of the connections hub concluded	IT investment ref 380 Connections Portal – this is the IT investment that will enable delivery of the connections hub and electronic management of the connections contracting process, providing an interface for customers, TOs and (ultimately) DNOs.	Project	Agreed way forward with TOs (on their respective portal proposals) on coordinated delivery of portal functionality, including outline plan for delivery.	N/A	N/A	N/A	N/A	Phase 2 of connection hub to be complete in Q4 2025 / 2026, helping to navigate customers and providing a seamless connection process to transmission & distribution electricity networks across GB; demonstrated through positive customer feedback
A15 Taking a whole energy system approach to promote zero carbon operability									

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A15.1 Develop the <i>System Operability Framework (SOF)</i> and provide solutions up to real time of ownership of network related operability issues.	D15.1.1 <i>System Operability Framework (SOF)</i> documentation – to identify and quantify operability needs in short and long-term planning timescales, encouraging the development of market-based solutions wherever possible D15.1.2 Innovation projects developing new operability solutions – undertake innovation projects, as appropriate, to test operability solutions	N/A	Continuous	Production of the Operability Strategy report	As required	As required	Positive Stakeholder feedback on clarity of future requirements  Linkage between requirements and solutions in deployment	Positive Stakeholder feedback on clarity of future requirements  Linkage between requirements and solutions in deployment or deployed	Ongoing; 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, tested through innovation projects where relevant
A15.2 Provide technical support to the connections process	D15.2.1 Updates to customer offers and agreements – provide technical support to the connection offer process and assess offers to determine future operability need	N/A	Continuous	N/A	As required and provide technical support to delivery of the connections hub in activity group A14.	As required and provide technical support to delivery of the connections hub in activity group A14	Content for agreements issued within licence deadline	Content for agreements issued within licence deadline	Ongoing; Future system operability strategy accounts for technical capabilities of future connections.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A15.3 Assess the technical implications of framework developments and implement changes into business procedures and systems.	D15.3.1 Changes to business procedures and processes following framework developments – provide technical expertise to development of Codes and Standards and assess impact of change to operability processes	N/A	Continuous	N/A	As required	As required	Change delivered in line with Mod Implementation	Change delivered in line with Mod Implementation	Ongoing; amendments to technical codes and standards are appropriate; and any consequential change to ESO internal processes (and, where appropriate, external industry processes) are made in a timely and efficient way.
A15.4 Manage operational data and modelling requirements for the ESO	D15.4.1 Data transfers between network organisations in accordance with Grid Code requirements – managing operational data flows across network companies to underpin offline network analysis in the ESO	N/A	Continuous	N/A	As required	As required	Data received and delivered in line with Grid Code Requirements	Data received and delivered in line with Grid Code Requirements	Ongoing; Data transfers occur in accordance with Grid Code provisions and fed into internal models / processes as appropriate.
	D15.4.2 Technical modelling for use across the ESO – ongoing development and support of system data and models	N/A	Continuous	N/A	N/A	N/A	All <i>ETYS</i> and <i>NOA</i> models delivered to time and quality	All <i>ETYS</i> and <i>NOA</i> models delivered to time and quality	Ongoing; Teams within the ESO have latest offline model developments and data.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	used to analyse future network needs and operability solutions by different teams in the ESO								
A15.5 Develop Regional Development Programmes (RDPs)	D15.5.1 Start RDP1 of RIIO-2 – Regional development plans provide a means to working with other network parties to facilitate connection of low carbon energy sources in capacity constrained areas. We plan to undertake 6 RDPs in RIIO-2	IT investment reference 340 RDP Implementation and Extension - This investment will provide the ESO with greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DNOs thereby facilitating the RDP process.	Project	Q4 2020 -21: RDP1 detailed development complete	Q1: start RDP1 IT requirements and design stage;  Q3: IT Requirements & design stage complete  Q4: IT Development & testing phase commences	Q4: IT implementation phase for RDP1 complete	RDP1 IT commenced; Requirements and design stage for investment 340 complete	RDP1 established; Positive feedback received from RDP partner on progress; IT investment 340 progressed to the first implementation phase	RDP 1 completed in Q4 2022-23 with learnings feeding into ENA Open Networks project and the development of future RDPs.  This will result in the connection of new zero carbon DER and the development of a co-ordinated flexibility market.
A15.5 Develop Regional Development Programmes (RDPs)	D15.5.2 Start RDP2 of RIIO-2 - Regional development plans provide a means to working with other network parties to facilitate connection of low carbon energy sources in capacity constrained areas.	IT investment reference 340 RDP Implementation and Extension - This investment will provide the ESO with greater visibility and control of parties connected to distribution networks.	Project	Outline RDP scoping complete	Q1: detailed RDP development commences  Q2: detailed RDP development complete	Q1: IT Requirements & design stage complete;  Q2: IT development & testing commences	RDP2 detailed solution scoping complete	RDP2 IT commenced; Requirements and design stage for investment 340 complete	RDP2 completed in 2023-24 with learnings feeding into ENA Open Networks project and the development of future RDPs.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	We plan to undertake 6 RDPs in RIIO-2	It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating the RDP process.			Q3: Start RDP2 IT requirements and design phase				This will result in the connection of new zero carbon DER and the development of a co-ordinated flexibility market.
A15.5 Develop Regional Development Programmes (RDPs)	D15.5.3 Start RDP3 of RIIO-2 - Regional development plans provide a means to working with other network parties to facilitate connection of low carbon energy sources in capacity constrained areas. We plan to undertake 6 RDPs in RIIO-2	IT investment reference 340 RDP Implementation and Extension - This investment will provide the ESO with greater visibility and control of parties connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating the RDP process.	Project	Outline RDP scoping initiated	Q2: outline need for RDP 3 identified Q3: detailed RDP development starts Q4: detailed RDP development complete	Q1: Start RDP3 IT requirements and design phase Q3: IT Requirements & design stage complete; Q4: IT development & testing commences	Outline need for RDP 3 identified; detailed RDP solution scoping complete	RDP3 IT commenced; Requirements and design stage for investment 340 complete	RDP3 completed in 2023-24 with learnings feeding into ENA Open Networks project and the development of future RDPs  This will result in the connection of new zero carbon DER and the development of a co-ordinated flexibility market.
A15.5 Develop Regional Development Programmes (RDPs)	D15.5.4 Start RDP4 of RIIO-2 - Regional development plans provide a means to working with other network parties to facilitate connection of low carbon energy	IT investment reference 340 RDP Implementation and Extension - This investment will provide the ESO with greater visibility and control of parties	Project	RDP4 not yet initiated	Q4: identify outline need for RDP 4	Q1: detailed RDP development starts Q3: detailed RDP development complete	Outline need for RDP 4 identified	Detailed RDP solution scoping complete	RDP4 completed in 2024-25 with learnings feeding into ENA Open Networks project and development of future RDPs.



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	sources in capacity constrained areas. We plan to undertake 6 RDPs in RIIO-2	connected to distribution networks. It will provide an integrated real-time data exchange, situational awareness and dispatch capability with DSOs thereby facilitating the RDP process				Q4: Start RDP4 IT requirements and design phase			This will result in the connection of new zero carbon DER and the development of a co-ordinated flexibility market.
A15.6 Transform our capability in modelling and data management	D15.6.1 Phase 1 data management scoping complete to feed into data & analytics platform (see Theme 1 D1.4.1) – modelling and data expertise will be used to scope requirements for the data & analytics platform	IT investment reference 220 Data & Analytics platform - This platform is foundational work to unlock the value of the data we hold and will be the key technology underpinning all our internal and external data management. This deliverable supports the delivery of the IT investment.	Project	Q4 2020 / 2021: Initial O/N Grid Code mods complete on Transmission-Distribution data exchange	Q2 Phase 1 modelling scoping complete to feed into requirements and design stage of the data & analytics platform (foundation implementation).	N/A	Scoping work enables timely progression of the platform foundation implementation; key stakeholders have been engaged on the scope.	N/A	2025-26 Data & analytics platform is complete; Clear code requirements are in place to support appropriate exchange and use of data; customers can access data on the platform via APIs, for their own analysis.
A15.6 Transform our capability in modelling and data management	D15.6.2 Further Grid Code mods (arising either from O/N 2020 work programme or alternative discussions with industry participants)	IT investment reference 220 Data & Analytics platform - This platform is foundational work to unlock the value of the data we hold and will be the key technology	Project	Q4 2020 / 2021: Initial O/N Grid Code mods complete on Transmission-Distribution data exchange	Q1: Determine what data is required, from which parties and any associated issues with obtaining the data. Any further data-driven Grid Code	N/A	Code modifications and / or agreements are developed with parties to facilitate data requirements for new processes and data platform.	N/A	Frameworks are in place to support appropriate exchange and use of data by the ESO, network companies and other

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	completed – such modifications may be required to facilitate more data exchange between parties as guided by the Open Networks 2020 work programme.	underpinning all our internal and external data management. This deliverable supports the delivery of the IT investment.			<p>mods scoped and raised as required.</p> <p>Q2-Q3: Code mods or agreements to obtain new data progressed in accordance with governance requirements as required</p> <p>Q4: Grid Code mods submitted for approval / agreements progressed to facilitate Transmission-Distribution data exchange</p>		Relevant stakeholders engaged in the process.		stakeholders through the data and analytics platform.
A15.6 Transform our capability in modelling and data management	D15.6.3 Phase 2 modelling scoping complete to feed into data & analytics platform extension (see Theme 1)	IT investment reference 220 Data & Analytics platform - This platform is foundational work to unlock the value of the data we hold and will be the key technology underpinning all our internal and external data management.	Project	Q4 2020-21: Initial O/N Grid Code mods complete on Transmission-Distribution data exchange	N/A	Q2: modelling scoping complete to feed into platform extension requirements phase	N/A	Scoping work enables timely progression of the platform extension implementation; key stakeholders have been engaged on the scope	2025-26: Data & analytics platform extension complete; The platform allows ESO customers to make quicker and more accurate decisions; Customers are able to extract and feed the data

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		This deliverable supports the delivery of the IT investment.							into their own analytics tools.
A15.6 Transform our capability in modelling and data management	D15.6.4 Data analytics platform foundation in place (see Theme 1)	IT investment reference 220 Data & Analytics platform - This platform is foundational work to unlock the value of the data we hold and will be the key technology underpinning all our internal and external data management. This deliverable supports the delivery of the IT investment.	Project	Q4 2020-21 Initial O/N Grid Code mods complete on Transmission-Distribution data exchange	N/A	Q3 Data & analytics platform foundation complete.	N/A	Data platform foundation delivered including successful testing of plug-and-play approach with modules in development/delivery phase	2025-26 Data & analytics platform complete; The platform allows ESO customers to make quicker and more accurate decisions; Customers are able to extract and feed the data into their own analytics tools.
A15.6 Transform our capability in modelling and data management	D15.6.5 Data platform extension complete (please see deliverable D1.4.1 for further details) – once the data & analytics platform foundation is complete, an extension will be developed as new tools are delivered.	IT investment reference 220 Data & Analytics platform - This platform is foundational work to unlock the value of the data we hold and will be the key technology underpinning all our internal and external data management. This deliverable supports the delivery of the IT investment.	Project	Q4 2020-21 Initial O/N Grid Code mods complete on Transmission-Distribution data exchange	N/A	Q2 modelling scoping complete to feed into platform extension phase	N/A	Modelling scoping complete and sufficient to inform timely progression of platform extension.	2025-26 Data & analytics platform extension complete. The platform allows ESO customers to make quicker and more accurate decisions; Customers are able to extract and feed the data into their own analytics tools.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A15.6 Transform our capability in modelling and data management	D15.6.6 Capacity Allocation and Congestion Management (CACM) & short circuit levels go live in Offline Network to support capacity validation process	IT investment ref 360 Offline network modelling – required to enhance network modelling tools to enable larger volumes of data, and a greater number of scenarios to be modelled. These modelling tools will be integrated with the Data & Analytics platform.  IT investment ref 270 EU Regulation - This investment enables the mandatory European Union (EU) regulatory driven change which impacts across ESO systems, particularly market operation.	Project	N/A	Q1, Q2 Engagement with TOs  Q3 CACM and short circuit go-live in offline network modelling	N/A	Modelling tools upgraded to support CACM capacity validation process	N/A	2021-22 capacity validation process implemented
A15.6 Transform our capability in modelling and data management	D15.6.7 Deeper Outage Planning go live in Offline Network Modelling - this will enable higher volumes of network data, regional models and outage planning data to be exchanged,	IT investment ref 360 Offline network modelling - required to enhance network modelling tools to enable larger volumes of data, and a greater number of scenarios to be modelled. These modelling tools will be	Project	Complete the Offline Transmission Assessment (OLTA) hardware refresh to facilitate enhanced modelling capability.	Q4 feed findings from deliverable A16.3.2 into future modelling scoping and development	Q4 feed findings from deeper access trials into offline network modelling development	Findings and recommendations outputs from deliverable A16.3.2 are fed into model development.	Offline network models are developed in accordance with learning from deeper access planning trials and implementation roll out plan; key stakeholders engaged in the model development process	2023-24 Deeper access planning processes and models go-live; Increased co-ordination between parties resulting in optimisation of flows across the

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	used and shared by network companies	<p>integrated with the Data &amp; Analytics platform.</p> <p>IT investment ref 350 Planning &amp; outage data exchange - outage planning and data exchange systems to enable a whole system approach to access networks, manage significantly increased data volumes, and provide interactive stakeholder engagement.</p>							<p>networks and network access. First phase of agile IT enhancements to enable deeper outage planning complete</p>
A15.7 Deliver an operable zero carbon system by 2025	D15.7.1 Commence System State Targeted Monitoring and Control System (MCS) stage roll out – this activity seeks to roll out a system that has been tested on a small scale via the Enhanced Frequency Control Capability (EFCC) innovation project and is comprised of 5 phases.	IT investment ref 500 – this investment is for a wide area monitoring and control system (MCS). It enables coordinated, fast frequency response, allowing a wide range of technologies to participate in managing system frequency to keep the system stable. It can therefore facilitate	Project	Phase 1 implementation of the MCS complete and NIA funding secured.	<p>Q1 Complete Phase 2 Requirements and design;</p> <p>Q2-Q3 Phase 2 Development and testing; engagement with key stakeholders</p> <p>Q4 Commence Phase 3 Implementation</p>	<p>Q1-Q3 Phase 3 implementation</p> <p>Q1 Phase 4 Start-up</p> <p>Q2-Q4 Phase 4 Requirements and design; engage with key stakeholders</p>	Phase 2 of the roll out complete and reported; Phase 3 of roll out commenced	Phase 3 of the roll out complete and reported; Phase 4 of the roll out commenced	2025-26 Roll out of Stage 1 of the MCS complete and facilitates, along with other Theme 1 investments, our ability to operate a zero carbon system; Stage 2 roll out of the MCS commenced

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
		zero carbon operation by 2025.							
A.15.8 Provide technical support to DSO and whole electricity system alignment	D15.8.1 Completion of any DSO associated code changes ahead of RIIO-ED2 to facilitate system operation activities.	N/A	Continuous	Q3 2020-21 Active engagement in the development of DSO and co-ordinated flexibility markets including Open Networks DSO Implementation Plan	Q1-Q4 Progress relevant DSO associated Code mods ahead of RIIO-ED2;  Q1-Q4 Undertake active engagement in the Open Networks project and lead Work Stream 4 Whole Energy Systems; support the RIIO-ED2 development process.	Q1-Q4 Undertake active engagement in the Open Networks project and lead Work Stream 4 Whole Energy Systems; support the RIIO-ED2 development process.	DSO associated Code changes initiated in readiness for RIIO-ED2.  The ESO has been actively engaged in the Open Networks Project and work stream 4 and RIIO-ED2 development process.	The ESO has been actively engaged in the Open Networks Project and work stream 4 and RIIO-ED2 development process.  DSO associated Code changes completed in readiness for RIIO-ED2.	The ESO has been actively engaged in the Open Networks project and work stream 4; Operational standards and frameworks are being considered and developed on a whole system basis
A.15.8 Provide technical support to DSO and whole electricity system alignment	D15.8.2 Review of aligned technical standards completed – this review will be led by BEIS and requires active engagement from industry participants	N/A	Project	N/A	Q2 Engage with the review scoping process	Q1-Q4 provide ongoing technical expertise and engagement with the technical standards review	Active engagement on the review	Active engagement on the review.	2023 / 2024 Outcome of review expected to be published and the ESO has provided technical input.
A15.9 Identify Future operability needs across whole energy system	D15.9.1 Trial new innovation projects for whole energy system operability	N/A	Continuous	N/A	Q1-Q4 Evolve existing approach to identifying innovation projects	Q1-Q4 seek innovation project opportunities to trial whole energy system operability	N/A	Ongoing proactive external engagement, for example through Open Networks WS4; Innovation projects	Innovation projects result in increased understanding and potential

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
					to give a broader cross-vector view	tools; provide technical support to ESO innovation events such as Open Innovation days and to initiatives driven by external stakeholders.		progressed as appropriate.	tools for future operability challenges; findings from innovation projects published to industry, along with progression plans as appropriate
A15.9 Identify Future operability needs across whole energy system	D15.9.2 Commence RDP approach to whole energy system challenges – build on the RDP approach used in the electricity sector to develop cross sector operability solutions	N/A	Project	N/A	N/A	N/A	N/A	N/A	2024-25 RDP approach to whole energy system challenges commenced, working closely with stakeholders (for example via Open Networks WS4/Whole Energy System work plan); scope and undertake first whole system/cross-vector RDP alongside key industry stakeholders
A15.9 Identify Future operability needs across whole energy system	D15.9.3 Second whole energy system RDP launched	N/A	Project	N/A	N/A	N/A	N/A	N/A	2025-26 Take emerging learnings from the first whole system/cross-

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
									vector RDP to develop the second project.
A15.9 Identify Future operability needs across whole energy system	D15.9.4 Whole system operability framework published – this extends the ethos of the current system operability reports to cover a wider range of parties and challenges	N/A	Project	N/A	N/A	N/A	N/A	N/A	2025-26 Whole system operability framework published with key industry stakeholders having been engaged in the process; positive feedback received on framework
A15.10 Develop a regime for an integrated offshore grid	D15.10.1 Initial scoping report published	Network analysis implications going forward.	Project	Q2 - Gap analysis and scope of Phase 2; Q3 - Phase 1: Complete technical analysis and Cost Benefit Analysis (CBA), including system analysis on conceptual offshore designs (Note 1); Q4 - Deliver Phase 2  <u>Notes</u> Dependency. Relies on Theme 3 tools: NOA	This work may result in a new ongoing role for the ESO, pending its outcome.	Ongoing	Ongoing	Ongoing	Initial report delivered in RIIO-1 Q4 potentially with an ongoing role into the RIIO-2 period, depending on the outcome of the project.  Allows us to progress with best approach to connecting offshore projects for consumers and coastal communities.



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				Enhancements Investment. 390 Economic Assessment Probabilistic Modelling Voltage Optimisation Stability Assessment					
A16 Delivering consumer benefits from improved network access planning									
A16.1 Manage access to the system to enable the TOs to undertake work on their assets, liaising with customers where access arrangements impact them.	D16.1.1 Year ahead regional outage programmes developed in liaison with network parties.	IT investment ref 350 Planning and outage data exchange, (Ongoing agile process enhancements)	Continuous	Transmission Outage and Generation Availability (TOGA) system replacement complete	Q4 deliver regional outage programmes	Q4 deliver regional outage programmes	N/A	N/A	N/A
A16.1 Manage access to the system to enable the TOs to undertake work on their assets, liaising with customers where access arrangements impact them.	D16.1.2 Detailed week and day ahead operational documentation produced for National Control	IT investment ref 350 Planning and outage data exchange (Ongoing agile process enhancements)	Continuous	TOGA system replacement complete	Weekly / Day ahead	Weekly / Day ahead	N/A	N/A	N/A.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A16.2 Enhance the Network Access Policy (NAP) process with TOs	D16.2.1 Great Britain (GB) wide NAP process goes live including extension of the existing SO-TO payment mechanism to the whole of GB; investigate, with TOs, any further mechanisms that will drive consumer value in this area ahead of RIIO-2	N/A	Project	Work with the GB TOs to develop NAP proposals; Development of proposals to extend SO-TO mechanism to whole of GB and explore other mechanisms that might drive further value; Commence development for increasing outage change cost visibility via an innovation project; Code changes submitted to authority for approval and licence changes agreed with Ofgem to facilitate go-live	Q1 GB wide NAP process go-live (and any further mechanisms progressed as appropriate)  Q3 review process with TOs and discuss process improvement  Q4 provide increased visibility of outage change cost	Becomes continuous process	NAP process and cost transparency ready to go-live in Q1 with positive relationships with TOs	Process reviewed and discussed at TO meetings.	Ongoing success is the value created through more efficient access planning and working with network parties. Greater visibility of outage change costs allow network parties to assess the possible impact of their actions.
A16.3 Work more closely with DNOs and DER to facilitate network access	D16.3.1 Conclude trials on closer working relationships with DNOs and DER – to enhance co-ordination of system access and development of	N/A	Project	Trial for closer working relationships established and underway	Q1-Q2 Ongoing engagement with trial partner(s) Q2 Completion of trials Q3 Trials concluded	N/A	Enhanced working relationship reflecting joint desire of trial participants to improve network access; lessons learned by all parties; interest	N/A	Q4 2023 / 2024 Deeper access planning go-live; Increased co-ordination between parties resulting in optimisation of flows across the

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	flexibility markets (commenced in <i>2019-21 Forward Plan</i> )						from non-trial parties to be involved		networks and network access.
A16.3 Work more closely with DNOs and DER to facilitate network access	D16.3.2 Learnings from trials shared alongside recommendations for GB roll out such that best practice is applied to ongoing processes	N/A	Project	Trial for closer working relationships established and underway	Q3 Engage relevant parties on conclusions and learnings from trials; feed findings into RIIO ED-2 business planning processes  Q4 Develop and then share learnings and recommendation for GB roll out	Progress recommendations in accordance with GB roll out recommendation; engage with relevant parties to support successful delivery	Agreed published statement on trial learnings and recommendations for broader process improvements.	Implementation of any relevant recommendations; Positive stakeholder feedback and increased co-ordination between parties	Q4 2023 / 2024 Deeper access planning go-live; Increased co-ordination between parties resulting in optimisation of flows across the networks and network access.
A16.3 Work more closely with DNOs and DER to facilitate network access	D16.3.3 Finalise new processes in readiness for approval of code modifications to facilitate closer working relationships and data exchange/modelling – this will ensure that frameworks support any new enduring processes developed in A16.3.1 and A16.3.2	N/A	Project	Trial for closer working relationships established and underway	N/A	Q1 Code modification requirements assessed, scoped and raised as required  Q2-Q4 Modifications progressed through governance  Q4 Code change process concluded; mods	N/A	Frameworks support and facilitate new processes between parties.	Q4 2023 / 2024 Deeper access planning go-live; Increased co-ordination between parties resulting in optimisation of flows across the networks and network access.

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
						submitted to Authority for decision			
A16.3 Work more closely with DNOs and DER to facilitate network access	D16.3.4 Deeper access planning go-live – frameworks, processes and models are in place to facilitate deeper access planning with network parties	IT investment refs 350 Planning and outage data exchange, and 360 Offline network modelling – These investments include proposals to exchange more data (including for DER) and models with stakeholders, and enhance our modelling tools to enable deeper outage planning.	Project	Trial for closer working relationships established and underway. TOGA system replacement complete. Offline Transmission Assessment (OLTA) Hardware Refresh Complete	Q4 feed findings from deliverable A16.3.2 into future modelling scoping and development	Q4 feed findings from deeper access trials into offline network modelling development	Findings and recommendations outputs from deliverable A16.3.2 are fed into model development.	Offline network models are developed in accordance with learning from deeper access planning trials and implementation roll out plan; key stakeholders engaged in the model development process	2023 / 2024 Deeper access planning processes go-live; Increased co-ordination between parties resulting in optimisation of flows across the networks and network access. First phase of agile IT enhancements to enable deeper outage planning complete
A16.4 TOGA / Whole system outage notification	D16.4.1 Scoping exercise concluded for delivery of enhancements to outage notifications  D16.4.2 Delivery of enhancements to outage notifications, to stimulate flexibility markets as an additional tool for efficient outage	IT investment ref 350 Planning and outage data exchange – this investment includes development of TOGA to provide digital communications to customers on the status of outages.	Project	TOGA system replacement complete	Q3 Commence scoping activity and engage with key stakeholders; align model development and requirements with output from deliverable A16.3.2 (recommendations for roll out of deeper access planning)	Q2 scoping exercise concluded and published.  Q3 commence IT project start-up phase.	Industry stakeholders, particularly DNOs and DER, are engaged with the project and scoping is underway.	Agreement and publication of scope for enhancements to outage notification processes, including technology roadmap; scope adequately informs the design and requirements stage of the system development	Q4 2024 / 2025 Delivery of whole system outage notification enhancement to support potential flexibility markets which in turn should give additional tools for managing outages

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	management - we will develop the TOGA system to become a more interactive experience for customers, stakeholders and the market.								
A18. Early Competition									
A18 Early Competition	Forward Plan: Early Competition Plan	<p>No direct IT Investment.</p> <p>Future IT Investment will be outlined in the proposed plan.</p> <p>Enduring role will benefit from and integrate to <i>NOA</i> tools</p> <p>Advantageous to have Theme 3 tools and enhancements in place: <i>NOA</i> Enhancements Investments. 390: Economic assessment Probabilistic modelling Voltage optimisation Stability assessment</p>	Project	<p>May to Dec 19 - Stage 1: high-level model development and project planning (complete)</p> <p>Q2 - Stage 2: detailed model development. Consultation with industry. Provide Ofgem Update.</p> <p>Q3 - Stage 3 Implementation planning Early Competition Plan update</p>	May result in ongoing activity pending Ofgem decision on early competition.	N/A	N/A	N/A	<p>RIIO-1 Q4. (Feb 21).</p> <p>Propose Early Competition models.</p> <p>Get a better understanding of: the criteria to use End to end process Equal access to all information required to submit bids</p> <p>The role of data Roles and responsibilities of all parties in each model</p> <p>How to measure performance</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
				Q4 - formal consultation and finalisation. Nov 20: Consult Feb 21: Submit Early Competition Plan.					For more information see the update to the Early competition plan published in February 2020. (Phase 1 Update)

## Open Data

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A17 Data portal									
A17 Data portal	<p>D17.1 Open data portal with limited data sets (initial go live 2019)</p> <p>This deliverable refers to the foundational data portal acting as a proof of concept for the RIIO-2 data portal which will be powered by the Data and analytics platform and utilise the user interface of the Digital engagement platform</p> <p>Milestones for the foundational data portal and enabling IT investments are included in this row with specific points captured in the deliverables below.</p>	<p>220 - Data and analytics platform: It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth.</p> <p>250 - Digital engagement platform: This investment will offer a single point of access into the ESO systems and external-facing processes, providing secure, open access to data, compliant with data classification policies and standards. We will consolidate our ESO data publication and reporting channels, offering stakeholders access to our data, including multi device capability and Application Programming Interfaces (API) functionality.</p>	Project	We will have developed a detailed strategy for our data and analytics platform, understanding the business requirements across ESO. This will have been translated into an IT architecture for implementation in RIIO-2.	<p>Q2-Q3 – Data and analytics platform foundation requirements and design</p> <p>Q2-Q4 - Digital engagement platform requirements and design</p> <p>Q4 - Master data management implementation</p>	<p>Q1-Q2 – Data and analytics platform foundation development and testing</p> <p>Q3 - Data and analytics platform foundation implementation</p> <p>Q1-Q3 – Digital engagement platform development and testing</p> <p>Q4 - Digital engagement platform implementation</p> <p>Q4 - Digital engagement platform integration with data and analytics platform</p>	<p>An increasing number of data sets will be shared with stakeholders through the foundational data portal.</p> <p>Requirements of the enduring data portal will have been considered in the development of the enabling IT investments: 220 - Data and analytics platform and 250 - Digital engagement platform</p>	<p>Integration of the data platform into the digital engagement platform will enable the acceleration of data upload automation and make publishing new datasets more efficient.</p> <p>Agile approach to adding new data sets, prioritising by overall benefit, accelerated due to data and analytics platform capabilities.</p> <p>As new data sets are published they are automatically in machine readable format.</p>	<p>2024-25</p> <p>All published data automated reducing publishing times (D17.4).</p> <p>All ESO data accessible through the single interface of the digital engagement platform.</p> <p>All published data available through an API.</p> <p>Additional functionality driven by user requirements (such as subscriptions and notifications).</p>

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A17 Data portal	D17.2 All published ESO data in machine readable format	<p>220 - Data and analytics platform: It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth.</p> <p>250 - Digital engagement platform: This investment will a single point of access into the ESO systems and external-facing processes, providing secure, open access to data, compliant with data classification policies and standards. We will consolidate our ESO data publication and reporting channels, offering stakeholders access to our data, including multi device capability and industry standard APIs.</p>	Project	<p>All published ESO data available via the ESO data portal with limited exceptions (e.g. data published through BMRS).</p> <p>Subset of ESO published data is machine readable.</p>	Q2 All published ESO data in machine readable format	<p>Q1-Q4 – Further data sets released</p> <p>Q1-Q4 – Further data sets automated</p> <p>Q1-Q2 – Data and analytics platform foundation development and testing</p> <p>Q3 - Data and analytics platform foundation implementation</p> <p>Q1-Q3 – Digital engagement platform development and testing</p> <p>Q4 - Digital engagement platform implementation</p> <p>Q4 - Digital engagement platform integration with data and analytics platform</p>	<p>All of the data published by the ESO is machine readable.</p> <p>Data is available to download manually or through an API, which will allow consumers of ESO data to integrate published data into their systems and models programmatically.</p>	As new data sets are published they are automatically in machine readable format.	2024-25 All published data automated reducing publishing times (D17.4)



Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
A17 Data portal	D17.3 ESO data list and publication schedule	<p>220 - Data and analytics platform: It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth.</p> <p>250 - Digital engagement: This investment will a single point of access into the ESO systems and external-facing processes, providing secure, open access to data, compliant with data classification policies and standards. We will consolidate our ESO data publication and reporting channels, offering stakeholders access to our data, including multi device capability and industry standard APIs.</p>	Project	We will have completed foundational work for data and analytics platform, involving auditing current data flows.	Q3 ESO Data list and publication schedule available	Q1-Q4 – Further data sets released	<p>- Stakeholders will understand the data sets that the ESO holds and when we will publish them.</p> <p>- Stakeholders will be able to inform the priority order in which we publish data sets.</p>	Agile approach to adding new data sets, informed by data list and publication schedule, prioritising by overall benefit, accelerated due to data and analytics platform capabilities.	2024-25 All published data automated reducing publishing times (D17.4)
A17 Data portal	D17.4 All published data automated	220 - Data and analytics platform:	Project	Publication of ESO data sets will still be a	Q2-Q3 – Data and analytics platform	Q1-Q2 – Data and analytics platform foundation	N/A	Agile approach to adding new data sets, prioritising by	2024-25 All published data automated

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
	reducing publishing time (2024)	<p>It will be the key technology underpinning all our internal and external data management, pulling together data from a variety of sources and ensuring there is only one source of the truth.</p> <p>250 - Digital engagement platform: This investment will a single point of access into the ESO systems and external-facing processes, providing secure, open access to data, compliant with data classification policies and standards. We will consolidate our ESO data publication and reporting channels, offering stakeholders access to our data, including multi device capability and industry standard APIs.</p>		largely manual process at the end of RIIO-1.	<p>foundation requirements and design</p> <p>Q2-Q4 - Digital engagement platform requirements and design</p> <p>Q4 - Master data management implementation</p>	<p>development and testing</p> <p>Q3 - Data and analytics platform foundation implementation</p> <p>Q1-Q3 – Digital engagement platform development and testing</p> <p>Q4 - Digital engagement platform implementation</p> <p>Q4 - Digital engagement platform integration with data and analytics platform</p> <p>Q4 – Data Platform integrated into digital engagement platform</p> <p>From Q4 - Automation of data upload accelerated due to data and analytics platform</p>		<p>overall benefit, accelerated due to data and analytics platform capabilities.</p> <p>Automation of publication of data sets will be in place leading to efficiencies for publishing teams, real-time publishing capabilities and improved data quality</p>	<p>reducing publishing times, reduced number of queries associated with the quality of our data or missing data.</p>

Sub activity	Deliverable	Related IT Investment	Project or continuous	RIIO-1 end point	2021/2022 Milestones	2022/2023 Milestones	First Year Success	Second Year Success	Expected Final Delivery Date and what success looks like.
						capabilities and replacement of supporting systems			