nationalgrid

Smart Optimisation Output Collaboration Plan

Contents

Executive summary

This Smart Optimisation Output (SOO) Collaboration Plan document fulfils the requirements stipulated by Ofgem in the Smart Optimisation Output Guidance document to "*promote and enable effective collaboration between the licensee and its local stakeholders and communities, leading to better decision making and more coherent local energy planning*". Our SOO Collaboration Plan is split into four sections, as detailed below:

1. **Our approach to data sharing**
2. **Whole system collaboration approach**
3. **How we use digital tools to support our customers**
4. **Our data architecture**

The UK electricity system is going through a period of transformation, with a national target to be net zero by 2035. This ambition is rapidly changing the way that electricity is generated and consumed.

At National Grid Electricity Distribution (NGED), we are seeing widespread investment in renewable generation and storage, alongside increasing deployment of low-carbon technologies (LCTs) across our regions. As the rollout of LCTs continues to ramp up, our forecasting shows that the demand to connect these to our network will increase exponentially. As such, we must adapt to the changing needs of our customers and stakeholders and support them to achieve their decarbonisation ambitions.

Key customer outcomes

Sustainability	Connectability	Vulnerability	Affordability
Lead the drive to net zero as early as possible	Customers can connect their electric vehicles, heat pumps and renewable generation.	First class vulnerable customer support programme where everyone benefits in a smart future	Maintain excellent customer service, safety and network performance and transform the energy grid for future generations, while keeping bills broadly flat.

Figure 1: Overarching outcomes we will achieve for our customers

We are committed to playing our part in enabling local and regional decarbonisation as a Distribution Network Operator (DNO), and to address these evolving needs on our network we have prioritised development of our Distribution System Operator (DSO) function and capabilities. Our DSO vision is **'to enable and coordinate a smart, flexible energy system that facilitates local decarbonisation for all customers and communities, at the right time and lowest cost'.**

Flexibility is key to achieving our vision, so we are accelerating the development of flexibility markets and expanding access. This will maximise the capacity of the existing network and the benefits of demand side solutions in our regions. We are also taking a proactive and long-term approach to strategic planning by being even more active role in supporting local and regional Net Zero strategies. Data and digitalisation are crucial for delivering on these ambitions and gathering robust data requires effective engagement with a wide range of stakeholders.

The stakeholder engagement activities outlined within this SOO Collaboration Plan relate to both our DNO and DSO responsibilities and activities.

Our approach to data sharing

We proactively engage our stakeholders to gather data that supports our strategic network planning activities and make the relevant data easily accessible. We support our stakeholders to use this data effectively in delivering their local and regional plans.

Placing data and digital technologies at the heart of our activities by providing accurate, user friendly and comprehensive market and network information is key to delivering a smart and flexible energy system. By making this data open, we deliver the visibility our customers and stakeholders need to make informed decisions when interacting with our network.

We have developed a range of transparent and user-centric approaches to sharing data and gathering feedback from our stakeholders and customers. These include:

- **Connected Data Portal**: portal that provides centralised access to machine readable datasets with an interactive exploratory function, as well as Application Programming Interface (API) provision for all relevant datasets.
- **LV Insights:** platform that shares open and transparent data from substations across our network. This enables the customers and communities we serve to access information on network usage, capacity, and constraints, and supports decision making for low-carbon technology deployment.
- **Clearview Connect**: platform that provides a comprehensive view of capacity headroom at all our Grid Supply Points (GSPs). This information is useful for renewable developers seeking to identify where they could connect to the network earliest and at the lowest cost.
- **Planning Regional Infrastructure in a Digital Environment (PRIDE):** project that aims to enhance local area energy planning, serve network investment decision needs, and fast-track low-carbon technology deployment. The project includes developing a “whole systems digital planning tool”, Local Area Energy Planning+ (LAEP+), and tests the potential to roll out the tool more widely beyond the West Midlands to support local area energy planning across our service areas.
- **Network capacity map:** we are currently developing an enhanced next generation capacity map that will be launched in 2024. This revised map will replace both the Network Capacity Map and the EV Capacity Map into a single heatmap. This improved view will provide geographic maps for substation areas, and increased visibility on flexibility and network management actions.
- **Network flexibility map:** the map provides a forecast of our flexibility requirements for our Higher Voltage zones over a five-year period. This includes the availability windows and expected market volumes. Visualisations of the data are available online through the mapping tool and datasets are downloadable without registration.

Over this year we will incorporate our network development plan outputs into the Net Zero Surgeries, to further enhance our data sharing and engagement activity. We are planning to

increase the amount and granularity of data available, both at High Voltage and Low Voltage levels.

Whole system collaboration approach

We aim to coordinate effectively with stakeholders across boundaries and energy vectors to support planning and delivery of local and regional decarbonisation ambitions.

We work in close partnership with stakeholders to enable the development of local and regional net zero strategies and some of the most advanced LAEPs in the UK. We are also supporting the delivery of leading decarbonisation programmes in our regions including Bristol Mission Net Zero and UK Central Hub in Solihull, with plans to reach at least four flagship low-carbon initiatives in the year ahead.

We use a range of channels to support our stakeholders:

- **Net Zero Surgeries:** to help local authorities and other stakeholders develop decarbonisation plans.
- **Flexibility Surgeries:** to help flexibility providers and wider stakeholders by ensuring our products and processes are fit for purpose and to reduce the barriers to participation in flexibility markets.
- **Local authority portal:** a dedicated website for local authorities which provides links to relevant and useful data. We also hold Data Support sessions with local authorities to ensure we have open dialogue around access to and use of data.

We will continue to closely engage with stakeholders through our Net Zero Surgeries and Flexibility Surgeries.

How we use digital tools to support customers

Beyond supporting stakeholders with their plans, we deliver digital tools and data to simplify access to flexibility market opportunities and ensure network investment is delivered when it is needed, at the lowest cost to consumers.

We have already implemented several flexibility services and active network arrangements, such as our Flexible Power Platform used for procurement and activation of flexibility and our Market Gateway platform for pre-registration of assets.

In developing our flexibility processes and systems, we have focussed on establishing scalable interfaces to create an open ecosystem for flexibility markets. These interfaces allow FSPs to interact directly with us if they choose to build their own systems.

We will also provide a more granular level of network data than today, including directional power flows, asset capability, network configuration and present and historic operation. This will support us to deliver improvements in forecasting accuracy which will in turn lead to more effective network investment.

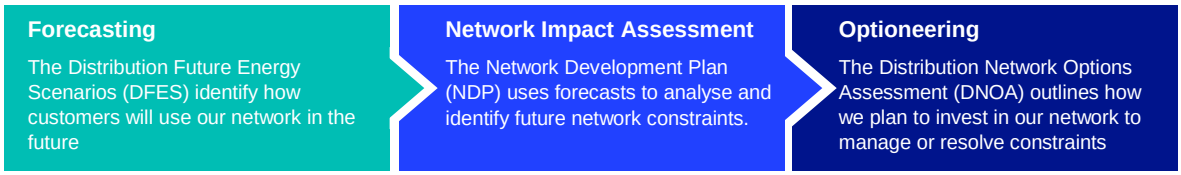

Figure 2: Overview of system planning process

Our data architecture

Data is a 'golden thread' that runs across all our strategies. Our approach helps customers and stakeholders to gain a greater understanding of the network and to make optimal decisions on the deployment of LCTs, LAEPs and whole system optimisation.

Our Digitalisation Strategy, DSO Strategic Action Plan, Network Visibility Strategy, and other related documents all seek to enable us to deliver accurate, user friendly and comprehensive market information and data to our customers and stakeholders. We are focussed on continuous improvement of our data management to enhance our network insights and operation.

Stakeholder feedback

Our stakeholders' feedback is incredibly important to us, and we will be engaging stakeholders over the coming year to continually evolve our Collaboration Plan. We will update the plan annually to ensure that we are continuing to meet the needs of our customers and stakeholders. We will continue to improve feedback channels to make it easier for stakeholders to give us feedback, and to ensure that feedback is turned into actions.

Our approach to data sharing

Our objective: To proactively engage our stakeholders by sharing relevant and easily accessible data and support them to utilise it to deliver their local plans and gather data that supports our strategic network planning activities.

The transformation of our network to support the drive to net zero requires smart and flexible solutions to help manage the distribution of energy. Data and digitalisation are key facilitators of this transformation by providing insights to improve the understanding and operation of our infrastructure, assets, and connectivity.

One of our core RIIO-ED2 Business Plan commitments is to enhance access to data that is tailored to the individual needs of our customers, by making 60% of NGED's network data available via an interactive API. This enhanced access to data can be tailored to the individual needs of our customers and will be hugely beneficial to them in developing strategies, project and in decision making.

Providing accurate, user friendly and comprehensive market information and data will support delivery of our DSO Strategy, placing data and digital technologies at the heart of our energy system. By making this data open, we provide the visibility our customers and stakeholders need to make informed decisions when interacting with our network. Partnerships are a key enabler to improving quality of and access to data, such as our partnership with EA Technology to develop the LV Insights portal.

We will work to continuously improve our data, technologies, and processes to ensure that we operate a responsive and dynamic network. As the pace of integration of LCTs increases, DNOs need to operate in a more dynamic way, moving towards real-time operation of the network. To make the right operational decisions, such as where to dispatch flexibility or when to use curtailment, there needs to be clear visibility of what is happening on the network. This requires reliable and timely data, supported by appropriate technology and processes. DNOs / DSOs can then draw the right data insights to facilitate effective decision-making.

Our approach to data sharing is detailed within our Digitalisation Strategy, which sets out three key pillars. We continue to engage extensively through our Innovation, and dedicated Stakeholder Engagement Teams in support of these three pillars. Our future plans to enhance and improve our data sharing capabilities is outlined within our Digitalisation Action Plan Interactive Timeline.

Our stakeholders have told us that they have different needs and expectations when accessing and using our data. That is why we are committed to ensuring the right data is available in the right format and at the right time to serve different users. Dedicated engagement focused on data and digitalisation ensures our Digitalisation Strategy is built around our customers and stakeholders, and our solutions provide the services our customers require. We continue to use a diverse range of engagement strategies, from our traditional face-to-face roundtable events through to regular communication in digestible, digital formats, such as short podcasts and videos of our latest developments and activities.

How we share data with stakeholders

Data Principles and quality

Our approach, as set out in our Digitalisation Strategy, aligns with Energy Data Task Force recommendations and Ofgem's Data Best Practice Guidance, including the consistent provision of meta-data and data dictionaries. This supports challenge to and accuracy of data. Where any dataset quality is deemed to not be meeting user needs, we follow the data custodian approach to improving data quality as detailed in Ofgem's Data Best Practice Guidance. Following the principle of presumed open data, we publish non-anonymised data where possible. In a number of cases (e.g. flexibility services) we confer permission to publish full market information in the contracts. Where this attributed data is not appropriate for publication (e.g. because it is commercially sensitive) we publish anonymised data.

Connected Data Portal

Our Connected Data Portal (CDP) provides a centralised location to access all externally available datasets and was an industry first when it was created. It is a platform for hosting datasets across our business which provides a foundation of raw data that supports modelling and forecasting. It is available to our stakeholders who can use the data in line with their needs to support their understanding of and engagement with DNO and DSO activities.

The CDP provides a webpage user interface and API endpoint for all published data resources. This meets the requirements of Ofgem's Data Best Practice Guidance. APIs provide stakeholders with the ability to[1] build an interface to our published data sets and consume our data in an automated and scalable way.

There are 96 datasets currently available on the CDP. The website is designed to allow filtering of the datasets according to the use and perspective of the stakeholder. The four main filters are:

- Data group (e.g. System and Network, Demand);
- Tags (i.e. key words such as 'transformer' or 'substation');
- The format that the dataset is available in;
- The licence the set relates to.

We will continue to publish policies which describe details of all technical methods across the business including those used to collect the data described in this document, and plan

to publish our full DSO policy suite throughout this year. The CDP has functionality for stakeholders to submit requests or provide feedback directly to us.

Clearview Connect

Clearview Connect is a tool which supports and improves how our business uses data on curtailment and flexibility dispatch to improve outcomes for our customers.

Users are able to access a Clearview Connect report is targeted towards stakeholders with generation assets who wish to connect to the network, and whose connection is dependent on transmission works. The report provides a comprehensive view of available capacity at a particular location and network level. It allows customers to estimate how long a connection might take at a particular location, how much curtailment they will face, and access a list of other parties higher up in the connection queue. This enables customers to compare costs across different potential connection sites, thereby reducing the chances that they will submit multiple connection applications, which holds space in the connection queue that they may not use. Ultimately, it means that connection queues will give a more accurate reflection of time to connect, thereby enabling our stakeholders to plan new generation projects more efficiently.

Clearview Connect was based on extensive, targeted engagement with larger stakeholders such as renewable generators, and it has been well received. We have shared the underlying methodology for making this data available with Northern Powergrid, with a view to achieving standardisation across the other DNOs in the longer term.

LV Insights portal

Where Low Voltage (LV) monitoring is available, we publish extensive data at 10-minute intervals, including feeder level real and reactive power flows, current and busbar voltages. We launched the LV Insights portal in partnership with EA Technology, which provides open and transparent data from substations across our network. This enables the customers and communities we serve to access information on network usage, capacity, and constraints. It also supports decision making for low-carbon technology deployment.

Open Networks standardisation

We have taken a leading role in the Open Networks workstream on standardisation of contracts across DNOs. Open Networks aims to allow flexibility providers to easily engage with the market while having transparency of network planning and decision-making. This will help to make energy networks more coordinated and aligned.

Our overarching contracting approach has become a benchmark, which the rest of industry is now moving towards. We are currently using a version of the Open Networks Standard Agreement, which has just been superseded by the version consulted on in early 2024. We will implement the minor changes needed to align with the latest version (V3.0) this summer, which was consulted on in early 2024. Our contracts include a range of features to encourage participation and minimise risk for Flexibility Service Providers (FSPs), for example:

- Capped mutual liabilities;
- Performance based payment mechanisms to incentivise participation;
- No penalties non-delivery, only loss of potential revenue.

How we will take account of local stakeholder plans and requirements

We are a key enabler of decarbonisation at a local and regional level. Our data and network planning expertise can help local authorities to develop their LAEPs and to support incoming RESPs. Our dedicated Strategic Engagement Team enable us to proactively help local authorities and other partners in developing their decarbonisation plans.

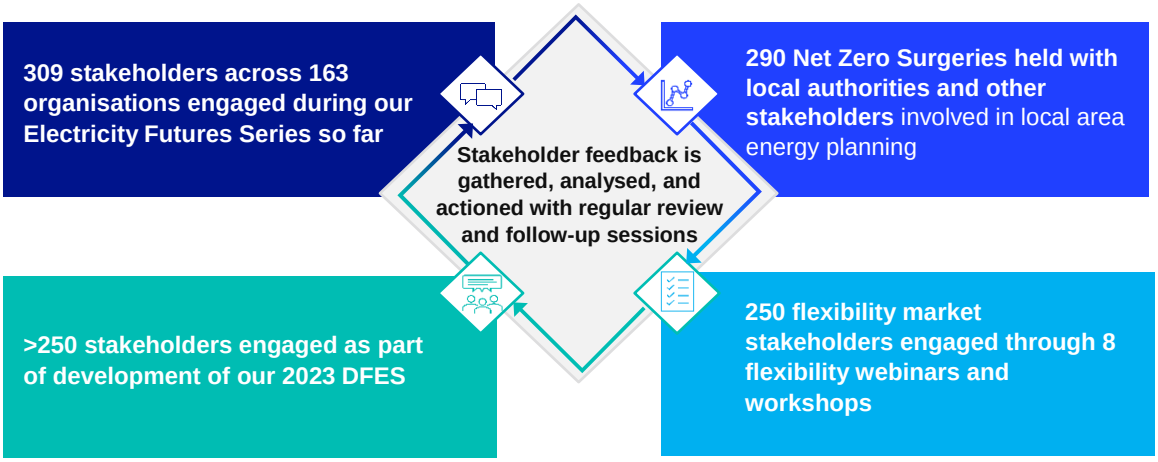

Figure 3: Stakeholder feedback process

In addition to this, we have our local authority portal is a dedicated website for local authorities which has a landing page and associated data links for useful data and information to support local area energy planning. Our Distributed Future Energy Scenarios 2023 methodology provides details of the annual engagement process with stakeholders.

Distribution Future Energy Scenarios workshops and webinars

A key part of developing our DFES is engagement and consultation with our local and regional stakeholders. Feedback from our stakeholders directly influences the models and assumptions we use to forecast future demand on our network.

We have engaged more than 250 stakeholders as part of our regional stakeholder webinars co-delivered with Regen for our most recent DFES. As part of this we captured views from a range of stakeholders to develop bottom-up and stakeholder-led regional future scenarios, including:

- 125 local authorities;
- Regional decision makers;
- Project developers;
- Asset owners;
- Energy consumers;
- Community energy groups;
- Trade bodies.

These views directly help to inform our network planning and investment.

Flexibility Surgeries and Flexibility Webinars

We conduct regular engagement with FSPs and market participants more widely through our Flexibility Webinars and Workshops, as well as Flexibility Surgeries. We have engaged over 250 stakeholders through these activities over the last year and plan to engage with

more stakeholders over the year ahead. This engagement helps to ensure that our products and processes are fit for purpose and reduces the barriers to participation in flexibility markets. Our webinars and workshops span a range of topics including revenue stacking and have covered the launch of our industry-leading Market Gateway platform.

Net Zero Surgeries

We conduct regular Net Zero Surgeries with local authorities and other stakeholders with 290 delivered in the last year. Through our Net Zero Surgeries, we support local authorities by providing network information and guidance on the processes, timescales and technical considerations required to realise their local decarbonisation ambitions in practice. This helps local authorities to understand what is needed to accelerate decarbonisation planning and the data and support available to them. We will deliver further Net Zero Surgeries to local authorities and other stakeholders in the next year.

Local Area Energy Planning strategic engagement

We work collaboratively with local authorities and other stakeholders in local area energy planning to achieve their decarbonisation ambitions. We can provide stakeholders with data on our current network now and the assumptions we are making about the demand on our network in the future. We can also capture stakeholders plans and ensure that they are included in our strategic investment process. This helps to support local authority decarbonisation initiatives of all sizes to move from planning through to delivery of their net zero targets, including leading city-scale projects such as Mission Net Zero in Bristol and UK Central Hub.

We have established a dedicated team of Strategic Engagement Officers focused on supporting stakeholders' local area energy planning and decarbonisation plans. This can help stakeholders to find the information they need about their electricity networks needs now and in the future.

Electricity Futures Series

Our flagship Electricity Futures Series has been our primary platform for engagement and ongoing dialogue with a diverse range of customers and stakeholders in 2023/24. We consistently involve our local, regional, and national stakeholders. This enables us to test and refine our approach to developing our DSO capabilities with a focus on the important topics, in a way that reflects the needs and priorities of our stakeholders. We capture extensive feedback through facilitated discussions both in person and online for stakeholders across our regions. We also used digital tools to capture more quantitative insights. These approaches enable us to publish stakeholder feedback reports following every event, which in turn directly shape the actions that we pursue through the SOO Collaboration Plan.

We held four Electricity Future Series in the first year to help shape the launch and formation of the DSO, and plan to hold at least two per year on and ongoing basis. We will also facilitate engagement on specific activities across the DNO and DSO roles, such as our flexibility engagement programme as we expand our market leading flexibility procurement.

Community energy group engagement

With interests in decarbonisation, renewable power, energy efficiency and helping people in fuel poverty growing at a local level, community energy groups are crucial for supporting local decarbonisation. We will collaborate closely with community energy groups to ensure LCTs are adopted at sufficient pace to bring about the scale of change needed to deliver on net zero pledges.

We are committed to supporting community energy groups to deliver on their ambitions through dedicated support from our energy engineers with 60 Community Energy Surgeries held per year. Our community energy engineers hold personalised one-to-one sessions, supply training, how-to guides, webinars, case studies and stage events to raise awareness of LCTs and renewable connections.

How we use stakeholder feedback

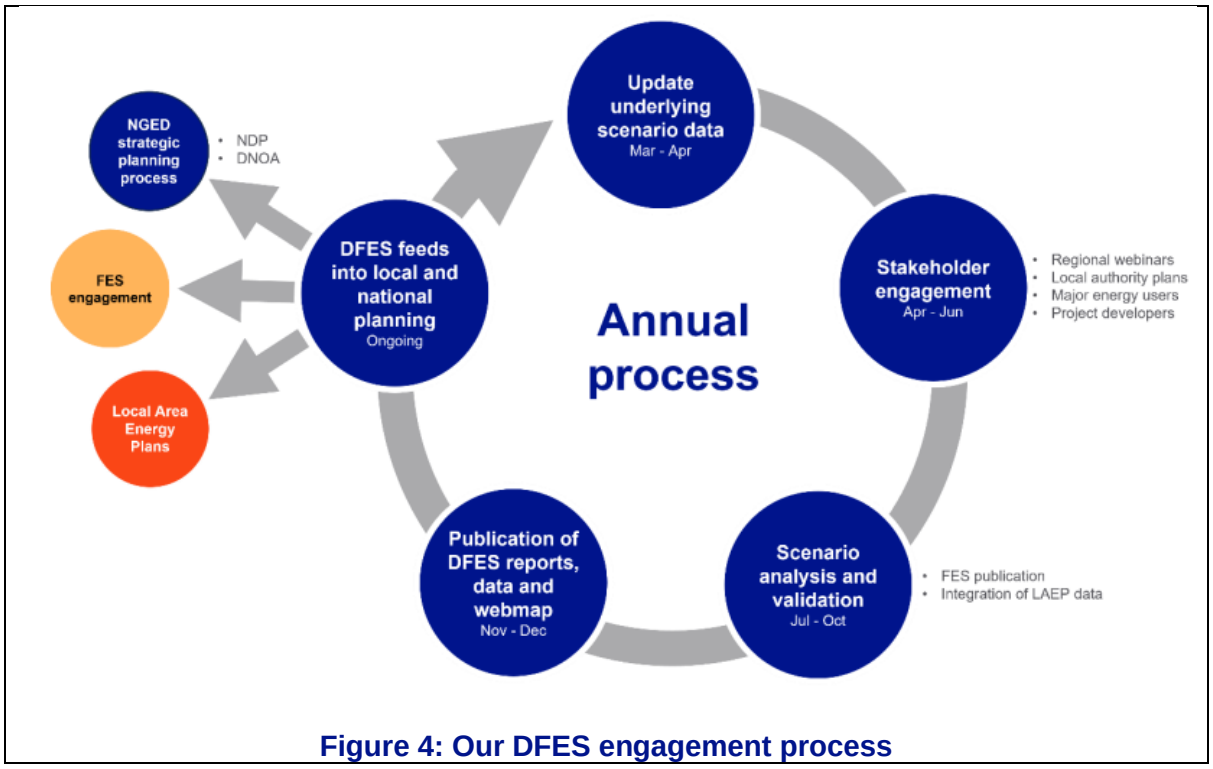

Figure 4: Our DFES engagement process

We gather feedback and information from stakeholders through the communication channels outlined above, which is vital in informing and guiding the development of our Distribution Future Energy Scenarios. For example, we have been engaging with Solihull Metropolitan Borough Council over several years. There is a high density of industrial consumers within this borough, many with their own decarbonisation plans. These plans are not consistently reflected in the local authorities own energy development plans. This led to a discrepancy between future industrial energy demands and our own DFES work, which was raised with us by stakeholders. We listened to the feedback and worked with the local authority and UK Central Hub over several engagements to improve our forecasting. This initiated significant changes to our DFES work in the region, including an additional 7,000 domestic dwellings by 2035 and 76 hectares of industrial and commercial floorspace. This strategic engagement delivered:

- Improved use of local knowledge to enhance the accuracy of DFES within the region, making our system planning more effective;
- Improved processes on an ongoing basis, as DFES now specifically considers deployment of different technology types in industrial and commercial heat supply;
- Improved understanding of and engagement with stakeholders in our processes and how their inputs are used.

Whole system collaboration approach

Our objective: To coordinate with stakeholders across boundaries, energy vectors and other interfaces and collaborate effectively to support local and regional decarbonisation projects, plans and strategies.

We work proactively to engage with stakeholders across the energy system and beyond to support them in delivering their local and regional decarbonisation ambitions. To support the pathway to a decarbonised energy system, stakeholders expect DNOs to collaborate and make decisions that are in the best interest of the whole system. This requires increasing coordination to ensure industry frameworks fit together, rather than becoming fragmented or creating barriers to entry. We will continue to work together with stakeholders in a transparent manner so that the decisions we make are clear. This will help to establish trust from our stakeholders and confidence in our ability to ensure the evolving markets are a success.

The Whole System Coordination Register on our website describes the outcome of the activities NGED has undertaken to coordinate and cooperate with stakeholders to facilitate whole systems optimisation outcomes, including support for system planning and data sharing.

We are currently undertaking a number of workstreams in collaboration with National Energy System Operator (NESO), including:

- Continuing to lead the Open Networks primacy group, collaborating with NESO and other DSOs to trial and implement new processes that set out operational decision-making priorities between the national and local level;
- Holding detailed bilateral discussions to discuss the interaction and data sharing opportunities between the national FES and DFES. This enables alignment between local planning and network design, which ensures that the customer is considered, and DFES data and learning is fed back into the FES forecasting approach;
- Participating in monthly meetings with ESO and National Grid Electricity Transmission (NGET) to discuss data exchange, statement of works, ongoing works, and the interfaces more generally between NGED and other parts of the National Grid Group. This enables a coordinated approach to network design and operation, which ensures we are operating an efficient and economic network that delivers value to customers.

We also report regularly to ESO using a host of data sets which provide visibility across our network, via our week 24 report. This includes Distributed Energy Resources (DER) performance and connection parameters. We will consider publishing our week 24 report in the future should we identify a requirement or particular use case. Similar information is included in our load forecasting, which is already publicly available.

Via our Inter-Control Centre Protocol (ICCP) link we provide the ESO with visibility of flexible and non-flexible DER output across 8 GSPs in the South West as well as individual generators on the MW Dispatch scheme. Via a separate link to the ESO's Ancillary Service Dispatch Platform, we also provide real time monitoring and availability status of MW Dispatch generators. We are working with the ESO to identify other datasets which would be beneficial to share more widely.

Additionally, we proactively share relevant data with adjacent DNOs to help improve strategic planning. This benefits customers by ensuring a coordinated approach to design, which delivers best value.

Enabling regional and local decarbonisation

We have actively identified and supported two flagship and large-scale decarbonisation programmes in our regions this year, namely Bristol Mission Net Zero and UK Central Hub in Solihull. Bristol Mission Net Zero aims to speed up Bristol and the West of England's transition to net zero by working with local people to address some of the barriers to progress, such as seeking investment for improvements and building the network of skilled professional to enact the changes required. Our focus in the year ahead is to expand this support to encompass at least four leading decarbonisation programmes.

UK Central Hub

We have established a collaborative partnership with Solihull Metropolitan Borough Council, to support its local decarbonisation ambitions. This will in turn supports regional decarbonisation ambitions from planning through to delivery. Within this jurisdiction, there is a high density of large industrial consumers, many of whom have devised their own decarbonisation strategies. However, these industrial plans have not consistently aligned with the local authority's energy development plans, resulting in a disparity between projected industrial demand and our own DFES, as highlighted by stakeholders.

In response to this feedback, we actively engaged with the local authority and UK Central Hub to enhance our forecasting methods. This enabled us to refine our DFES projections in the region, including the addition of 7,000 domestic dwellings by 2035 and 76 hectares of industrial and commercial floorspace. This strategic collaboration led to several key outcomes, including the incorporation of local insights to enhance the accuracy of DFES within the region, unlocking more effective system planning. Moreover, we have implemented ongoing improvements to ensure that the DFES now accounts more precisely for the deployment of various technology types in industrial and commercial heat supply. Importantly, this process has enhanced our approach to engaging with stakeholders on the DFES, clarifying how their inputs should best inform our decision-making processes.

Future Energy Grids for Wales

We supported the launch of the innovative Future Energy Grids for Wales report commissioned by the Welsh Government. The report outlined several realistic pathways to decarbonise the Welsh energy system, and the infrastructure changes needed to unlock these pathways. This report complements our extensive work with local authorities in Wales supporting the development of 13 LAEPs, which represent some of the most advanced local decarbonisation plans in the UK.

Project EQUINOX

Project EQUINOX is a leading initiative which aims to investigate the optimal methods of engaging domestic consumers in utilising heat pumps to offer flexibility services to the DSO. This project, led by NGED, involves collaboration with various partners including Octopus Energy, SP Energy Networks, Welsh Government, West Midlands Combined Authority, Sero, and Guidehouse. The project includes over 1,350 households with heat pumps and will span trials over three winters, concluding in spring 2025. The aim of the project is to establish a model for the routine use of flexibility in the domestic heat market, leveraging positive results already demonstrated during the trials without compromising comfort levels within homes.

Net Zero South Wales 2050 Innovation Project

A further example of our approach to whole system collaboration is the Net Zero South Wales 2050 innovation project which we undertook in partnership with Regen and Wales and West Utilities (WWU), through the Network Innovation Allowance (NIA) programme.

The main objective of the project was to create integrated DFES for the gas and electricity networks in South Wales and, and to develop a new methodology for conducting cross-vector scenario forecasting at a regional level. The project also looked to provide insights into how South Wales might transition to a net zero future under different decarbonisation pathways.

The principal output of Net Zero South Wales 2050 is a DFES projection dataset that can be used to inform network planning and investment. The dataset covers demand and supply of key technologies, that might be expected to connect to the gas and electricity distribution networks under the different decarbonisation pathways. It covers each year from 2020 to 2035, and five yearly intervals between 2035 and 2050. Projections are provided at a level of granularity relevant for each respective network, including Electricity Supply Areas (ESAs) and Gas Supply Areas (GSAs).

We are committed to supporting the development of robust, local and regional plans across the whole energy system. We are planning to actively coordinate with Ofgem, NESO and other local and regional stakeholders to shape and support the evolution of the incoming Regional Energy Strategic Planners (RESP). Based on current boundary proposals, we will interact with more RESPs than any other DNO, having a particularly important role in supporting the development of coordinated and cross vector plans.

Transmission connections

The newest data exchange format to manage the process for ESO and NGET approval to connect distribution customers is commonly referred to as Appendix G. As the first DNO to implement this enhanced format across all our GSPs, our customers will have visibility of transmission headroom, queue and indicative timescales for connection. We demonstrate transparency and accountability by publishing this data on our website and providing regular updates. This approach gives our customers visibility into transmission headroom, queue status, and indicative timescales for connection. Furthermore, in response to feedback gathered through engagement with our connections customers, we have recently revamped the user interface to enhance the overall customer experience. These proactive improvements underscore our commitment to facilitating seamless and efficient connections while prioritising customer satisfaction. A leading example of this in action is Clearview Connect, which is explained earlier in this document.

Our MW Dispatch initiative aims to manage transmission constraints driven by high potential for renewable generation in the region. This collaborative project with the ESO provides an innovative transmission constraints management service. MW Dispatch allows the ESO operate its “connect and manage” approach with assets which are outside the balancing mechanism. This service provides the ESO with increased visibility and commercial control of distribution connected generation, whilst coordinating with the DSO to enable an end-to-end whole systems approach.

We are working with NGET to release a unified National Grid Whole System coordination register that will showcase the work being undertaken across both transmission and distribution. We plan to work closer with the ESO and NGED in the future, driven by the growth in demand on our network, requiring an increase in transmission works. We contribute to the Strategic Connection Group (SCG) which is looking to address the existing 'first-come, first-served' approach, that is causing significant delays. Where optioneering reveals implications for neighbouring networks or transmission, we proactively engage relevant licensees to assess potential options. The outcomes of these engagements are recorded on our published Whole System Coordination Register.

PRIDE tool

PRIDE is investigating how we can bring together datasets from a variety of sources on a single platform to support regional planning. Working with West Midlands Combined Authority and Advanced Infrastructure, PRIDE examines how local decision making could be enabled by a digital twin, and what new supporting models and datasets would be required.

PRIDE aims to support LAEPs and serve network investment decision needs, to fast track low-carbon technology deployment at a regional level. The project includes developing a "whole systems digital planning tool", testing how this tool works across different regional energy planning stakeholders. This will inform how it could be used in broader governance structures, specifically in the upcoming RESP process. Furthermore, we are exploring the potential to broaden the reach of our LAEP+ tool to empower local authorities across all our service areas to support their local area energy planning processes.

Collaboration across boundaries

The Whole System Coordination Register, accessible on our website, delineates the outcomes resulting from our efforts to coordinate and collaborate with other electricity network licensees in advancing whole electricity systems objectives. These outcomes encompass coordinated system planning and data sharing.

While the license condition mandates liaisons with other electricity network licensees for whole system benefits, we surpass this requirement by engaging in collaborations that yield positive outcomes with non-licensee entities. To guarantee that the register reflects the coordination efforts of the preceding financial year, we update the register at least annually.

Presently, we are collaborating with NGET to unveil a unified National Grid Whole System coordination register, illustrating the collaborative endeavours we are pushing across transmission and distribution. Notably, we have undertaken innovative cross vector work with WWU, leveraging our respective data sets to develop multiple pathways to net zero by 2050 for South Wales.

How we use digital tools to support our customers

Our objective: To utilise digital tools and data to create and simplify access to flexibility market opportunities and ensure network investment is delivered when it's needed, at the lowest cost to consumers.

The transformation of our network to an energy system that can support the drive to net zero requires smart and flexible solutions to help manage the distribution of energy. Data and digitalisation are key facilitators of this transformation and help to improve operation of our infrastructure, assets, and connectivity.

Providing accurate, user friendly and comprehensive market information and data will support delivery of our DSO Strategic Action Plan, placing data and digital technologies at the heart of our energy system. By making this data open, we deliver customers and stakeholders the visibility they need to make informed decisions when interacting with our network.

We have already implemented several flexibility services and active network arrangements, such as our Flexible Power platform used for procurement and activation of flexibility. We will increase the visibility of our network through more sensors and monitoring, whilst utilising data such as smart meter data to drive insights at a local level.

Market Gateway portal

Our Market Gateway is the initial interface for prospective Flexibility Service Providers (FSPs). The Market Gateway was developed to support the contracting and technical on-boarding processes that FSPs are required to complete to provide distribution flexibility services to National Grid. The Market Gateway also delivers a number of additional benefits to both NGED and our stakeholders:

- Streamlining and digitalisation of the initial procurement process, delivering efficiency for both NGED and FSPs;
- Enhancing visibility on anticipated demand in the flexibility markets, so that we can prepare accordingly;
- Providing the pathway to procurement of energy efficiency and secondary trading as the market for these services arises in the future;
- Enabling both small assets to play in markets, and for markets to procure smaller flexibility requirements;
- Using common data which allows FSPs to select or develop their own interface product in a non-proprietary way.

So far, we have 33 organisations and 70,000 assets registered on Market Gateway, rising from half the number of FSPs and less than 1,000 assets last year. The system is capable of handling several orders of magnitude times this amount of assets without a significant upgrade and will continue to play a key role in delivering benefits to our stakeholders and consumers through flexibility procurement.

Flexible Power Portal

The Flexible Power Portal (FPP) is the operational tool which we use to facilitate all API communication necessary to dispatch services, as well as to calculate settlement and performance. It is separate to the Market Gateway which delivers the procurement of flexibility.

We have collaborated with Northern Powergrid, Scottish and Southern Energy Networks (SSEN) and SP Energy Networks (SPEN) on the development of the FPP to drive consistency across the industry and offer a single point of information in respect to our flexibility service requirements.

Flexibility providers are able to view flexibility locations, requirement data, procurement notices and documentation published by other DNOs on the joint website. Once contracted, providers are given access to the joint FPP where they can declare the availability of their assets, receive dispatch signals and view performance and settlement reports.

Low Voltage Sustain

Low Voltage Sustain is an innovative product which engages and rewards domestic consumers for provision of flexibility services. This product was designed in response to feedback from our stakeholders, to make flexibility services more accessible for a wider range of domestic customers.

LV Sustain allows consumers to be rewarded for lowering their energy consumption in the same 4 hour time window, 5 working days a week, through the winter. LV Sustain does this by establishing a ‘fixed requirement flexibility contract’, which is predictable and easy to understand. It gives suppliers, aggregators, and households consistency.

The flexibility offering is now available to 176,000 households, and we plan to expand this access further. We contracted over 1,200 domestic households using this product, via

aggregators and suppliers, to deliver flexibility through the winter in 2023/24. Partners currently signed up to LV Sustain include Octopus Energy and Axle Energy.

The flexibility provided will free up winter peak capacity to allow new connections, and defer reinforcement, delivering savings to all consumers.

We are also undertaking a separate Network Innovation Competition trial relating to domestic household flexibility with Octopus Energy, Scottish Power and Sero exploring the potential of utilising heat pumps to deliver flexibility services.

Improving flexibility market access and procurement

Our focus up to now has been on building the market frameworks and enabling them to operate efficiently and scale up. The key next steps on trading include:

- Deploy day-ahead competitions to maximise participation further;
- Deploy the joint utilisation competition to allow competition between long- and short-term procurement;
- Introduce short-term load forecasting with use of weather data to feed into flexibility dispatch decisions and curtailment modelling;
- Build automation to include the trading stages of flexibility.;
- Consider what needs to happen to our processes and systems to enable secondary trading and assess the levels of market demand for this service.

In development of our flexibility processes and systems, we have focussed on establishing scalable interfaces to create an open ecosystem for flexibility markets. We have several key interfaces serving different functions:

- Provision of market information;
- Commercial interactions;
- Operational interactions.

These interfaces (which include API compatibility for all repetitive processes) allow FSPs to interact directly with us if they chose to build their own systems. However, our approach also allows for third parties to develop interfaces which FSPs can interact with. This collaborative approach allows choice and should support maximum market participation of FSPs of all sizes. Our approach should also drive competition in the market for interface development and allows scope for third parties to offer services which coordinate across multiple markets.

We are currently trialling and iterating this innovative capability through our partnership with Piclo and its PicloMax product. We are using this partnership to test the interoperability of our systems. Our deployment so far has focussed on a single service provider, but we are also working with Electron to further test and develop the interoperability of our systems. We are continuing to explore and support alternatives routes to market to expand access to flexibility markets for all interested parties.

Improving network development forecasting

By working collaboratively, the insights we obtain from local authorities across heat, buildings and transport help us to develop more accurate forecasting for our future network investment. By enabling this two-way sharing of data, we can invest in the right areas of the network so future capacity is ready when local and regional stakeholders and their communities need it. This transparent and coordinated approach can help to optimise local and regional energy system planning and deliver better whole system outcomes at least cost.

The DFES is the starting point for our network investment process. Having produced our eighth DFES this year, we have strong capabilities in developing detailed forecasts across our regions. We rely on accurate data and insight for effective modelling. It is therefore essential for us to understand our stakeholders' future needs, to ensure we can deliver network investment where and when it is needed, at the lowest cost. We will continue to refine and deliver targeted improvement to our DFES forecasting accuracy on an ongoing basis, drawing on insights from our stakeholders.

We will provide a more granular level of network data than today, including:

This granular network data will be enabled by deploying the next generation of sensors on our LV network and utilising smart meter data. This will support us to deliver improvements in forecasting accuracy which will in turn lead to more effective network investment.

Our data architecture

Our objective: To harmonise our strategies to deliver accurate, user friendly and comprehensive market information and data to our customers and stakeholders.

By integrating our strategies and putting data at the heart of what we do, we are ensuring that our investments in digitalisation and data delivers on the SOO objectives and unlocks tangible outcomes for our customers and make strategic development data more accessible, transparent, and interoperable to our stakeholders. Data is a 'golden thread' that runs across all our strategies to support our stakeholders and customers to gain greater understanding of the network and support them to make optimal decisions in relation to the deployments of LCTs, development of LAEPs and supporting whole system optimisation.

Operating a smart and flexible network for our customers and stakeholders requires a DSO function powered by digitalisation and data. Our DSO vision is to enable and coordinate a smart, flexible energy system that facilitates local decarbonisation for all customers and communities at the right time and the lowest cost. To respond to this challenge and accommodate the changing demands on our network, we established our DSO function in April 2023 and published our DSO Strategic Action Plan in March 2024.

We will achieve our DSO vision by accelerating the development of flexibility markets and expanding access. This will maximise the capacity of the existing network and the benefits of demand side solutions in our regions. Enhancing the visibility of our network information and harnessing the latest data and digital solutions helps us to operate a dynamic network that is responsive to the needs of our customers and stakeholders.

Our Digitalisation Strategy is key to delivering transformational change throughout our business including how we plan, manage, and operate our network and how interact with and provide data to customers and market participants. We have made sure our Digitalisation Strategy is fully aligned and integrated with our other business strategies to deliver solutions that utilise our Innovation Programme to develop data and digital solutions: for example, our Innovation Programme is developing machine learning (ML) algorithms to identify and propose improvements in our Geographic Information System (GIS) data that will help to improve the accuracy of network modelling, regulatory reporting and the information we share with third parties.

Data and digitalisation are key facilitators of the delivery of a smart and flexible network. Placing data and digital technologies at the heart of our energy system through the delivery of accurate, user friendly and comprehensive market information and data is key to giving our customers and stakeholders the visibility they need to make informed decisions.

We have made meaningful investment to facilitate DSO in our Digitalisation Strategy and Action plan, which reflects our ambition to be the leading DSO in the UK. Our Digitalisation Strategy and Action Plan is fully integrated with our DSO strategy to deliver the transformation needed for a smart and flexible network for our customers and stakeholders.

We published our Networks Visibility Strategy at the end of 2021, focusing on improved monitoring of the network. This includes the deployment of bi-directional power flow monitoring at 11kV and higher voltages and the roll out of 15,500 LV monitors. While we deliver this improved network visibility, we aim to share as much of the data we already collect as possible. We are evolving the approach as data become available.

Our Load Related Expenditure plan published at the end of 2021, puts data at heart of the planning process. We recognise the levels of uncertainty which are present in the range of futures pathways as the UK transitions to net zero. In particular, how much of a role electrification has to play in the decarbonisation of sectors including transport and domestic heat, which will result in a different impact on electricity distribution networks.

As a result it is crucial to ensure that any load related expenditure plan is created using input data which closely reflects local and national policies and relevant data where available. Our strategic ambition is to periodically assess and refresh our input data for forecasting to ensure that the load related investment plan is up to date.

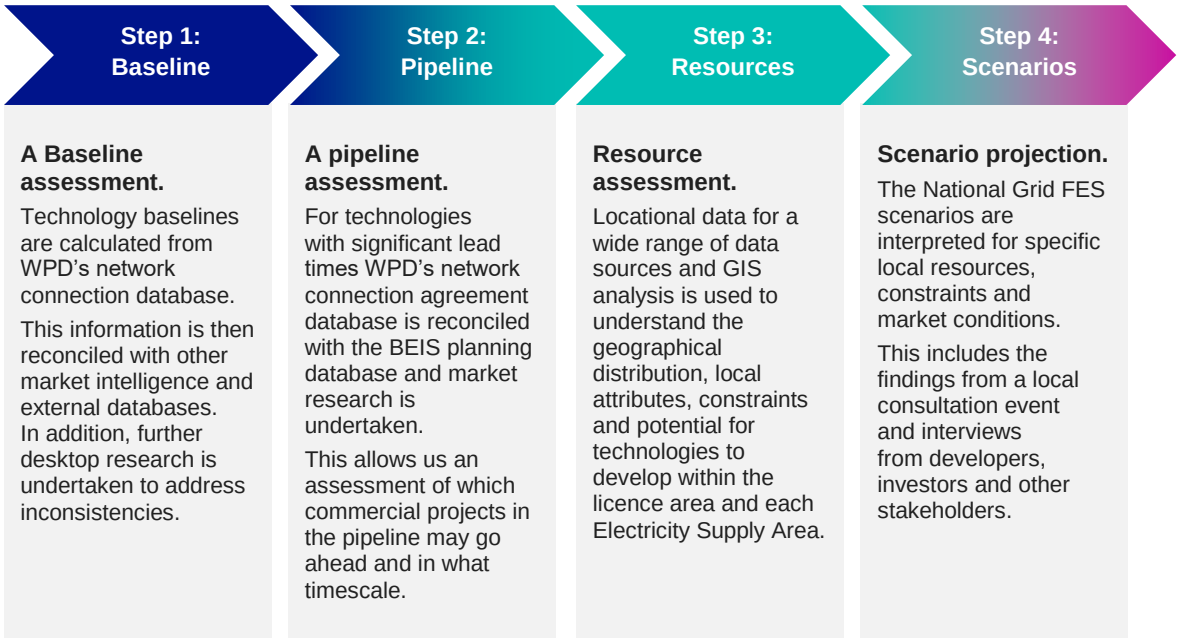

Figure 4: Our DFES development process

The first step of load related planning methodology is establishing a forecast of future network loads across each of our four licence areas. Since 2015, we have been undertaking scenario planning work through Distribution Future Energy Scenarios reports. Accurate data is critical to delivering accurate scenario projections as displayed in the DFES process chart

in Figure 5 above. Enhanced network visibility and monitoring and utilisation of smart meter data will enable us to deliver smarter, more flexible networks.

We are committed to regularly updating our suite of load related expenditure planning documents, including Distribution Future Energy Scenarios, Network Development Plans and Distribution Network Options Assessment. All reports will continue to be published on our website. Data and assumptions will be published on our Connected Data Portal, aligning with our core commitment to improve the accessibility and usefulness of data for our stakeholders.

Wider data infrastructure changes

Our objective: Embed data and digitalisation practices across our business to deliver for our stakeholders through increased network insight and operation and improved data management.

Our Digitalisation Action Plan continues to focus on implementing revolutionary change to deliver for our key four drivers - customers, our employees, infrastructure and ensuring our system is smart and flexible. We are focussed on setting the foundations for tangible and valuable outcomes for all our current and future data and system users.

Using the three underpinning elements of our Digitalisation Strategy, each activity within the Digitalisation Action Plan is characterised against at least one of these:

- Improved data management;
- Increased network insight and operation;
- Delivering for stakeholders.

A selection of projects are highlighted below that are supporting us to deliver smarter, more flexible networks and maximising accessibility to our stakeholders of our data.

LV Network Visibility project

The goal of this project is to provide greater visibility of the LV network, and to enhance the customer supply visibility and insights we develop.

Gaining increased visibility of the LV network will ensure that we can better serve our customers today and in the future. Better visibility of the LV Network will help earlier identification of LV faults, assist with LV voltage monitoring and assist with planning decisions and vulnerable customer engagement. The project is expected to bring the following benefits:

- Understanding of demand and energy profiles for key customer and technology archetypes to inform network planning and build tailored customer energy plans;
- Delivering data architecture to enable effective end-user access to smart metering and LV monitoring data to inform network planning and customer engagement;
- Enabling LV network data to be made available to external users, such as community energy groups;
- Delivering reliable and effective system to cluster Smart Metering no-supply alerts to understand a potential Feeder or LV network fault;
- Automating the historic voltage profiles of individual customers and clustered customers.

ConnectLV

ConnectLV is an LV Connection design and estimation tool with automated costing, up to date capacity margin indications, accurate network models (using Greatly Improved Automatic Network Topology performance), and a user interface. The tool enhances the accuracy of the network model.

To support future LV planning activities, the efficient connection design and estimation tool should have innovative digitalisation and data handling capabilities. These capabilities will help LV planners to gain greater visibility of the LV network, to deliver design and cost estimates to customers and offer a superior user experience.

This will allow us to:

- Increase the accuracy of our design and cost estimates for customers;
- Reduce the time to do LV studies through automation of the underlying model.

11kV Planning Tool (Sincal)

Planning the 11kV network is becoming more complex as the volume of connection applications increases and new technologies are connected. We provide HV planning engineers with a brand new and more efficient power system analysis tool that delivers greater visibility of the HV network.

This will deliver:

- Greater efficiency as the tool helps engineers to process customer connection applications faster and with higher accuracy. It automates data processing and minimises the time required by 11kV Planners, and others, to carry out specific modelling and design tasks (e.g. contingency and time series data analysis);
- Improved visibility of the HV network through significantly enhanced functionality and performance of 11kV modelling. This will facilitate greater understanding and ability to share network information.

Next steps

The document outlines how NGED will work with stakeholders to ensure that our network delivers best value to our customers, in the context of increasing investment in renewable generation and storage, alongside growing deployment of LCTs. We will adapt to the changing needs of our customers and stakeholders and support them to achieve their decarbonisation ambitions. Access to and effective use of data is a key enabler of this, and we will continue to work with our stakeholders to ensure that we are responsive to their needs regarding data.

We will continue to seek feedback from stakeholders through the various engagement channels outlined in this document, to measure the effectiveness of the Smart Optimisation Output and seek feedback on ways that it could be improved in future. An engagement log and change log will be published annually, which will outline detailed comments, decisions, and actions. This will help to drive improvements in the Collaboration Plan and System Visualisation Interface to maximise the value of the SOO for our stakeholders.

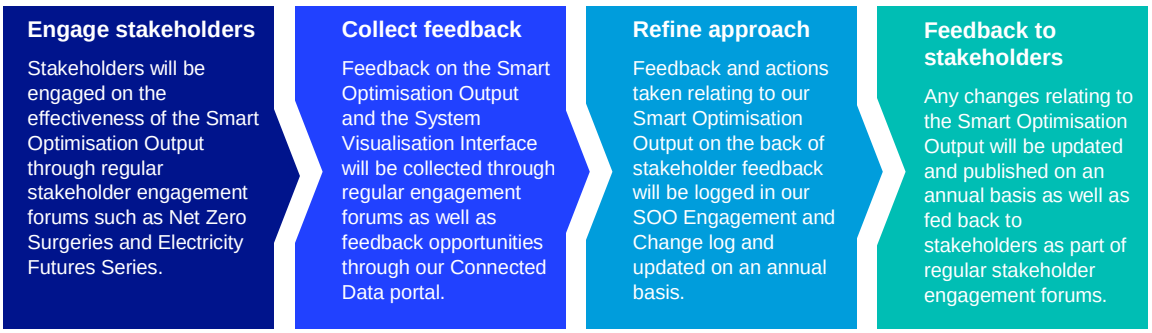

Figure 5: Overview of our Smart Optimisation Output feedback approach

Appendix

Glossary of terms

API	Application Programming Interface
CDP	Connected Data Portal
DER	Distributed Energy Resources
DFES	Distribution Future Energy Scenarios
DNO	Distribution Network Operator
DSO	Distribution System Operator
ESAs	Electricity Supply Areas
ESO	Electricity System Operator
FPP	Flexible Power Portal
FSPs	Flexibility Service Providers
GIS	Geographic Information System
GSA	Gas Supply Area
GSP	Grid Supply Point
ICCP	Inter-Control Centre Protocol
LAEP	Local Area Energy Plan
LCT	Low Carbon Technologies
LV	Low Voltage
ML	Machine Learning
NESO	National Energy System Operator
NGED	National Grid Electricity Distribution
NGET	National Grid Electricity Transmission
NIA	Network Innovation Allowance
PRIDE	Planning Regional Infrastructure in a Digital Environment
RESP	Regional Energy Strategic Planners
SCG	Strategic Connection Group
SOO	Smart Optimisation Output
SoW	Statement of Works
SPEN	SP Energy Networks
SSEN	Southern Energy Networks
TO	Transmission Owner
WWU	Wales and West Utilities

List of relevant documents and webpages

Links to our webpages referred to throughout this plan, and where our stakeholders can provide feedback:

- Whole System Coordination Register
- Connected Data Portal feedback and data request
- Stakeholder engagement events
- Customer Connection Steering Group
- Digitalisation Strategy
- Digital Interactive Roadmap
- DSO Strategic Action Plan
- Connected Data Portal (CDP)
- Low Voltage Sustain
- Clearview Connect

SOO Engagement and Change Log

Item No.	Date raised	Comment	Decision	Action

Table 1: SOO Engagement and change log

National Grid Electricity Distribution plc
Avonbank
Feeder Road
Bristol BS2 0TB
United Kingdom

nationalgrid.co.uk

April2024. BLU28418/PR