

Open Networks 2021 in Review



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Foreword

In the year of COP26, as the transition towards a Net Zero economy accelerates, Britain's electricity and gas network infrastructure continued to sit at the heart of decarbonisation; and operators are building an energy system fit for a Net Zero future, which leaves nobody behind.



Farina Farrier
Head of Open Networks
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2021 was another challenging year for the energy sector – with the industry negotiating the likes of Storm Arwen, market volatility, suppliers going into administration and multiple government consultations amidst the continued pandemic. However, with distribution network operators (DNOs) successfully publishing RIIO ED2 Business plans and continuing to push for innovation, the ambition to drive towards building a secure, reliable and clean energy system that works for all remains.

ENA's Open Networks programme has been running for five years and has evolved significantly over the past few, it has moved from defining deliverables to implementing them in a range of areas identified early in the programme and starting development in a number of new areas which were not a priority when it started. See below for what the programme has achieved in 2021:

Developing local markets to support more cost-effective energy in the long term;

- Made around 3GW of flexibility – a record-breaking amount – available to the market for tendering, advancing our Flexibility markets ahead of every other country in Europe.

- Standardised and simplified processes including making a consistent flexibility contract available across Great Britain (GB) and introducing a standard and transparent methodology for all distribution network operators in Great Britain to be able to 'market test' and make decisions on potential flexibility solutions.

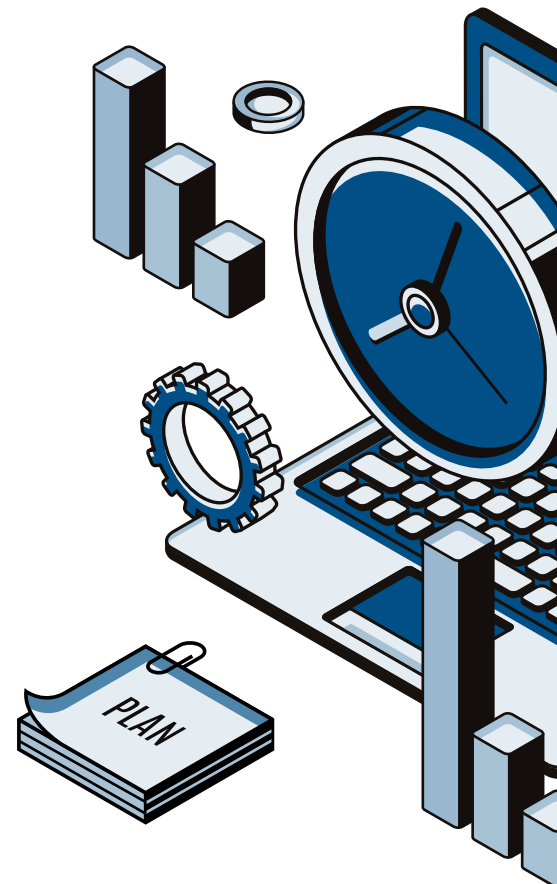
Working better together, so customers have the best possible solution;

- Worked more closely with the industry to understand how to collaborate better, ultimately revising our governance to enable this in 2022. This work resulted in introducing two new stakeholder engagement groups – a Challenge Group and Dissemination Forum – which will launch in Q1.
- Received recognition of our Whole System Cost-Benefit Analysis framework under Ofgem's re-opener guidance / Coordinated Adjustment Mechanism.
- Increased visibility of network capacity data and further standardised Distribution Future Energy Scenarios to enable customers to more easily identify opportunities for investment.

Better transparency and data sharing to ultimately help people connect more quickly and efficiently;

- Updated an interactive roadmap to deliver Distribution System Operation (DSO), which now contains 544 steps mapped out across individual GB networks.
- Further developed Embedded Capacity Registers, continuing to open up and standardise data on connected resources and any services they provide.

The largest area of work in 2021 has been in flexibility, where we focused our efforts to open local markets for flexibility services, as well as standardise and improve the experience for customers across network operators and with the Electricity System Operator (ESO). This included publishing a [Flexibility Roadmap](#) for the first time, implementing a Common Evaluation Methodology, developing, implementing and further consulting on a standard contract for providers and undertaking an Active Network Management (ANM) review including contracts, curtailment risk and curtailment information.



2.9GW

of flexibility services were tendered, contributing to the UK being a world leader with the largest flexibility markets

OVER 100

network representatives were engaged during 2021 to achieve the programme's ambitious goals

OVER 70

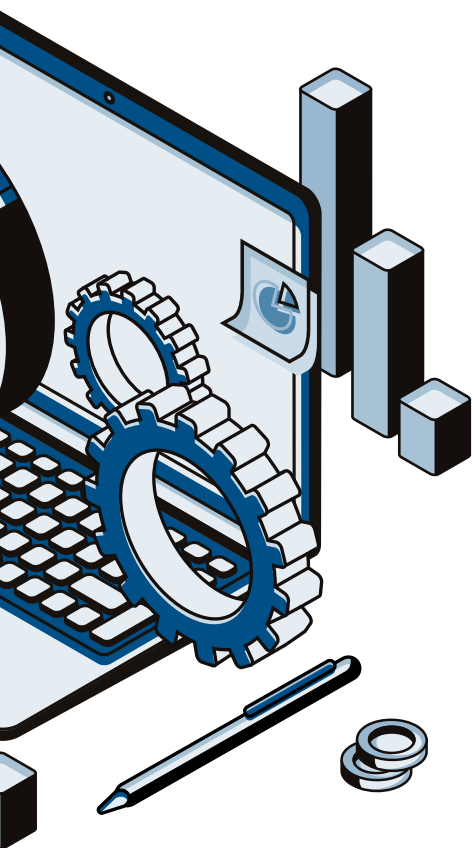
deliverables – including reports, guidance, methodologies and working models – were published by the programme

Through the years the programme has introduced real momentum into the transition to Distribution System Operation (DSO) and has set out a clear pathway and the actions required to deliver it. In 2021 we have gone a step further in being transparent and now publish all data, including company level detail on progress through our DSO Implementation Plan. Updated in Q1 and Q3, it sets out all the work that is under way or planned by the energy networks to improve visibility and to share data with the wider industry to unlock new opportunities. The improved interactive [DSO roadmap](#) contains more than 540 detailed steps.

Collaboration between electricity and gas networks remains as vital as ever. In early 2021 we were delighted that Ofgem gave formal recognition of our Whole System Cost-Benefit Analysis framework and its use as an essential part of the evaluation of network proposals under the Coordinated Adjustment Mechanism. Later in the year, gas and electricity network operators consulted with around 120 local authority representatives to shape a whole energy system service aimed at helping with their growth, clean air and decarbonisation plans. Working closely with the Gas Goes Green programme, we brought the networks closer together in mid-2021 by launching a Whole Systems Strategy Board, with the joint committee of senior gas and electricity network leaders meeting on a quarterly basis in 2022.

Working with our friends and partners in the industry

Stakeholder engagement and collaboration across the industry has always been at the heart of the Open Networks programme, and was crucial in delivering our objectives and to ensure consistency of our regulatory and policy developments in 2021. This includes engagement with Ofgem, government and industry. In addition to our public consultations and Advisory Group meetings, we increased our stakeholder outreach through more frequent webinars, media partnerships, social media advertising and increasing newsletter subscribers. We also continued our Community Energy Forums, conducting two forums for community groups to talk to the networks on the issues that are most pressing to them, and supported Community Energy Fortnight. More broadly, we have worked even more closely with the industry this year to understand how to collaborate better and have revised our governance to enable this in 2022. This includes introducing two new stakeholder engagement groups – a Challenge Group and Dissemination Forum – which will launch in Q1.



Looking ahead to 2022

2022 marks a key moment for the programme – it's fifth anniversary – and it will be another important year as it ramps up efforts to unlock Net Zero. The Ofgem and BEIS Smart Systems and Flexibility Plan reiterates these challenges and has given Open Networks the mandate to deliver a common framework for flexibility by 2023.

Our new emblem will be used across 2022 for any Five Year activities.

The UK Government's Smart Systems and Flexibility Plan, coupled with stakeholder feedback provided through a public consultation undertaken in late 2021, have guided priorities for the year ahead.

Another key area will be continuing to engage closely with stakeholders. We are revising our governance approach for Open Networks to enable the programme to work more collaboratively with industry in developing our flexibility proposals and are setting up two new stakeholder engagement groups, which both commence in Q1.

Flexibility remains one of the programme's largest and most important areas of work for 2022, similar to previous years, we will continue to take an adaptable approach to delivery to ensure that latest industry developments and practical lessons are taken into account.

We will also continue to focus on informing and implementing key policy on Distribution System Operation.

Launched in January, the [Open Networks 2022 Work Plan](#) provides more detail of the programme's priorities and what's to come in the year ahead.

FIVE
YEARS
ON

Energising the
UK's transition to
Net Zero networks



2021 highlights

The year in numbers

25

areas of focus for the programme, enabling further standardisation across networks and addressing barriers to customers

OVER 70

deliverables – including reports, guidance, methodologies and working models – were published by the programme

2.9GW

of flexibility services were tendered, contributing to the UK being a world leader with the largest flexibility markets

544

least-regret steps mapped out across individual GB networks to support the adoption of Distribution System Operation (DSO)

119

local authorities were consulted to progress our Whole System Optioneering Service work

37%

uplift in newsletter subscribers – sign up to our [monthly updates](#)

OVER 550

stakeholders attended our webinars across the year

OVER 100

network representatives were engaged during 2021 to achieve the programme's ambitious goals

57%

increase in Advisory Group participation via our engagement programme

04

public consultations conducted with respondents from across a wide range of industry

OVER 45







community energy groups reached through our Community Energy Forums

13

references to Open Networks in UK Government's Smart Systems and Flexibility Plan

2021 highlights

Themes and publications

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Opening Flexibility markets 	Flexibility roadmap published		Flexibility figures published	Common evaluation methodology adopted nationally Standard Agreement Evolution report published		Technical Specification for a Baseline Verification Tool for use by flexibility providers
DSO transition 			DSO Implementation Plan Q1 full update			
Whole System efficiencies 		Whole System Cost-Benefit Analysis model incorporated into Ofgem Coordinated Adjustment Mechanism (CAM) consultation	Identification and engagement of early users of the Cost-Benefit Analysis (CBA) tool	Continual monitoring of CBA users for feedback to further develop the tool throughout 2021	Engagement of 119 different local authorities to seek input on the regional data repository and a potential Whole System optioneering service	Network-led repository of regional local authority data for sharing amongst networks
Transmission and Distribution collaboration 						
Customer connections 			Stakeholder engagement to identify user commitment improvements			
Industry engagement 	2021 Work Plan consultation Launch of 2021 Work Plan, consultation and 2020 End of Year Review DSO Implementation plan webinar	Baseline Methodologies webinar 2021 Work Plan consultation webinar	Non-DSO services stakeholder workshops Advisory Group New programme chair announced, Sotiris Georgiopoulos, taking over from Nigel Turvey	DSO Implementation Plan webinar Community Energy Forum: 'Getting our networks to Net Zero' Common Evaluation Methodology (CEM) tool webinar	2021 Work Plan published ON took part in Utility Week Live Queue Management webinar Advisory Group Letter to Rt Hon Philip Dunne MP on removing the barriers to the development of community energy	Community Energy Fortnight - blog and video Industry engagement to inform sharing of ANM curtailment information

JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
<p>Full 2021 Flexibility figures with both historical and forward looking data</p> <p>Britain breaks network flexibility record with 45% more contracted than in 2020</p>	<p>Flexibility consultation</p> <p>Flexibility consultation webinar</p> <p>V2 of Standard Agreement for procurement of flexibility, aligning DNO and ESO procurement for the first time</p>	<p>Public consultation on V2 Standard Agreement for procurement of flexibility</p> <p>Standard Agreement consultation webinar</p>	<p>Summary of stakeholder feedback on LIFO mechanism and proposed caps-and-collars method ANM curtailment apportionment</p> <p>Internal proposals for further development of Carbon Value and flexibility Option Value in the CEM</p>	<p>Stakeholder engagement</p> <p>Update CEM including Carbon Value being published in Jan-22</p> <p>Updated (post-consultation) V2 of Standard Agreement for procurement of flexibility</p>	<p>ANM exit guidance for network customers</p> <p>Primacy principles for network coordination and cooptimisation</p> <p>Improving Curtailment Information 2021 summary, including a gap analysis of DNO provided curtailment information</p> <p>Flexibility and Standard Agreement consultation responses published</p>
<p>Potential Conflicts of Interest & Unintended Consequences Q2 full update</p>					
<p>Outcomes from stakeholder engagement on a potential local Whole System optioneering service</p>			<p>Horizon scanning and scoping activity to understand how networks can support LAEPs, setting out how ON will work with Energy Systems Catapult on this</p>	<p>Whole System optioneering service early design and resource requirements</p>	<p>Whole System Cost-Benefit Analysis methodology key learnings and next steps</p> <p>Local authority data alignment recommendations paper</p>
<p>Defined use cases and volumes for operational Distributed Energy Resources visibility & monitoring</p> <p>Shortlist of datasets and their use cases and benefits for operational data sharing</p>	<p>Network Capacity Signposting reports published by DNOs</p>		<p>Stakeholder engagement on DNO published Network Capacity Signposting reports to inform Network Development Plan (NDP) process</p>		<p>"Best View" Scenario for network forecasting; description and justification criteria</p> <p>Network Development Plans Form of Statement Template & end to end process</p> <p>Operational Distributed Energy Resource visibility & monitoring baseline functional specification</p> <p>Operational Data Sharing implementation plan</p> <p>Proposed coordination register format (Form of Statement)</p>
<p>Updated Queue Management user guide</p> <p>Queue Management implementation</p> <p>Internal process to develop format and proposal for inclusion of assets <1MW in the ECR</p>			<p>Updated and improved Embedded Capacity Register (ECR) including additional information for Transmission</p>		<p>Connection Agreement Review to determine scope for potential further development</p> <p>Implementation Plan for inclusion of assets down to 50kW in the Embedded Capacity Register (ECR)</p>
<p>Community Energy Forum: 'Communities in our future energy system'</p> <p>Advisory Group</p>	<p>Conflicts of Interest and Unintended Consequences refresher workshop</p> <p>ON took part in Power Responsive Summer Event</p> <p>Letter to Alan Whitehead MP regarding flexibility figures</p>	<p>Business Green X Open Networks webinar</p> <p>Two new stakeholder engagement groups proposed to key stakeholders</p> <p>ON took part in Network Asset Performance Conference 2021</p> <p>Advisory Group</p>	<p>2022 Work Plan consultation</p> <p>ON took part in ISGAN event</p> <p>Applications opened for two new stakeholder engagement groups - Challenge Group and Dissemination Forum</p> <p>Energy Networks Innovation Conference (ENIC)</p>	<p>Final Advisory Group</p>	

Three ways the energy networks are unlocking Net Zero

Foundational to every part of the low-carbon transition, the UK's energy networks have helped turn the UK into a superpower of renewable energy and are gearing up for a zero-carbon energy system by 2035.

Energy networks are at the heart of the smart, flexible system which will accommodate increasing volumes of renewables to be built whilst also rolling out the technologies we need next for Net Zero. With the focus of the international community and the global energy industry on the COP26 summit last year, here are three ways the networks are unlocking Net Zero.

01 Maximising new opportunities for Net Zero technologies and services

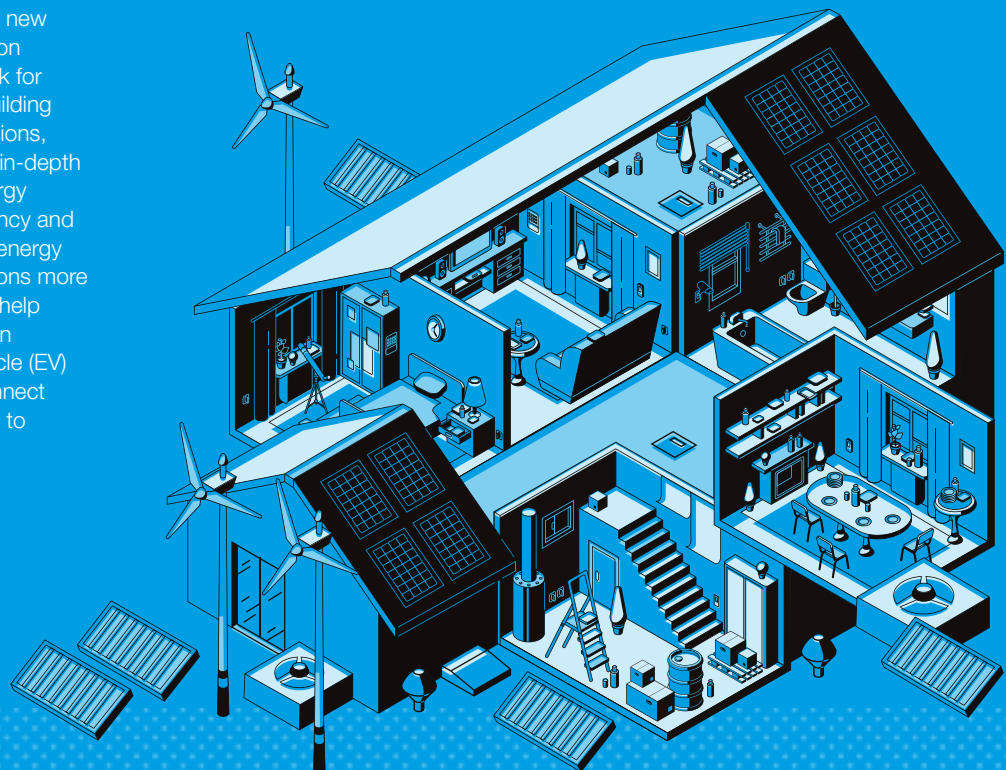
From hydrogen to heavy goods vehicles, by investing in innovation the networks are finding new ways to run the gas and electricity grid infrastructure, deliver efficient solutions to consumers and enable new markets and services. Our Innovation Strategy provides a clear framework for this progress and more recently, building on the government's recommendations, ENA produced a proof-of-concept in-depth digital system map of the UK's energy system. It provides more transparency and helps companies in and out of the energy industry to make investment decisions more intelligently. Crucially, this data can help renewables projects and low carbon technologies, such as Electric Vehicle (EV) fleets, solar PV and wind farms connect more intelligently. ENA will continue to develop this map in 2022.

02 Delivering network investment

Through the energy networks regulation process, innovation projects and green recovery, the networks are planning investment in building the world's first zero-carbon gas grid and a smart electricity grid infrastructure, at both a local and national level. So, we can not only find new ways to keep household costs down but also take advantage of new opportunities for it to be more coordinated, making our energy system more capable and resilient. This includes working with consumers and organisations like local authorities, community energy groups and energy producers.

03 Seeing the whole picture

Our new energy ecosystem will require the development and support of new systems, processes and data to manage it. This will create new opportunities for us to plan and run our gas and electricity grids in a coordinated way. Doing so will help us all reduce our carbon emissions faster and smarter – transitioning to Net Zero Networks. We are committed to developing the future of our energy networks, including the transition to green gas and a smart electricity grid.



Enabling local markets and reaching record levels of flexibility

Flexibility continues to be a key component of our future smart grid. Working closely with industry, the progress Open Networks has facilitated in 2021 has made it easier for customers to provide services all across the country.

Simply put, 'flexibility' in an energy context is about changing where or when electricity is consumed or generated, levelling out peaks in demand as we move to a greener future. It's about connecting local generation to the grid, making use of green tech like Electric Vehicles for storing energy and in some instances reducing the need to build more infrastructure.

[Figures from UK Government's Smart Systems and Flexibility Plan 2021](#) show that flexibility could reduce annual whole energy chain costs by £10 billion a year by 2050 whilst also creating 24,000 'green collar' jobs. It also means our gas and electricity networks can work together in a smarter, more integrated way to keep our energy system safe and secure as new green technologies are connected. What's more, flexibility is a key aspect of delivering a green recovery, as it enables us to meet Britain's targets for the widescale roll out of electric vehicles and heat pumps.



Made around 3GW of flexibility – a record-breaking amount – available to the market for tendering, advancing our Flexibility markets ahead of every other country in Europe.

Our work is helping to increase the uptake of these local flexibility services, with more stakeholders than ever before looking to take part in flexibility tenders, building a mosaic of different options. We have seen an increase in market liquidity of [nearly 40% in the past two years](#), driving more competitive outcomes with customers benefiting from more cost-efficient solutions.

Wide-reaching public consultations

To help inform further standardisation of flexibility markets and a market leading common contract, we launched two public consultations in the latter half of this year to hear thoughts of the industry.

The former gave flexibility providers the opportunity to feed back to the networks on the framework we're building for them, ultimately allowing flexibility providers of all types to offer their services more consistently across the country. In doing so this creates a competitive and accessible marketplace, driving down prices all whilst directly enabling more renewable power to be built-out.

For the latter, stakeholders were invited to help shape the third iteration of a standard contract, created with input from distribution network operators and National Grid Electricity System Operator (ESO), to provide a consistent GB-wide core agreement for those wishing to provide vital local flexibility services to the networks.

Key changes in the improved version included:

- Increased alignment with National Grid ESO's approach.
- Simplified content – reducing the contract length by almost 50%.
- Modifying contract wording to ensure it works for aggregators (including smaller assets).
- Retaining the simplicity of previous versions whilst also allowing the sharing/publication of relevant data.

The updated version, published at the end of 2021, will help take the transition to the smart grid to the next level and marks another step forward in bringing consistency across the industry.

Clear and open decision making

A standard and transparent methodology for distribution network operators when choosing solutions to solve congestion was adopted nationally earlier this year. The Common Evaluation Methodology provides greater transparency of the decision-making process and, by assessing different potential options, ultimately helps secure the lowest overall cost for customers.

It also ensures that distribution network operators are evaluating flexible options versus traditional network reinforcement solutions consistently and transparently to choose the most effective solution.

Enabling local markets and reaching record levels of flexibility (cont.)

Wider recognition

A joint publication from the UK Government and Ofgem, the Smart Systems and Flexibility Plan 2021, published in July, recognised the deliverables and achievements of Open Networks – with the programme receiving 13 mentions throughout the plan.

“Industry has developed new local markets for flexibility as part of the ENA Open Networks project.

“As these new markets mature, this work has taken initial steps towards standardisation, including the development of standard products, a common contract for distribution flexibility tenders, and a common valuation methodology for flexibility.”

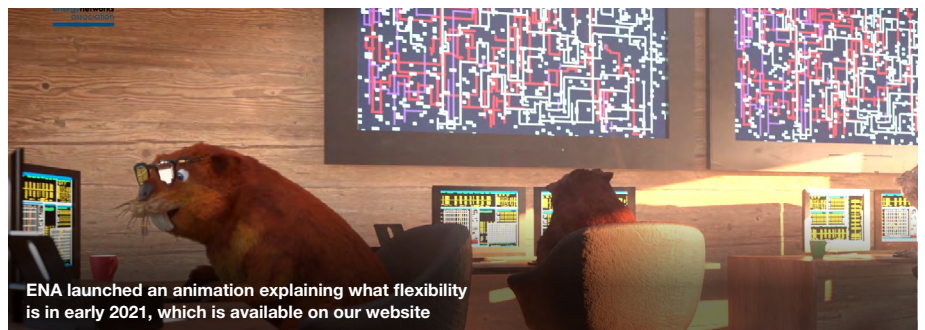
[Smart Systems and Flexibility Plan 2021 \(p.57\)](#)

Earlier this year, a report commissioned by pan-European trade association GEODE and written by the Centre on Regulation in Europe (CERRE), revealed that the [UK’s electricity networks lead all their competitors](#) in Europe for supporting and delivering local flexibility services. Open Networks received 10 mentions in the report, and through this programme, electricity networks have been central to this transformation, laying the foundations for the UK’s decentralised, digitalised, Net Zero emissions future.

“Great Britain also has notable innovation projects (Open Networks and Intraflex) which have attracted interest from other countries.”

[Optimal Regulation for European DSOs to 2025 and beyond. \(p.77\)](#)

Flexibility explained



Whether for national balancing, local congestion relief or even the emerging opportunities offered through peer-to-peer trading, flexibility is a well-used industry term – but what does it actually mean? We launched a video early in 2021 to [explain what flexibility is](#) and some of the changes happening to our energy system, with the help of some furry friends!

Flex Assure

ENA, via SSEN, is feeding in to the Association of Decentralised Energy (ADE)’s Flex Assure scheme to represent the UK’s electricity network and system operators. Flex Assure is a code of conduct scheme which sets standards for flexibility service providers, working with business energy users to deliver flexibility and demand side response services. The programme will support the development of practices which are safe, consistent and sustainable.

Active Network Management (ANM)

Finally, ENA has undertaken work in 2021 to provide more guidance and improve information sharing to enable greater participation of Active Network Management (ANM) in flexibility markets.

Focus for 2022

The programme will continue to build on the momentum and progress from 2021 to deliver further standardisation, simplification and transparency in how local flexibility services are facilitated. A key priority will also be to deliver a common framework for flexibility, as mandated by BEIS and Ofgem’s Smart Systems and Flexibility Plan.

Distribution System Operation Transition

Britain needs a modern, low-carbon energy system that can keep our energy flowing; and our energy networks are planning and building a future power grid that leaves nobody behind, empowering communities to make the most of their electric vehicles, batteries and solar panels to power us well into the future.

Updated DSO Implementation plan

ENA made another step towards the network of the future with two updates to an interactive roadmap which supports network companies in reaching Distribution System Operation (DSO). The first, in early 2021 focused on accessibility and usability, and the latest iteration focuses on granularity. Making all data available transparently was an important step for networks and we now publish all data, including company level detail, on progress.

Focus for 2022

Next year this work area will continue to tackle the transition to DSO head on, progressing our agreed pathway. Identifying and addressing potential conflicts of interest and unintended consequences will make the transition as efficient as possible.

With supply and demand patterns shifting, building a smarter, more accessible energy system will help the energy networks reach Net Zero as fast as possible.

Managing conflicts of interest

In 2021 a range of updates were made to a [Risk Register](#) that analyses the work programme as well as industry developments. The programme worked closely with stakeholders to identify these risks and capture any potential or perceived conflicts of interest or unintended consequences which could arise and potentially compromise the energy system's ability to operate at its best and most efficient. This includes the construction of a heatmap to simplify interpretation of the register and to aid stakeholders to clearly prioritise risks.

We have also continued to engage with ENA's Customer & Social Issues Working Group to review risks that have a direct impact on end consumers and to monitor and advise on vulnerable customer impacts.



Customer connections

With smarter technologies becoming more commonplace in homes, businesses and communities, and consumers gaining more control and visibility of their data, our aim is for everyone to be able to make informed decisions about energy usage.

Queue Management

Queue Management is a key process that enables the management of the connections queue. In mid-2021 we developed improvements to the existing Queue Management process through the introduction of milestones. This work is enabling network companies to more effectively manage contracted projects within a connection queue and to remove stalled or slow-moving projects to free up capacity for other projects.

These improvements were developed with extensive stakeholder and wider industry engagement, resulting in network companies implementing these proposals in July.

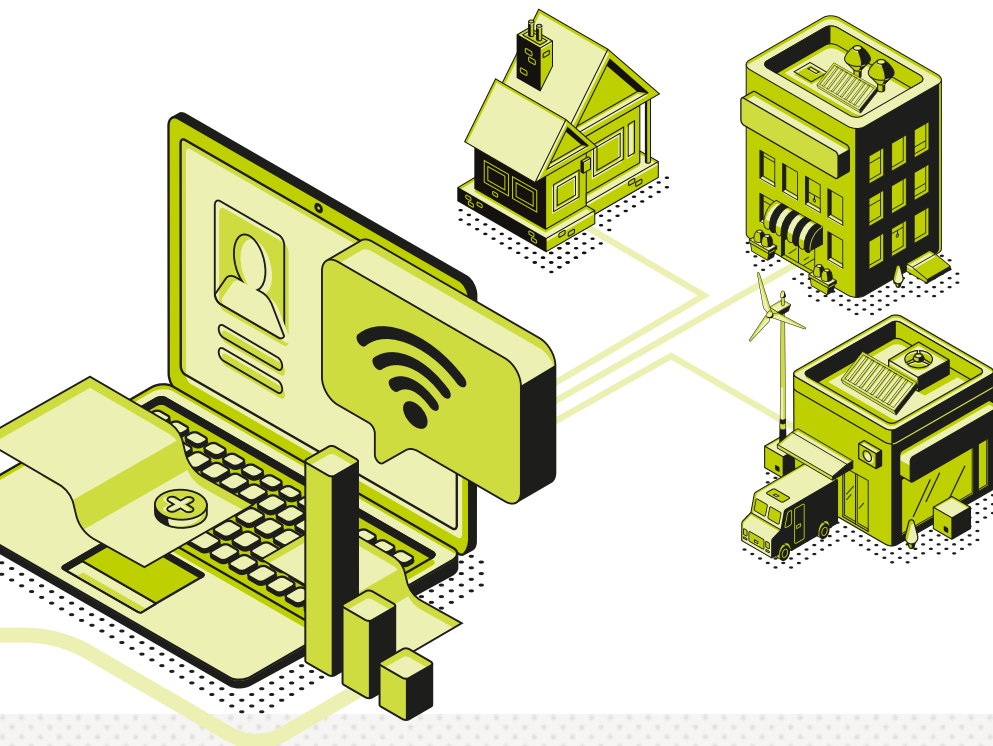
Embedded Capacity Register

The Embedded Capacity Register (ECR) has been developed to provide better information to electricity network stakeholders on connected resources and network requirements. Each DNO hosts a register which will provide accessible information at a local and national level. The programme continued to further improve the ECR in 2021 and these registers are a major ongoing commitment by DNOs to publish and update on a monthly basis. The registers give the best view of where new capacity might be needed in the country give the opportunity for new low carbon electricity generation to connect.

ECR – As part of our work in 2021, the programme set out a case for extending the current ECR to include assets up to 50KW, which significantly increases the amount of data for the industry to utilise. Given the quantity of data, a database was identified as the solution and will be developed in 2022.

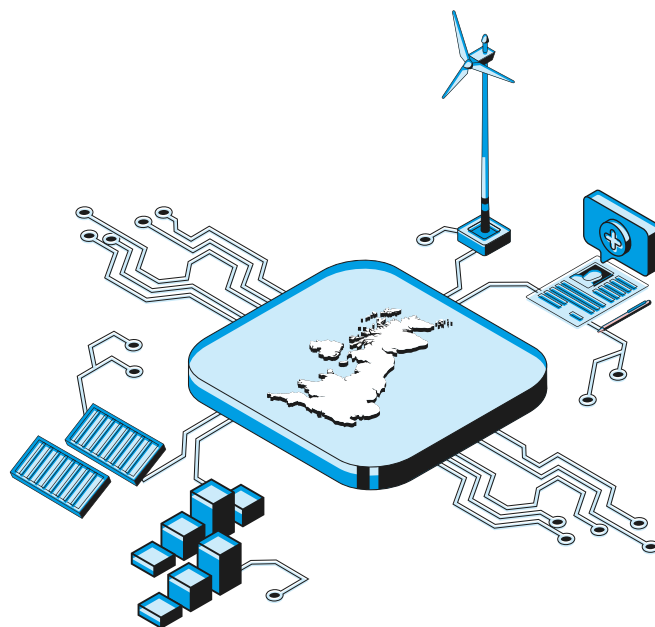
Focus for 2022

The programme will continue to focus on improving both the visibility of data and the connections process. This work area will collaborate with ENA's Data and Digitalisation Steering Group to deliver the Embedded Capacity Register as an end-to-end database solution. It will also continue to monitor the implementation of Queue Management and interactivity processes.



Following a whole energy system approach

By bringing together electricity and gas members, along with stakeholders such as local authorities, Open Networks is the first industry project to consider how electricity and gas networks can work more efficiently.



Energy networks are at the heart of the smart, flexible system which will accommodate increasing volumes of renewables on the network whilst also connecting the technologies we need next for Net Zero. They are also driving the shift towards a hydrogen economy and decarbonising both heat and transport, all whilst protecting the natural environment and supporting green, skilled jobs.

Our energy networks are already supporting the delivery of the Prime Minister's Ten Point Plan and Climate Change Committee targets. As ambitions ratchet up post COP26, so will their delivery in driving the path towards Net Zero Networks.

We launched a Whole Systems Strategy Board in 2021, with the joint committee of senior gas and electricity network leaders meeting on a quarterly basis, at a minimum, in 2022. The Board's role is to provide a joint industry framework that will allow network companies to develop and implement the above common Whole System framework; as well as delivering consistent responses to consultations and any other relevant publications in co-ordination with our Strategic Communications Committee.

Collaborative efforts

The programme commenced work on how to support and add value to the Local Area Energy Planning (LAEP) process. In late 2021 a report on the scope of future work to establish a framework for the energy networks' role in Local Area Energy Planning

was published, which will form the basis of a go/no-go decision to commence work to develop the framework.

The framework could potentially provide a coherent and consistent approach for energy networks' contributions to Local Area Energy Plans, enabling networks to fully endorse an LAEP, and for the LAEP to be credible at a wider national level. Alternatively, it could provide a mechanism for best practice sharing of approach across GB.

In 2021, we facilitated this work area alongside ENA's Gas Goes Green project that is looking at the future of gas and leading the transition. A priority was to also incorporate wider industry partners to support its progress – including Energy UK, Regen, Energy Systems Catapult and the Association for Decentralised Energy (ADE).

Whole System Cost-Benefit Analysis (CBA)

This ENA-developed tool aims to enable the comparison of costs and benefits across different sectors, across a number of stakeholders (regulated and non-regulated) as well as across a range of scenarios. Since then, it has evolved from a concept to a fully functioning model within the space of 12 months, bringing together experts from all of the distribution network operators, gas distribution networks and ESO to work with stakeholders to develop this. Earlier in 2021 we were delighted with the recognition and incorporation of our Whole System Cost-Benefit Analysis framework under Ofgem's re-opener guidance / Coordinated Adjustment Mechanism for RIIO-2.

Working with local authorities

Electricity and gas networks are working together to support local authorities to shape the energy system of a Net Zero future.

To effectively deliver the decarbonisation of heat, industry and transportation, there is an urgent need to acknowledge that different solutions will work in different places and the best-placed people to determine those solutions are often the local authorities in the area. In 2021, electricity and gas network operators consulted with over 100 local authority representatives through Open Networks. Through a series of one-on-one and group interviews, webinars and surveys, we sought views on developing a service aimed at supporting local council development plans. Working across transmission, and electricity and gas distribution networks, this feedback will be used to help steer the design of the 'whole energy system' service and how it will be taken forward as a robust, enduring framework.

Focus for 2022

The programme will continue to be managed as a joint work area between electricity and gas networks, further developing the Whole System CBA framework and proposals for a Whole System optioneering service for local authorities along with a range of other deliverables. More information on our ambitions for 2022 are available in the [Open Networks Work Plan](#).

Transmission and Distribution Collaboration

For the past five years, Open Networks has been at the heart of improving Transmission and Distribution coordination, a key aspect of Distribution System Operation, as well as implementing change across a range of areas including investment planning and improvements to Future Energy Scenarios.

In 2021, the programme sourced further areas of improvement across network company Future Energy Scenarios and opened up even more data on network requirements for all. In addition, Open Networks further progressed operational data exchange opportunities from Regional Development Programmes and the proposed Code Modifications to support the use of the Common Information Model.

Whole System FES

National Grid ESO's Future Energy Scenarios (FES) describe the potential options and scenarios for energy in Great Britain. This year the team completed a successful cycle of Whole System FES using updated building blocks and developed a methodology that takes into account multiple scenarios to inform Network Development Plans (NDPs) and Long Term Development Statements (LTDS). This will enable networks to adopt a common framework in assessing future network requirements and how they are reported.

Network planning and development

Network planning and development is essential for ensuring the electricity network infrastructure supports customers' needs and is especially important due to the expected challenges as usage of electricity increases due to decarbonisation. In 2021, Network Capacity Plans were developed and published and, building on this, Open Networks defined a common end-to-end process and format for delivering Network Development Plans (NDPs).

Network Development Plans are key publications that all DNOs publish once a year to report on network capacity and development plans for the medium term.

Operational Distributed Energy Resources (DER) visibility and monitoring

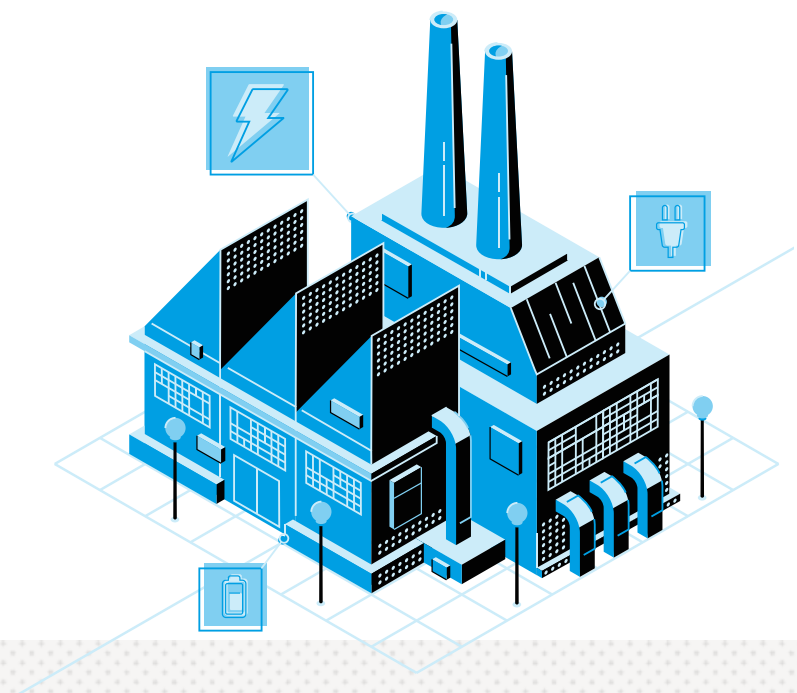
Visibility and monitoring of Distributed Energy Resources is critical in improving network operation and resilience. In 2021, Open Networks undertook work to investigate the needs case for greater visibility and established a set of use cases and functional specifications for this. A cost benefit analysis is currently being undertaken to help understand the costs and benefits of these use cases.

Operational data sharing

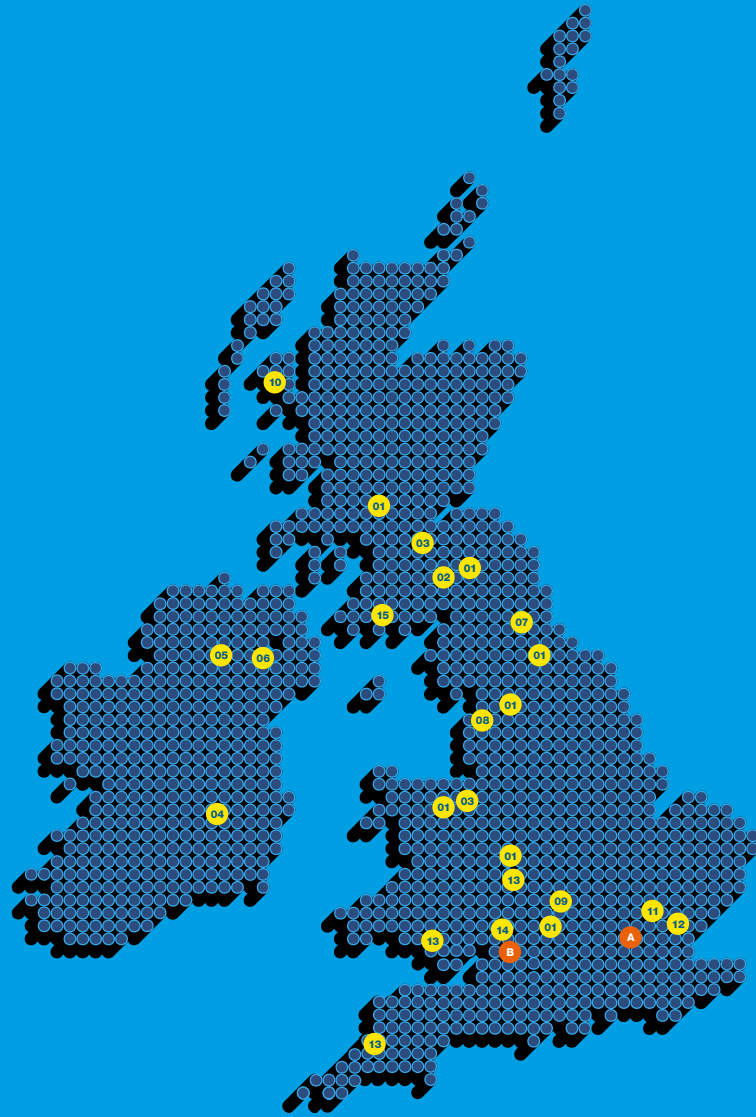
In 2021 this work area identified operational data and information that the networks can share with non-network market participants, along with an implementation plan for sharing this data. This will improve the decision making of market participants, improve the trust that market participants have in the networks and contribute to national data sharing targets.

Focus for 2022

We will continue to improve interaction and co-ordination between electricity transmission and distribution networks, progressing functions fundamental to flexibility services such as network operations, planning and forecasting.



Open Networks case studies



01 UK DNOs collaborate to deliver Flexible Power (NPG, SPEN, SSEN, WPD, ENWL)

Flexible Power is a joint initiative from five UK DNOs; Western Power Distribution, Northern Powergrid, Scottish and Southern Electricity Networks, SP Energy Networks, and Electricity North West. By collaborating, these five DNOs are able to offer a single point of information in respect of their flexibility service requirements.

SP Energy Networks (SPEN)

02 PACE

PACE is part of a strategic partnership between SP Energy Networks, Scottish Government and Scottish and Southern Electricity Networks. It has delivered 167 new public chargers in more than 44 locations across Lanarkshire, whilst proving the benefits of having a DNO involved in various stages of deploying public charging infrastructure.

03 Heat-Up

Following the success of SP Energy Networks' EV-Up tool to model electric vehicle uptake, and funded via Ofgem's Network Innovation Allowance, the Heat-Up tool enables users to predict, model and understand where and when domestic heat pumps will connect to the electricity network, and the impact that will have.

04 ESB Networks (Republic of Ireland)

Through the National Network – Local Connections Programme, and a number of other initiatives, ESB Networks is improving connections for customers and building on Open Networks' development for flexibility services.

Northern Ireland Electricity Networks (NIEN)

05 FLEX

A Utility Regulator (UR) funded pilot demonstrating Ireland's first local flexibility markets built on Open Networks standards and good practice. The framework design and procurement is complete, and the operation includes particular focus on TSO/DSO interactions in a small system with high renewable penetration.

06 Dynamic Capacity Allocation

Exploring dynamic assessment and allocation of capacity to distribution connected participants in non-DSO markets, securing the distribution network whilst maximising available service volumes. Evaluating access principles and their technical and commercial impacts.

Northern Powergrid (NPG)

07 Microresilience

Northern Powergrid launched a first-of-its-kind 'smart grid' pilot to trial a pioneering technology innovation that will maintain power supplies to critical infrastructure and isolated communities, futureproofing the network for a rapidly changing energy landscape. The £2.5m programme, known as Microresilience, uses energy storage systems and innovative communications technology. It's being piloted at two key locations – Newcastle's historic Swing Bridge, and the remote forest village of Byrness, Northumberland.

Electricity North West (ENWL)

08 BiTraDER project

The BiTraDER project is planned to trial options for the introduction of a bilateral flexibility trading market. Intended to launch in May 2022, it will investigate how flexibility providers can trade their position in a merit order stack determining the order in which they are asked to curtail their output at times of high demand on the network. BiTraDER could provide a benefit of £35.5 million for the North West region by 2050 and, if rolled out nationally, the benefit could reach £581 million.

Scottish & Southern Energy Networks (SSEN)

09 Project LEO and TRANSITION

SSEN's innovation projects, LEO and TRANSITION are running trials to build evidence of the technological, market and social conditions needed for a greener, more flexible, and fair electricity system. TRANSITION has begun Energy Flexibility Market Trials with LEO partners which are testing its unique Neutral Market Facilitator (NMF) platform. The NMF is linked to other technologies created by TRANSITION, including a Whole System Coordinator, Power Systems Analysis and Forecasting tools.

10 Resilience as a Service (RaaS) project

This Network Innovation Competition (NIC) project aims to develop a market-based solution which uses services provided by an energy storage system together with local distributed energy resources to swiftly, automatically, restore power to customers in the event of a fault. This project has worked closely with National Grid "Distributed Re-start" project.

UK Power Networks (UKPN)

11 Open Data Portal

UK Power Networks is the first network operator in the UK to publish all its datasets via a portal covered by an internationally-recognised open data licence - meaning anyone can use them. The datasets will have Application Programming Interfaces so users can automatically connect to data sources and get live updates.

12 Shift: Dispatching flexibility

Shift is revolutionising the electric vehicle industry. In partnership with Kaluza, Octopus Energy and ev.energy, UK Power Networks developed different market mechanisms to facilitate smart charging in a way which shifts EV demand away from periods of peak use. In 2021, the first commercial dispatch instructions were issued for ev.energy to reduce electricity demand by managing EV charging.

Western Power Distribution (WPD)

13 EQUINOX

The first Network Innovation Competition (NIC) project dedicated to addressing the challenges DNOs face with the electrification of heat and seeking viable domestic flexibility solutions in order to meet the ambition of 600,000 heat pump installations in the UK by 2028. EQUINOX is exploring three novel commercial methods designed to maximise participation in flexibility services, exploring a combination of upfront flexibility payments and dynamic price signals that incentivise customers to flex their energy use.

14 Distribution Network Options Assessment (DNOA)

A first for WPD, the DNOA aims to provide market participants with the maximum amount of transparency possible. It provides more detail, setting out to give clear indications and legitimacy to the market by showing WPD's thinking about flexibility decisions. As a result, the DNOA shows the areas where WPD expects constraints and how it will manage those constraints through flexibility, reinforcement or a combination of the two.

National Grid ESO and SPEN

15 Distributed ReStart project

A joint ESO/SPEN project which explores how distributed energy resources (DER) such as solar, wind and hydro, can be used to restore power to the transmission network in the unlikely event of a blackout. The project is currently running trials and will finish at the end of June 2022. During Autumn 2021, a small hydroelectric generator was able to energise a dead transmission in Southwest Scotland and proved it is possible to restart the transmission network from a distributed energy source – a world first.

Regional Development Programmes (RDPs)

A, B RDPs are collaborative projects that are developing and delivering co-ordinated flexibility markets. The ESO is working closely with UKPN and WPD to develop two MW dispatch projects. These projects will see the development of DER flexibility markets to manage flows on the transmission grid. During 2021 we have assembled joint project teams and engaged with providers to develop arrangements that will work for them. These are now being developed into new IT systems with go lives anticipated from 2022.



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