

**Electricity
Distribution**

Innovation Annual Summary

2024/25

nationalgrid





Welcome to our Innovation Annual Summary 2024/25

Our innovation mission really is simple; to add value for our customers.

Our approach is to enhance user experience but also align with broader trends in technology and energy.

We seek to find new innovative solutions ourselves but also to learn and rapidly follow other organisations and sectors as they deploy innovation and reap the benefits.

Our mission is anchored by six key themes:

- smart network management,
- safe and efficient operations,
- faster connections,
- leveraging data,
- our supply chain, and
- our future workforce.

Across these themes, we are rolling out solutions like network monitoring, self-serve digital tools, whole system thinking, and new approaches to mapping and data visualisation – all of which demonstrate our commitment to leveraging technology for improved service delivery.

By focusing on these areas, we can ensure that our innovations translate into tangible benefits for our customers, enhancing their overall experience, and making sure our services remain reliable, affordable, and efficient.

Headroom - Whole System Thinking is a great example of a project that has given strategic insights, helping our Distribution System Operator (DSO) quantify and report their benefits to Ofgem.

As well as looking at the innovation of the future, making sure there is the right emphasis on activation and Business as Usual (BAU) scale-up is also crucial – in ‘value-add’ lies.

LV Pre-fault and **LV Visibility** are great examples of projects where we have invested in innovation throughout ED1, seen the scale-up opportunity, and are now in the process of rolling-out across our BAU operations in ED2.

Looking ahead, there are two significant projects that are concluding their trial stages that we hope to scale-up in ED3.

EQUINOX is informing our DSO on how to best engage customers with heat pumps in our flexibility products. And a second project, **PRIDE**, will assist in our ability to do whole system planning.

This summary is an overview of all of our activity, including NIA-funded projects, from 1 April 2024 to 31 March 2025.

Through collaboration with peers and partners, we will continue to improve the way we operate our network to the benefit of our customers.



Tim Polack
Director of Strategy
and Transformation



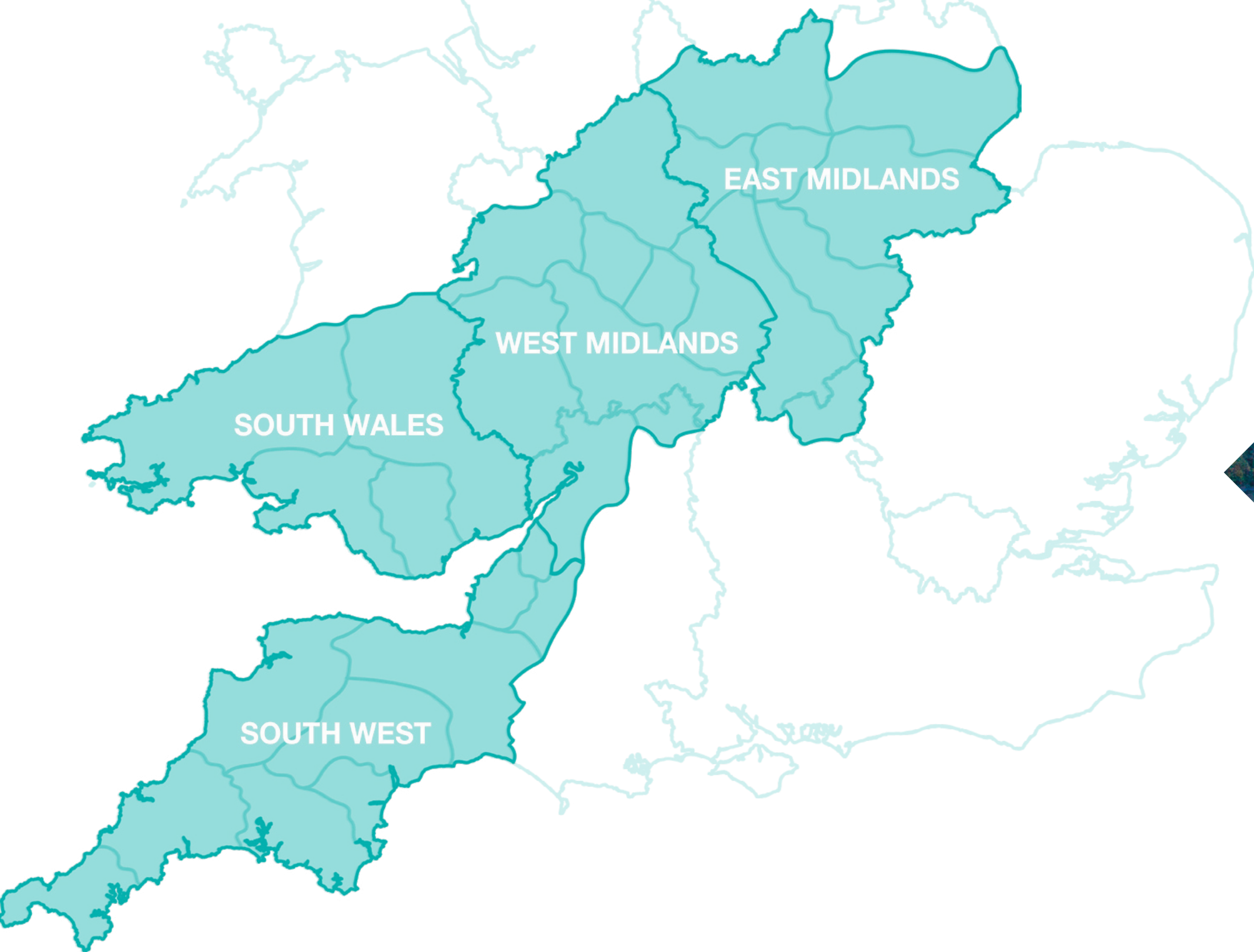


The area we serve

National Grid Electricity Distribution brings energy to life for over 8 million homes and businesses across the South West of England, South Wales, the West Midlands, and East Midlands.

Our 7,200-strong team ensures the safe and reliable supply of electricity for an area of 55,500 km² stretching from the Isles of Scilly to Cardiff to Lincolnshire.

Our network of overhead lines, underground cables, and substations transforms power from the 400,000 volts supplied by National Grid Electricity Transmission to the 230 volts which provides essential power to homes and businesses.



Innovation at National Grid Electricity Distribution is so much more than a team – it is a truly global ecosystem that brings together the experience and advances across various functions, industry partners, and innovative start-ups.

Our global innovation approach is aligned to our six key themes, ensuring that we use innovation to truly deliver the networks of the future in a way that allows all customers to be part of the transition, and unlocks advances in safety and network efficiency.

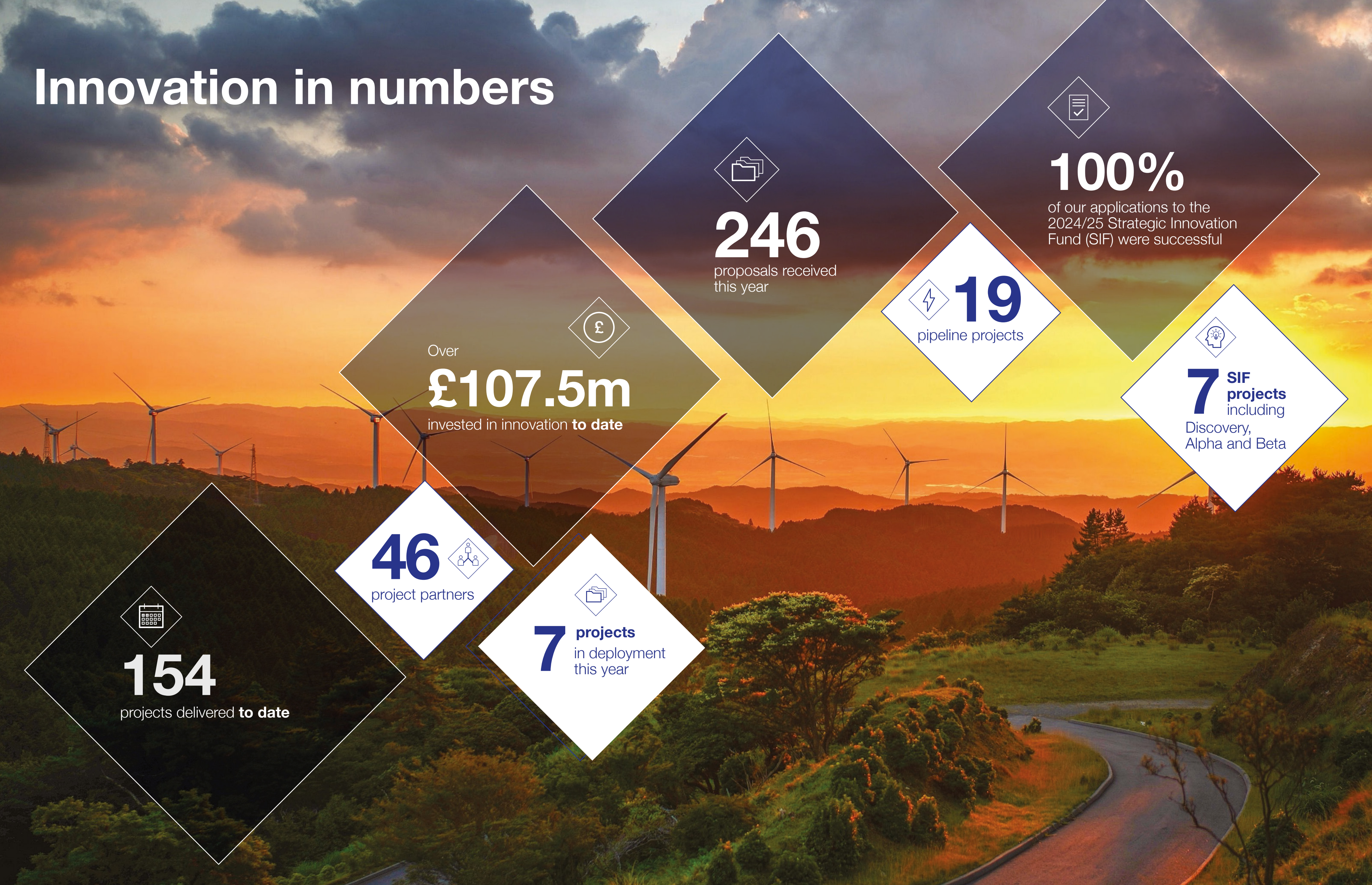
As well as working across our group portfolio, we engage with a range of partners including universities, other network companies, and start-ups - harnessing the power of collaboration, but also making sure advances and best practice are shared to the benefit of all customers.

This holistic approach not only addresses current challenges but also prepares us for future demands in the energy sector, and promotes efficiency and value by co-developing and sharing best practice.





Innovation in numbers



246
proposals received
this year



100%

of our applications to the
2024/25 Strategic Innovation
Fund (SIF) were successful



19

pipeline projects



Over

£107.5m

invested in innovation **to date**

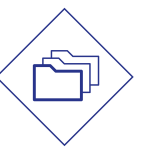


7 SIF
projects
including
Discovery,
Alpha and Beta



46

project partners



7 projects
in deployment
this year



154

projects delivered **to date**



Our innovation strategy

Our innovation strategy presents the focus areas and values of our Innovation team for all four NGED distribution licence areas. It is shaped by the industry challenges of meeting net zero, and our ethos as a company.

Originally produced as part of the RIIO-ED1 business plan, it continues to be reviewed and updated periodically.

This ensures that it reflects changing external factors and business priorities, while incorporating recent learning.

It is also of vital importance that the strategy is in line with the current price control period, our organisational purpose, values and ambitions.

Included in the strategy is a long-term view of the development of our distribution assets, network operations, and customer service caused by changing system and customer needs.



View our full [innovation strategy](#).

Our values

One of our core ambitions is to be a leading contributor to decarbonisation. We aim to achieve that by having a portfolio of projects that is focusing on the right areas.

To deliver our projects successfully, collaboration is a crucial part of how we innovate.

We are always looking for new partnerships with organisations and individuals that share the same passion and values as we do, so that we can achieve excellence together.

We are committed to delivering value for money to our customers and utilising our innovation funding in the most effective manner.

Our internal governance processes are in place to ensure that we achieve that through the way we create, manage, and implement our innovation outputs into the business.

Our focus areas

Through our innovation work, we aim to find the most efficient ways of addressing the technical challenges of the future electricity network, while at the same time keeping electricity affordable and reliable for everyone.

We want to understand how we can best support our customers and our communities so that no one is left behind in the energy transition.

To achieve this, our projects are shaped around our **six key themes** of smart network management, safe and efficient operations, faster connections, leveraging data, our supply chain, and our future workforce.



We are a team of engineers **dedicated to identifying challenges, finding solutions, and trialling them.**



Everything we do **revolves around a positive contribution to decarbonisation, achieving excellence, and providing value for money to our customers.**



We recognise **collaboration is essential to find solutions for all of our customers**, so we actively work alongside experts in the business and industry.





Smart Network Management
Understanding how we can invest and drive the network better



Safe and Efficient Operations
Improving our responses to faults, keeping people safe and working more efficiently



Faster Connections
Speeding up customer connections to our network



Leveraging Data
Creating benefit with data insight



Supply Chain
Ensuring our supply chain is secure and provides value for money



Future Workforce
Retaining vital knowledge in our workforce while building up future skills

Our key themes

Our innovation projects sit under six different themes

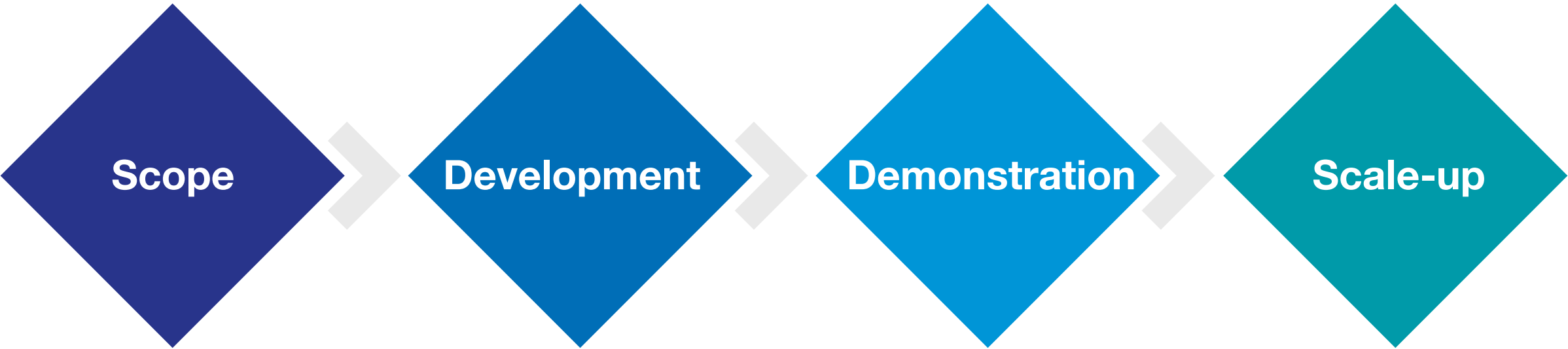


Creating long-term value for our customers

Our Innovation team works on a variety of projects.

These include testing out innovative ideas that will tackle the needs of the future, through to integrating new technologies into Business as Usual (BAU) that will benefit our customers now.

How we work



An innovation idea is initially scoped out for first review. In collaboration with business and industry experts, the idea is then developed into an innovation proposal with a fully costed benefit analysis (CBA). Once all stages of the project have been agreed by our team and the collaborative partners, we move to the delivery stage. Throughout the delivery of the project, continual review and monitoring of project outcomes takes place to ensure the project is delivering value to customers.

At the end of the demonstration of the innovation project, an evaluation takes place. Learnings are gathered and disseminated before moving further.

For successful ideas, it is common for further work to be required if there is deemed benefit, or we move into the scale-up stage within the business which will deliver long-term value for our customers.

Our [LV Visibility](#) and [LV Pre-fault](#) roll-out projects are great examples of where we have done this, and we have many more in progress which can be viewed on our [innovation programme](#) page.





LV Visibility

Funding stream: **Roll-out project**
Project timeline: **April 2023 - March 2028**

We are installing over 10,000 LV monitors to provide greater visibility of load-related issues and potential fault activity, providing a more resilient network.

The focus is on parts of the network that will provide the biggest benefit, including ground-mounted substations with high customer densities, and older parts of the network that are historically more prone to reliability disruptions.

Data from these monitors will support both our Distribution Network Operator function, where we will have a better understanding of the load on the network and the way in which it is performing, and our distribution system operator functions, which will benefit from data for better forecasting future reinforcement need.

The implementation of this ED1 innovation activity has the potential to save UK energy consumers an estimated £10.3 million by 2040. This could increase to £24.8 million if operational effectiveness increases further.

Our LV Visibility project supports our core commitments to improve our service levels to customers, enhance network reliability, invest in assets, and better utilise the existing network.

The monitors that have been installed have also enabled us to run a second project – **LV Pre-fault**.

In collaboration with:
Kelvatek
EA Technology
Lucy Electric



By having a greater view of our network, we could save £24.8 million for our customers through better visibility of issues and potential fault activity.





LV Pre-fault

Funding stream: **Roll-out project**
Project timeline: **January 2025 - January 2026**

Supporting our Field Operations teams with a new digital dashboard to prevent faults.

Working with our in-house IT and Digital team and three third-party manufacturers, project LV Pre-fault is creating a panel that will use data from LV monitors to visually portray alarms that are being flagged, the potential benefits of responding to these alarms, and the likelihood of failure within a given timeframe.

The data will help to inform the overall condition of an underground cable, whether it is nearing the end of its lifespan and requires future asset replacement, or if intermediate remedial action is needed.

Our Field Operations teams can then take an informed decision to prevent a permanent or transient fault, ultimately preventing power cuts by fixing issues before they occur.

The impact of this project will benefit our customers with reduced interruptions and connections to the network, as well as improving our planned day-to-day activity as a business.

In collaboration with:
Kelvatek
EA Technology
Lucy Electric



**Safe and
Efficient
Operations**



LV Pre-fault aims to benefit our customers by reducing the amount of interruptions they have with their supply.





Electricity Distribution

Our innovation projects

national**grid**



Innovation funding streams

Our innovation projects are funded in different ways. So far, we have invested over £107.5 million as a business to support this vital work. This has enabled us to test and deliver solutions that will benefit our customers and make our services affordable, reliable and efficient. Ofgem supports wider network innovation through a number of different funding streams.

Network Innovation Allowance (NIA)

The Network Innovation Allowance (NIA) was first introduced as part of the RIIO-1 price controls.

The funding allows Distribution Network Operators to take forward innovation projects that have the potential to address consumer vulnerability or deliver longer-term financial and environmental benefits for consumers.

Network Innovation Competition (NIC)

The Network Innovation Competition (NIC) was a funding mechanism used from 2015-2023.

It was an annual competition across all UK electricity network operators to fund larger scale, greater value projects. [EQUINOX](#) was our last project approved under this funding mechanism.

Strategic Innovation Fund (SIF)

The Strategic Innovation Fund (SIF) replaced the NIC.

It was established to enable larger scale innovation to transform the gas and electricity networks in order to achieve a low carbon future. The vision is to support pioneering and inventive projects that can shape the energy networks of the future and accelerate the journey to net zero, but also to stimulate innovation in the UK to become the “Silicon Valley” of energy.



**We have
invested
£107.5 million
into innovation
to date**





Our innovation programme

Network Innovation Allowance (NIA) Projects

Project name	Start date	End date	Project theme
Headroom - Whole System Thinking	September 2023	May 2025	Smart Network Management
HV Pinpoint	March 2024	October 2025	Safe and Efficient Operations
LCT Harmonic Limits (Low Carbon Technology Harmonic Limits)	May 2024	May 2025	Faster Connections
LV-ACT (Low Voltage – Active Power Control Transformer)	September 2024	May 2026	Smart Network Management
OBELISC (On-Boundary Enhanced LCT Integrating Service Cabinet)	January 2025	July 2027	Faster Connections
V2G Dynamic Headroom Control (Vehicle-to-Grid Dynamic Headroom Control)	July 2024	January 2026	Smart Network Management

Network Innovation Competition (NIC) Projects

Project name	Start date	End date	Project theme
EQUINOX (Equitable Novel Flexibility Exchange)	March 2022	December 2025	Smart Network Management

Strategic Innovation Fund (SIF) Projects

Project name	Phase	Start date	End date	Project theme
REACH (Rural Energy and Community Heat)	Discovery	March 2024	June 2024	Faster Connections
	Alpha	December 2024	May 2025	
Road to Power	Discovery	March 2024	June 2024	Faster Connections
	Alpha	October 2024	April 2025	
Phase Switch System	Beta	December 2024	December 2027	Smart Network Management
PRIDE (Planning Regional Infrastructure in a Digital Environment)	Alpha	October 2023	April 2024	Faster Connections
	Beta	November 2024	October 2027	



You can read more on all our projects at nationalgrid.co.uk, or read more on the different funding streams for our projects on [page 11](#).

Business Funded Projects

Project name	Start date	End date	Project theme
Distribution OLTC transformer trial	December 2024	June 2026	Smart Network Management
FASTER (Forecasting Ampacities for Short Term Enhancements to Ratings)	December 2023	June 2024	Smart Network Management
FLAMBERGE (Fault Level Analysis of Make and Break Currents Estimated with Real Time Grid Evidence)	December 2023	October 2024	Smart Network Management
PCB Tester (Polychlorinated Biphenyl Tester)	February 2024	May 2024	Safe and Efficient Operations
Wildlife Protection	February 2024	November 2024	Safe and Efficient Operations

Scale-up and Roll-out Projects

Project name	Start date	End date	Project theme
Arc-Aid Roll-out	April 2025	March 2026	Safe and Efficient Operations
LV Visibility	April 2023	March 2028	Smart Network Management
LV Pre-fault	January 2025	January 2026	Safe and Efficient Operations
Power Quality Monitoring Roll-out	April 2023	March 2028	Faster Connections
Smart FPI Roll-out (Smart Fault Passage Indicator Roll-out)	March 2025	June 2026	Safe and Efficient Operations
STAR Position (Storm Arwen-funded Position)	November 2024	March 2026	Safe and Efficient Operations
Taking Charge	December 2023	January 2025	Supply Chain



OBELISC

(On-Boundary Enhanced LCT Integrating Service Cabinet)

Funding stream: **Network Innovation Allowance (NIA)**
Project timeline: **January 2025 – July 2027**

Enabling domestic customers to connect large low carbon technologies through a new three-phase retrofit supply.

The On-Boundary Enhanced LCT Integrating Service Cabinet (OBELISC) aims to facilitate the adoption of Low Carbon Technologies (LCTs), such as electric vehicles and heat pumps, by simplifying the upgrade process from single-phase to three-phase electricity supplies for domestic customers.

Traditional upgrades to three-phase supplies often entails significant costs and disruptions, including extensive cabling and modifications to existing meter positions. This is particularly challenging in older homes.

OBELISC seeks to address these issues by developing a novel meter cabinet installed at the boundary of properties.

This solution is designed to integrate existing single-phase connections while enabling the addition of LCTs across one or three phases, thereby minimising installation disruptions and enhancing network load balancing.

The project is structured into four stages:

- initiation and stakeholder engagement,
- requirements gathering,
- solution design, and
- prototype validation and testing.

Two distinct cabinet designs will be created and tested which will help to explore a range of solutions for different types of housing. A dedicated stakeholder panel will provide ongoing feedback to ensure the solutions are user-friendly and meet design standards.

In collaboration with:
Frazer Nash
EQ Communications
Lucy Electric
Proteus Switchgear
Cubis Systems



Faster Connections



By streamlining the upgrade process, OBELISC aims to reduce barriers for customers to adopt low carbon technologies, which supports the UK's broader net zero objectives.



Read more about OBELISC on **ENA's Smarter Networks Portal.**



LCT Harmonic Limits

(Low Carbon Technology
Harmonic Limits)

Funding stream: **Network Innovation Allowance (NIA)**
Project timeline: **May 2024 – May 2025**

Investigating the number of low carbon technologies that can be connected to the network until harmonic limits are exceeded.

With the energy transition to net zero being well underway, the move to Low Carbon Technologies (LCTs) for domestic customers is continually on the rise, creating a significant increase in electricity consumption among other potential issues.

One of these issues is the impact of LCTs on power quality.

It is vital that Distribution Network Operators (DNOs) are aware of the potential effects of connecting too many LCTs on a single feeder while, in turn, not blocking the uptake of LCTs in the energy transition.

The outcome of the LCT Harmonic Limits project will aim to enhance our current design processes that focus on connections, power quality, and the permissible limits before intervention is needed.

Updating these standards will give the DNO more confidence in conforming to network requirements and also result in quicker connections to customers.

The project has detailed various networks that are present in urban and rural areas of the National Grid geographic. It has considered existing background harmonic emissions, and incorporated varying diversities of LCTs in terms of percentage of electric vehicles against heat pumps, and also the spread of LCTs along a given feeder.

In collaboration with:
EA Technology



**Faster
Connections**



**The goal of LCT
Harmonic Limits is
to understand the
power quality limits
on our network to aid
customer adoption
of low carbon
technologies.**



Read more about LCT Harmonic Limits on **ENA's Smarter Networks Portal**.



PRIDE

(Planning Regional Infrastructure in a Digital Environment)

Funding stream: **Strategic Innovation Fund (SIF)**
Project timeline: **November 2024 – October 2027**

Working with local authorities to create a digital tool that will support the planning and connection of low carbon technologies.

A critical barrier to meeting the UK’s climate targets is the lack of dynamic information exchanges between stakeholders. This is vital to enable integrated local and regional planning to support decarbonisation of major energy demands.

UK energy networks struggle to respond to changing local energy demands due to limited visibility, while most local authorities are neither required nor resourced to deliver consistent Local Area Energy Plans (LAEPs).

Technical barriers, such as non interoperable data between LAEP and network modelling, also makes integrated planning difficult.

Our Planning Regional Infrastructure in a Digital Environment (PRIDE) project focuses on using digital tools to share data and work more closely on an integrated approach to planning and

connecting low carbon technologies, such as heat pumps and electric cars.

PRIDE has the potential to reduce connection requests by leveraging digital tools to assess the viability of projects. It supports LAEP by giving local authorities greater insight, streamlining processes, and ultimately reducing cost. The data-driven approach PRIDE offers will enable more effective strategic investment by aligning it with future demand. This will result in efficient, impactful use of funds as local authorities plan projects and investment in energy, transport, heating and housing.

National Grid Electricity Distribution will obtain data from local authorities to help plan and deliver network development and reinforcement where it’s needed most to ensure the network is ready ahead of need.

In collaboration with:
Advanced Infrastructure Technology
West Midlands Combined Authority
Regen
NESO



Project PRIDE is working on a digital tool that will help local authorities plan ahead for the increase in low carbon technologies, thereby supporting customers to connect quicker and easier.



Read more about PRIDE on **ENA's Smarter Networks Portal.**



Headroom – Whole System Thinking

Funding stream: **Network Innovation Allowance (NIA)**
Project timeline: **May 2024 – May 2025**

Exploring how distribution network headroom availability affects the entire energy system.

This project is investigating the impact distribution network capacity will likely have on wholesale electricity costs, and the carbon intensity of the grid, as more generation connects to the distribution network.

Our current strategy to accelerate renewable connections includes issuing curtailable connections to generators. Under schemes such as Active Network Management, generators are required to reduce the amount of electricity they export when our network risks becoming overloaded.

In the last year, the project has established an improved ‘best view’ of system wide curtailment incorporating improved battery export profiles, abnormal running conditions, better seasonal load profiles, and 132 kV analysis.

This analysis indicated that curtailment volumes are likely to grow over time, reaching up to 8.4 TWh in 2034.

Subsequent power market modelling has indicated a potential saving of £2.5 billion.

We wanted to understand where to direct attention to realise this benefit, and voltage level analysis indicated that the strongest areas of potential benefit would be on our Low Voltage (LV) network, making up £732 million in savings, and our 132 kV networks, making up £987 million.

These insights will allow us to deliver strategic innovation that directs our future strategy towards maximum value for customers in the UK.

In collaboration with:
**Baringa
EA Technology**



**Smart
Network
Management**

£

Increasing capacity on Great Britain's LV and 132 kV networks could offer a benefit of £1.7 billion to our customers.



Read more about Headroom - Whole System Thinking on **ENA's Smarter Networks Portal**.



LV-ACT

(Low Voltage – Active Power Control Transformer)

Funding stream: **Network Innovation Allowance (NIA)**
Project timeline: **September 2024 – May 2026**

Developing a new device to address voltage and thermal constraints that will enable more low carbon technology connections.

With the rising uptake of Low Carbon Technologies (LCTs) onto the low voltage network, it is forecast that voltage and thermal constraints will increase, limiting the amount of demand and generation that can be connected to the network. Conventional network reinforcement can address this but it can be costly and very disruptive to customers.

Our Low Voltage – Active Power Control Transformer (LV-ACT) project seeks to provide a more cost-effective method to alleviate these issues through the use of a novel transformer, and without the need for conventional network reinforcement.

Load sharing will be facilitated, thereby aiming to remove constraints from one feeder by transferring load to another unconstrained feeder, while also controlling the voltage profiles.

The project consists of two phases, with phase 1 developing a detailed design for the active power control transformer and analysing the extent of potential deployment on the network.

Phase 2 will involve the development and testing of a prototype transformer to prove the concept, as well as a detailed power systems analysis of the solution.

If successful, it is expected that the solution could save up to £13,000 per affected network.

Based on forecasts of the number of networks which will experience constraints, this could save up to £193 million in network reinforcement costs out to 2050, while enabling the connection of more LCTs to the low voltage network.

In collaboration with:
Ionate
EA Technology
Cardiff University



**Smart
Network
Management**

LV-ACT aims to reduce network reinforcement costs and enable more low carbon technology connections, directly benefitting our customers.



Read more about LV-ACT on
ENA's Smarter Networks Portal.





V2G Dynamic Headroom Control

(Vehicle-to-Grid Dynamic Headroom Control)

Funding stream: **Network Innovation Allowance (NIA)**
Project timeline: **July 2024 – January 2026**

Understanding how electric vehicles can contribute to flexibility services.

It is predicted that between 12 to 28 million battery electric vehicles will be on the road by 2035, with over 20% of consumers engaging in vehicle-to-grid (V2G) charging*.

With this significant increase in low carbon technology adoption, it is vital that we understand how the network may be affected, including the amount of electricity that will be exported from V2G connections.

V2G Dynamic Headroom Control will explore innovative techniques to dynamically control active and reactive power of V2G to help facilitate the adoption of low carbon technologies. The explored techniques aim to provide enhanced flexibility services to system operators while minimising reinforcement costs.

The project will use smart meter data to provide improved visibility of the existing capacity headroom along the length of feeders, and to improve the targeting in location and time of active and reactive power management of V2G.

Simulation models have been developed to provide an initial review of the operation of active (Volt/Watt) and reactive (Volt/VAr) techniques for the management of voltage, neutral currents, and phase imbalance.

Looking ahead, additional work will be carried out to further explore and verify simulated results through the incorporation of smart meter data.

In collaboration with:
Loughborough University

 **Smart Network Management**

 **The project aims to future proof our network resilience while offering financial benefits for customers with EV chargers.**

 Read more about V2G Dynamic Headroom Control on **ENA's Smarter Networks Portal**.

*2023 ESO Future Energy Scenarios



EQUINOX

(Equitable Novel Flexibility Exchange)

Funding stream: **Network Innovation Competition (NIC)**
Project timeline: **March 2022 - December 2025**

EQUINOX is the first Network Innovation Competition (NIC) project dedicated to addressing the challenges that Distribution Network Operators may face with the electrification of domestic heat.

The project is developing new commercial arrangements that unlock flexibility from residential low carbon heating across Great Britain.

As part of the energy transition, Distribution Network Operators (DNOs) may witness a substantial increase in peak electricity demand, triggering significant network reinforcement throughout the later years of RIIO-ED2 and into ED3.

There are currently limited viable solutions for DNOs to unlock the flexibility from residential low carbon heat at scale in a reliable, cost-effective, and equitable way.

EQUINOX has demonstrated the benefits available to the network through flexibility from domestic heat pumps with the first round of trials acting as a proof of concept for heat flexibility.

The second and third trials have built on this to inform business as usual arrangements with a larger and more diverse pool of customers.

The trials aimed to include households from all sectors of society, ensuring that commercial and technical arrangements were designed equitably. Variables being tested have included payment amount, notice period, control method, and time of day.

Trial 2 results came out in summer 2024. It covered 72 hours of events and saw home energy use dropping by an average of 48%. These results also informed the design of trial 3, and results from this will be published at the end of summer 2025.

In collaboration with:
SP Energy Networks
Octopus Energy
Passiv
Welsh Government
West Midlands Combined Authority
Guidehouse
Sero
Scottish Power
National Energy Action



Read more about **EQUINOX** on our website.



Phase Switch System

Funding stream: **Strategic Innovation Fund (SIF)**
Project timeline: **December 2024 – December 2027**

Rebalancing the low voltage network with an innovative solution.

Electricity is delivered across the transmission and distribution network via three phases.

The load delivered across these phases should be balanced, meaning an equal amount of power is being delivered across each phase.

This ensures the most efficient way of electricity delivery and reduces unnecessary ageing to electrical assets.

Unfortunately, in practice, this is not always the case due to variation in household and commercial loads being connected and a general bias towards one phase due to the cable connection being easier to connect to.

This imbalance will only be exacerbated with high scale adoption of Low Carbon Technologies (LCTs) such as electric vehicles, heat pumps, and solar photovoltaic generation.

Phase Switch System (PSS) is an innovative solution to the emerging issue of the adoption of LCTs leading to phase imbalance across the networks. The project has the ambition to design, build, test and trial a new PSS system that will have the ability to rebalance the LV network without any interruptions to customers.

After the completion of the first phase of the NIA project with UK Power Networks, another Distribution Network Operator, NGED is now using SIF funding to prove that the solution can work at a larger scale than ever tested at before.

The focus is on evolving the current system through further design enhancements, as well developing optimisation tools and planning strategies. By the end of 2025, the aim is to have a production line in place ready to start producing the solution in 2026.

In collaboration with:
**Low Carbon Electric
Nortech
PNDC
UK Power Networks**



Read more about Phase Switch System on **ENA's Smarter Networks Portal**.



HV Pinpoint

Funding stream: **Network innovation Allowance (NIA)**
Project timeline: **March 2024 – October 2025**

HV Pinpoint is developing a non-invasive methodology for the detection and precise location of pre-fault events occurring on the HV underground network.

Faults on high voltage (HV) underground cables account for a large proportion of unplanned outages. Customers can remain off-supply until the fault is found and repaired, unless an alternative network arrangement is used to restore supplies.

Our completed **Pre-Fix project** demonstrated that HV underground defects are a phenomenon that can be detected before customers experience an outage. However, the learnings also showed that we need new tools to take advantage of this.

HV Pinpoint will provide a new solution to pre-fault location by retrofitting sensors on underground cables while they remain in service.

This removes the requirement of network outages for traditional fault location methods such as the use of a test van.

The Pinpoint equipment can either be used in conjunction with the Pre-Fix method to provide a more precise defect location, or on its own as an alternative pre-fault method.

The intention is to reduce the reliance on test van methods and provide a new proactive approach to underground cable defects.

The project has had a number of successes so far.

- The solution has been deployed onto our test network for the first time.
- Field trials have been held of the pulse injection generator (PIG), confirming pre-fault location within 3 metres.
- Sensors have been developed to fit a range of cables.

Network trials to collect and store live data are continuing, with analysis taking place when significant pre-fault events occur.

In collaboration with:
Create Innovation Solutions



Safe and Efficient Operations



Read more about HV Pinpoint on **ENA's Smarter Networks Portal.**



Electricity Distribution

Dissemination and events

nationalgrid





Dissemination and events

Energy Innovation Summit (EIS)

The Energy Innovation Summit is the UK's flagship knowledge dissemination event for electricity network operators. It is a chance to hear about the results and findings from a variety of innovation projects, and for innovators to discuss their ideas.

In 2024, the event took place at the Exhibition Centre in Liverpool and focused on accelerating innovation to deliver net zero.

In addition to having a stand at the event, the Innovation team had the opportunity to present posters on a number of completed projects, including:

- **Energy Planning Integrated with Councils (EPIC)** which tested out an idea of developing an integrated local area energy plan
- **Flexible Operation of Water Networks Enabling Response Services (FLOWERS)** which investigated where South West Water could modify the triggers and timing of their water pumping processes to respond to the needs of the electricity network
- **Shifting Currents** which developed a new kind of flexibility within the timing and control of water network pumping.

Current project HV Pinpoint also had a poster included. The project is developing a new non-invasive way of detecting and determining the precise location of pre-fault events occurring on the HV underground network.

Two projects were highlighted in roundtable discussions. **EQUINOX** was presented within the session on the future of heat. It is the first project of its kind that is exploring ways to unlock flexibility in the network by rewarding households with heat pumps.

Running Cool, a project that sought to challenge current active network management curtailment arrangements, was presented as part of the discussions on how near real-time data could enable consumer participation.

Our Innovation and Deployment Engineers also led various collaborative sessions with other speakers focused on:

- The challenges of operating in net zero and enabling an inclusive transition for all
- Solutions for reducing the environmental impact of operations and from building new assets or re-purposing existing ones
- Ensuring the reliability and resilience of an increasingly critical energy system
- Accelerating system capacity to enable mass integration of low carbon technologies
- Views on what connections customers would require to reach net zero in a fair, efficient, and affordable way, and how innovation could deliver it.





CIRE

CIRE is an international conference series for electricity distribution companies. It offers the chance to learn about new research and share the results of ongoing projects from around the world.

This year a workshop was held in Vienna and the focus was on increasing distribution network capacity.

Our Innovation and Deployment Engineers spoke about two of our projects.

The results from stage one of the project **Headroom – Whole System Thinking** were explored in a presentation with project partner EA Technology.

The session was part of the theme Planning of Power Distribution Systems.

Project **Running Cool** was also presented to conference attendees. The project aligned to the topic of network operation and control supporting increased hosting capacity.

Nortech, a partner of the project, joined us on stage to cover the learnings and to contribute to the discussion.



Laurence Hunter, one of our Innovation and Deployment Engineers, speaking at CIRED 2024.



Utility Week Live

Utility Week Live is Europe’s only exhibition that brings together water, electricity, and gas sectors in one place to focus on the latest innovation, insights, and solutions.

As well as having a stand at the event in 2024 which was shared with National Grid’s Telecoms department, the Innovation team took part in various interactive sessions to boost stakeholder engagement. These included dissemination sessions, strategic discussions, exhibitions, and poster sessions.

Highlights from the event include:

- Our Director of Asset Management and Operations Support, Phillipa Slater, leading a session on net zero flexibility vision for flexible distribution networks
- Liza Troshka, one of our Innovation and Deployment Engineers, joining forces with Ofgem Flexibility Project expert Nina Klein, and UKPN Data Science and Development Manager Jamie Bright, to lead a collaborative exchange session around the question: How can energy companies create an accurate efficiency digital model to understand and forecast constraints?
- Alex Jakeman from Guidehouse, one of the partner companies for project **EQUINOX**, presented a session where he provided the latest insights from the domestic heat pump flexibility trials.



Liza Troshka, our Innovation and Deployment Enigneer, speaking on stage at Utility Week Live.



National Grid Innovation Day

National Grid’s inaugural Innovation Day took place in June 2024. It brought together over 200 guests to engage in National Grid’s innovation journey. They represented utilities, regulators, policy makers, industry bodies, key innovation partners, and customers.

The Innovation team’s **EQUINOX** and Taking Charge projects were featured alongside other innovation projects from National Grid, National Grid portfolio companies, and non-portfolio companies.

Attendees heard from expert panellists including members of National Grid’s Executive Team and Group Chair, as well as senior leaders from Google Cloud, AWS and Hitachi Energy.

There were also three engaging workshops and Q&A panels that focused on customers, infrastructure and regulation.



Events timeline

This is an overview of some the events we have attended or held over the last year, including industry events, project launches, and community forums.





Keep up to date with the latest innovation news and events by joining our **mailing list**.

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