SP Electricity North West

Innovation Summary Report

July 2026

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SP Electricity North West

Foreword

It gives me great pleasure to introduce this year's Innovation Summary Report, which highlights our progress in delivering innovation across our RIIO-ED2 Network Innovation Allowance (NIA) and Strategic Innovation Fund (SIF) portfolio during 2025/26.

This report covers innovation activity undertaken between 1 April 2025 and 31 March 2026 within the SP Electricity North West (SP ENW) licence area.

We provide an overview of our current innovation portfolio, alongside relevant projects from previous regulatory periods, and share the key learning outcomes, benefits realised to date, and our plans for wider implementation. Through this approach, we aim to demonstrate how innovation is helping to address current challenges while supporting the long-term development of our network.

Innovation remains central to our business strategy. As the energy system continues to evolve, we are committed to exploring new technologies, processes and partnerships that enable us to respond to changing customer needs and expectations in an increasingly uncertain energy future.

Throughout RIIO-ED2, our focus is on delivering projects that support the transition to a net zero energy system while ensuring that the benefits of this transition are shared fairly and that no customer is left behind.

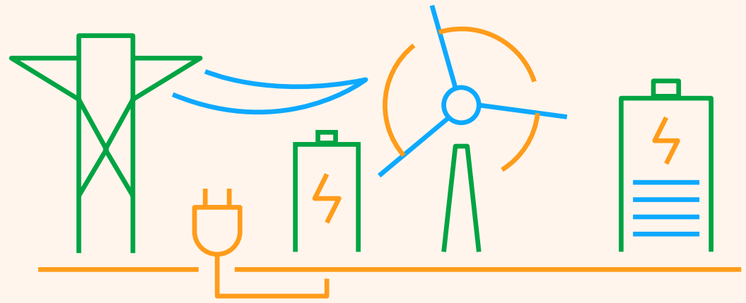
During 2025/26, we continued to prioritise innovation projects aligned to our strategic challenges and themes, with a particular emphasis on delivering long-term value for customers, communities and the wider energy sector.

During ED2, we secured more than £20 million of innovation funding and over £100 million to support the business-as-usual deployment of previously developed innovations. These investments are forecast to deliver in excess of £325 million in financial benefits, demonstrating the significant value that innovation can create for customers across Great Britain.

Our Innovation Team remains committed to developing and delivering a diverse range of projects in collaboration with industry partners, academia, businesses and community organisations. These partnerships help us bring new ideas to life and maximise the value innovation delivers across the North West and beyond.

As we look ahead to ED3, we will continue to place customers and communities at the heart of our innovation strategy, ensuring that our projects are focused on delivering practical, measurable and lasting benefits while supporting a resilient and sustainable energy future for all.

Richard Moulton
Head of Innovation
& Reliability Performance,
SP Electricity North West



"Innovation remains central to our business strategy"

Innovation in numbers

Network Innovation Allowance

9 live projects

5 registered in 2025/26

£5.47m
total NIA value

£1.52m
spent in 2025/2026

2 projects completed

3 projects working with other DNO partners

Strategic Innovation Fund

2 live projects

1 registered in 2025/26

£7.96m
total SIF value

£1.08m
spent in 2025/2026

1 project completed

2 projects working with other DNO partners

Network Innovation Competition

2 projects in year

£16.46m
total value projects

£2.63m
spend this year

1 project completed

Benefits

£53m
benefits realised so far in ED2

£5.4m
funding for our flagship CoolDown SIF beta project

£20.5m
total innovation funding awarded

£325m
in forecasted financial net benefits from BAU rollout projects

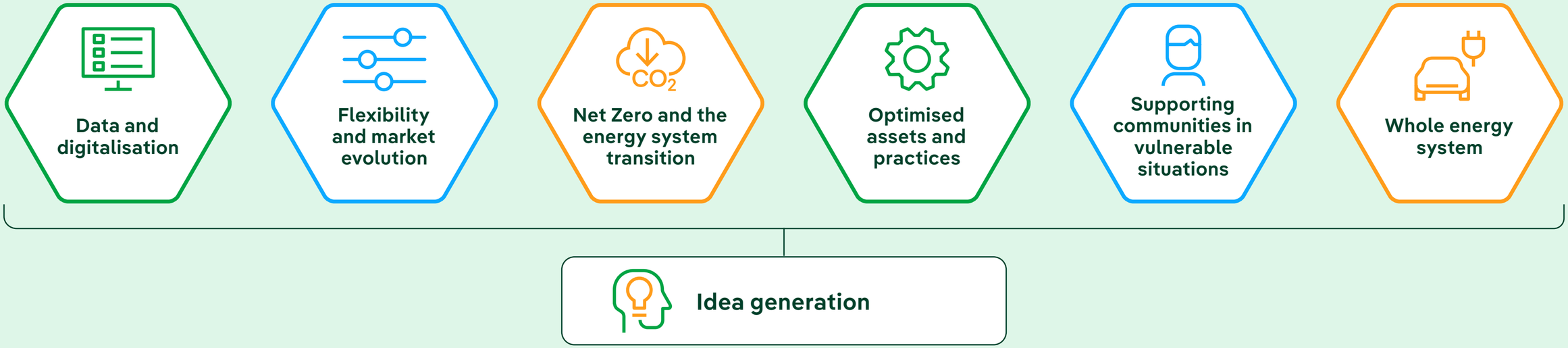
£34.5m
BAU rollout of LineSIGHT

Deployment of
Smart Street
saving customers on bills

£78m
BAU rollout of Smart Street

Our Strategy

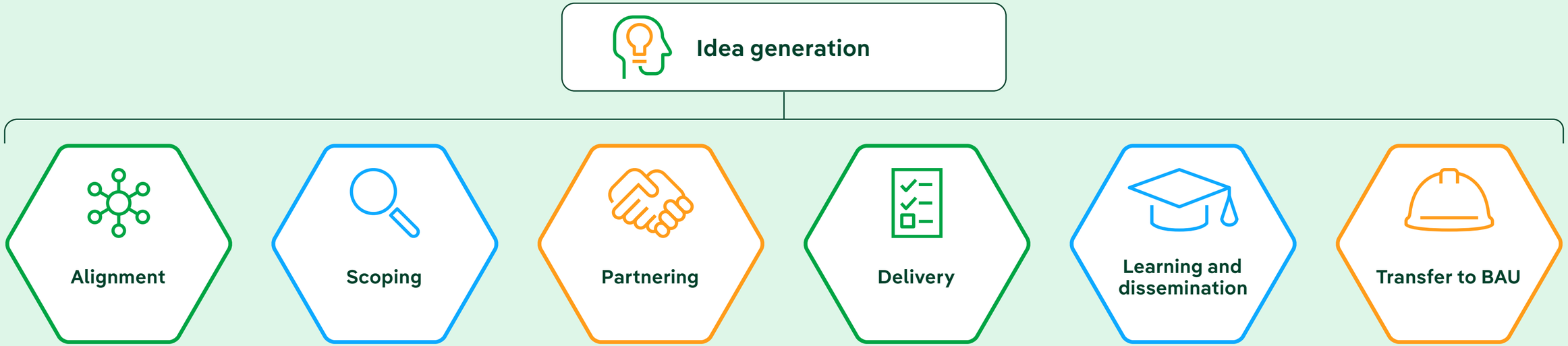
Aligning new innovations with shared industry themes



Core to the principles of the RIIO-ED2 framework, we aim to encourage innovation projects that support:

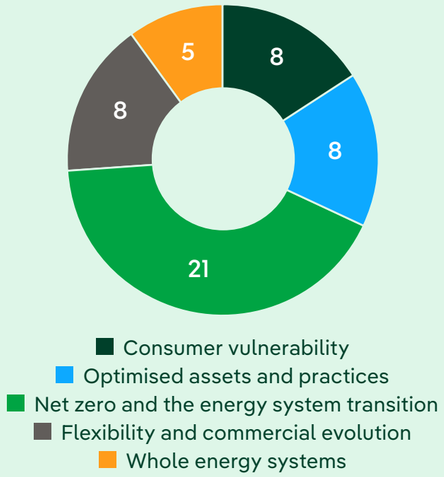
Decarbonisation | **Flexibility** | **Digitalisation** | **Improved service quality**

- We will plan for a reliable and efficient network, whilst preparing for the net zero future, keeping costs low and ensuring that all our customers are included and treated fairly and equitably.
- Successfully delivering against our RIIO objectives and shared industry themes presents several challenges right across the organisation, and it's in these areas that we aim to focus our innovation efforts.

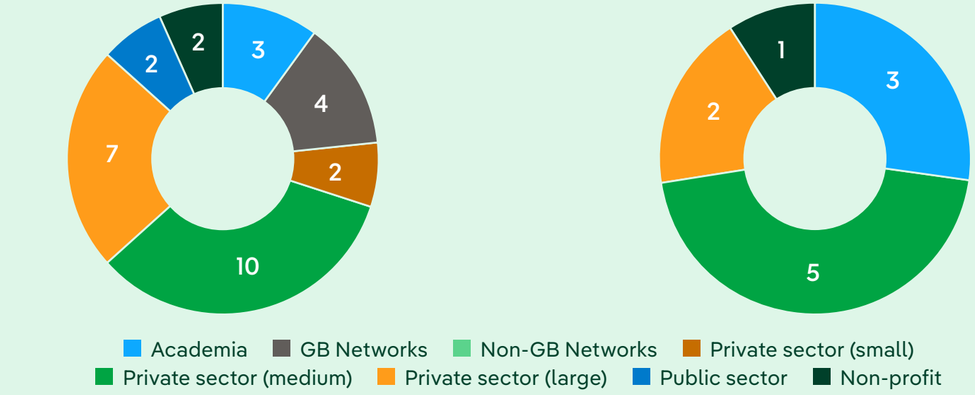


- Innovative ideas can come from a variety of sources, including diverse stakeholders such as academia, customers, partners, our supply chain, and our people, and are assessed against our strategy and business plan.
- An idea will not be taken forward unless the value for customers is clear and there are appropriate linkages to at least one of our innovation themes.
- Ideas are then turned into projects, which describe the aims, objectives and expected outcomes. Once partners are identified, together we will discuss the project scope to understand the value and cost.
- During project delivery, we rely on our proven project management skills to ensure projects are delivered on time and to cost. We also engage with the wider business to ensure that the scope includes all elements required to support the transfer to BAU.
- Once the project is complete, we share learning. This is essential to avoid duplication and extend the benefits from our work to others, before the transfer to BAU.

Primary and Secondary strategy alignments



Project partners



Project supporters

Our innovation portfolio is designed to do more than deliver individual project outcomes. Each project contributes to a broader strategic ambition: creating a network that is resilient, affordable, customer-focused and capable of supporting the transition to Net Zero.

Across the portfolio, projects such as Net Zero Terrace, THISTLES and Smart Street Rural are helping to identify practical and inclusive pathways to decarbonisation. They explore how low-carbon technologies can be deployed at scale while ensuring that customers living in harder-to-treat homes, or those who may otherwise face barriers to participation, are not left behind. These projects support our Net Zero objectives while maintaining a strong focus on affordability and fairness for customers.

At the same time, initiatives including QUEST, LV Futures, Delta Detect, VOLT, Cool Runnings and Smart ReStart are strengthening our understanding of how future networks can operate safely and reliably in an increasingly electrified energy system. Through improved forecasting, enhanced asset visibility, advanced monitoring and smarter operational practices, these projects are building the tools and evidence needed to improve network resilience, make better use of existing assets and reduce the need for costly reinforcement.

Projects such as BiTraDER and CoolDown are helping to shape the future flexibility markets and operational approaches that will allow us to connect more low-carbon technologies at lower cost. By unlocking flexibility, optimising voltage and demand, and developing new market mechanisms, these projects support our objective of delivering value for money while enabling customers to play an active role in the future energy system.

Collectively, the portfolio is also developing the capabilities that will be required in ED3 and beyond. The learning generated through these projects is informing the future deployment of data-driven decision making, advanced network management, digital forecasting, whole-system planning and customer-led energy solutions. Alongside new technologies, we are building the skills, partnerships, processes and evidence base needed to transition innovation into business-as-usual activities and future investment plans.

As we look towards ED3, innovation will continue to provide a vital bridge between today's challenges and tomorrow's network. By linking strategic objectives to practical delivery, our portfolio is helping to ensure that SP Electricity North West is prepared to deliver a net zero energy system that is resilient, affordable and centred on the needs of customers and communities.

Network Innovation Allowance (NIA)

Our NIA portfolio is focused on supporting early-stage innovation through technology development, applied research and network demonstration trials. These projects help us explore new solutions, address emerging challenges and build the evidence needed to support future deployment across our network and the wider energy sector.

At the start of RIIO-ED2, we were allocated £8.4 million of NIA funding. Following Ofgem's consultation on additional innovation funding, we received a further £3.7 million to support activity in the final two years of the price control period. This investment reflects both our strong track record of innovation delivery in ED1 and our continued commitment to developing and implementing innovative solutions throughout ED2.

As expected with projects that are innovative in nature, we have experienced delays in delivering some of our projects due to protracted contract negotiations and unexpected complexities in developing the solution.

During the 2025/26 reporting period, we launched five new NIA projects that will generate valuable learning and have the potential to deliver benefits for customers and the energy system. These projects are:

p14 **Net Zero Terrace** continues the work from the SIF Alpha project to develop a smart local energy system for disadvantaged communities of terraced streets to decarbonise their household energy usage and supply.

p11 **Cool Runnings** will investigate the extent to which capacity can be released by applying variable ratings on distribution transformers to manage the impact of increased demand from heat pumps.

p17 **Smart ReStart** will develop and simulate a methodology for mitigating cold load pickup from heat pumps and EV chargers through smart meter-based load control.

p18 **Visual Overhead Line Tracking (VOLT)** aims to leverage beyond visual line of site drone operations, enabling rapid and scalable inspections of assets in remote areas to identify faults and allow faster power restoration.

p19 **Transforming Heating Into Storage for Local Energy Systems (THISTLES)** evaluates the role of smart heat batteries to help decarbonise homes that are unsuitable for heat pumps or heat networks.

In addition to projects led by SP Electricity North West, we have continued to collaborate on a number of innovation projects led by other energy network companies. These collaborations enable us to share knowledge, reduce duplication of effort and maximise the value delivered through innovation funding across the energy sector.

> Network Innovation Allowance (NIA) continued

We recognise that collaboration is a critical factor in delivering successful innovation. We remain committed to increasing third-party participation across our innovation programme. Through our ED2 business plan, we committed to taking a proactive approach to sourcing new ideas, identifying partners and engaging with a broad range of stakeholders. This includes participation in industry forums and innovation networks, including Energy Networks Association (ENA) initiatives and other sector-wide collaboration platforms.

Looking ahead, we will continue to expand and strengthen our ED2 innovation portfolio. Our innovation strategy remains focused on supporting the transition to a net zero energy system, improving network efficiency and delivering positive outcomes for customers and communities. In particular, we will continue to prioritise projects that address the challenges of whole-system decarbonisation and support vulnerable and underserved customers.

The continued generation of new ideas, effective collaboration and meaningful stakeholder engagement will be key to achieving our innovation ambitions throughout the remainder of ED2. We will continue to share progress, learning and outcomes from our NIA projects to ensure the benefits of innovation are realised as widely as possible.

As we begin planning for ED3, we will build on the experience and evidence gained through our innovation programme to identify the solutions, partnerships and capabilities required to meet future customer needs. By maintaining a strong focus on innovation, collaboration and customer value, we aim to ensure that our network is well positioned to support a fair, resilient and affordable energy transition.

Partner Projects

- **NGED – V2G Dynamic Headroom Control** 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, while improving the confidence that assets will remain within thermal and voltage limits.
- **NGED – HV Pinpoint** HV Pinpoint aims to develop a methodology for detection and precise location of pre-fault events in the HV underground network. The intention of this is to reduce the reliance on test van methods, as well as providing a new solution to more easily retrofit sensors on to existing underground cables.
- **NGN – Open Maps** This project will provide accurate assessment of communities to enable GDN, DNO, Electricity transmission, and Gas transmission partners such as community groups to specifically target areas with relevant support, this will allow project partners to accurately provide information which will be bespoke to the specific needs of the area.

Cool Runnings

Total Project Cost:
£154,205

Timescale:
August 2025 – January 2027

What is Cool Runnings?

Cool Runnings is focused on enabling greater uptake of heat pumps by improving how distribution networks manage transformer capacity.

Building on the earlier Smart Heat project, it explores a variable transformer rating method, where transformer limits adapt dynamically based on conditions such as ambient temperature, asset design, and loading.

The project assesses how much additional demand from heat pumps can be accommodated without costly network reinforcement. It considers a range of network configurations, including different building types and transformer characteristics.

Cool Runnings will develop an initial transformer rating algorithm and define laboratory testing requirements to validate it. Overall, it aims to provide a practical, scalable solution to support rapid electrification of heat.

What have we learned?

The learnings for this project are expected to be generated during the next reporting period.

What are the next steps?

The outcomes and next steps for this project are expected during the next reporting period.

The Project has been delayed due to the partners company acquisition which has caused significant contractual delays, preventing the project from starting on the agreed date of August 2025 and delaying start until July 2026. Extending the project end-date will allow activities to be completed satisfactorily.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: WSP

LV Predict II

Total Project Cost:
£719,000

Timescale:
October 2024 – December 2025

What is LV Predict II?

As we transition to net zero, the level and volatility of demands across the network will increase, with the greatest impact expected on the LV network particularly, underground cables.

Without intervention, this increase in demand will increase the degradation rate of LV cables, causing higher failure rates.

LV Predict researched physical models for determining the temperature within LV cables, the stress cycles and physical damage cables sustained and constructed statistical modelling methods to predict this damage using commonly held LV data.

LV Predict II will build on this work and will refine and extend the probabilistic framework by improving the skill and reliability of the model, expanding the model to other network assets, and applying the model in decision making.

What have we learned?

LV Predict II demonstrated that a combined physical and statistical modelling approach can determine LV joint condition at scale using available data, improving on largely reactive practices.

Enhancements to thermal and degradation modelling increased engineering realism, and emulator-based simulation enabled analysis across different network topologies.

The project confirmed that data limitations, particularly around fault histories and asset condition are the key constraint on validation and predictive confidence.

Important real-world factors such as phase imbalance and local installation conditions can materially affect outcomes but remain underrepresented, meaning outputs are best used for relative risk and prioritisation rather than precise failure prediction.

What are the next steps?

This project has now formally closed. Further work will shift focus to BAU transition and confidence building. This includes strengthening validation through improved fault and asset data and addressing key modelling gaps.

A phased deployment should follow, beginning with risk-based prioritisation while progressively improving predictive reliability as data and model maturity increase.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: FRAZER-NASH CONSULTANCY, A KBR COMPANY

Delta Detect

Total Project Cost:
£1,150,000

Timescale:
November 2024 – February 2027

What is Delta Detect?

DeltaDetect's aim is to leverage the capability of existing LV monitoring devices at secondary substations and extend their functionality to monitor HV underground networks.

To do this, existing LV monitoring will be adapted, and an innovative algorithm will be developed to reverse engineer signals from LV side of the transformer onto the HV network.

By monitoring critical parameters, the system aims to identify abnormal conditions indicative of faults, such as insulation breakdown or equipment malfunction allowing for improved detection, location, and repair time, leading to improved reliability and customer satisfaction.

What have we learned?

The project has highlighted the importance of early access to resources and realistic scoping of technical complexity, particularly when modelling novel network behaviours.

It became clear that accurately representing HV fault propagation to LV levels requires more sophisticated modelling and iterative validation against real-world data than initially anticipated.

The value of robust design iteration and continuous comparison with measured data has been critical in building confidence in the model outputs.

What are the next steps?

The focus now shifts to finalising LV trigger signal development for HV faults, and the algorithm development to utilise the captured data into HV information. This work will be supported by real testing on the PNDC test network at their Cumbernauld facility.

Additional time has been needed by project partner, Camlin Energy (formerly Kelvatek), on modelling and simulation to improve the mathematical transformation and mapping between the HV & LV networks. The extraction and preparation of data done to date has proved more onerous and time consuming than planned. The work has also highlighted that additional review cycles will be required to ensure the quality of learning required is maintained. Extending the project timeline will enable subsequent tasks to be completed in full, all project outputs to be delivered, and expected outcomes to be realised.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: camlin, UNIVERSITY of STRATHCLYDE PNDC

Net Zero Terrace

Total Project Cost:
£680,616

Timescale:
May 2025 – June 2026

What is Net Zero Terrace?

Net Zero Terrace (NZT) is an approach designed to help decarbonise the UK's millions of terraced homes, which are often difficult to retrofit due to space and noise constraints.

Instead of relying on inefficient standalone electric boilers, NZT explores a coordinated, community-based solution using Home Energy Management Systems (HEMS) and Community Energy Management Systems (CEMS). These systems optimise heating and energy use across groups of homes, reducing costs, network constraints, and carbon emissions.

The project picks up from the SIF Alpha project and focuses on developing and testing a minimum viable product, designed to monitor, control and optimise energy use in real time.

What have we learned?

Key learnings from the project centre on the importance of the HEMS as the critical enabling component of the wider NZT solution.

The project has demonstrated that moving from conceptual design to real system testing is essential to understand integration challenges, data flows, and governance requirements.

It has also highlighted the need for robust interoperability and reliable household-level control to support future community scale coordination.

Additionally, insights into customer engagement and GDPR considerations, have been crucial in shaping a scalable, practical approach to deployment.

What are the next steps?

Next steps focus on progressing the HEMS testing from a controlled to real-world environment. As part of this, links with the developing CEMS will need to be validated to enable the wider SLES to function as needed.

The project will also enhance customer journey tools and data governance approaches.

Areas of the network suitable for future deployment will be assessed, helping prepare for large-scale, real-world trials that demonstrate how NZT can be rolled out effectively across terraced communities. A Beta phase application for funding has been made to explore this.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: looped ENERGY COMMUNITIES | BURO HAPPOLD

LV Futures

Total Project Cost:
£1,537,000

Timescale:
February 2025 – August 2026

What is LV Futures?

The LV Futures project aims to improve understanding of how the energy transition will impact LV networks, particularly due to increased adoption of electric vehicles and heat pumps.

By using data from LV monitoring and smart meters, the project will develop granular, long-term forecasts of demand and capacity at LV feeder level over a five-year horizon.

These insights will aim to enable network operators to proactively plan interventions, such as reinforcement or procuring flexibility services.

What have we learned?

The project has highlighted that the complexity of LV data and forecasting requirements was initially underestimated, leading to delays and multiple refinement cycles.

A key learning is the importance of clear data definitions, specifications, and collaboration between partners to manage data dependencies.

Early modelling work has demonstrated the feasibility of the approach, while initial testing has provided valuable feedback for improvement. Aligning new forecasting methods with existing tools is critical to ensure consistency and confidence in outputs, particularly where data quality and availability remain ongoing challenges.

What are the next steps?

The challenges faced in this project by our partners have resulted in much slower progress than initially anticipated, and a thorough review of deliverables and deliverability has resulted in an agreed rescheduling of project works, that have not impacted the scope of cost or the project but have significantly extended delivery times into 2027.

The focus has moved onto load forecasting based on historical recorded data that has been reformatted to meet the underlying structures required for efficient future modelling.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: camlin ERM

Smart Street Rural Phase 1

Total Project Cost:
£185,000

Timescale:
November 2024 – December 2026

What is Smart Street Rural?

Until recently, voltage regulation technology was not mature for pole mounted distribution transformers, meaning that customers connected to them could not take advantage of the benefits of Conservative Voltage Reduction (CVR) as proven on ground mounted transformers as part of the Second-Tier project, Smart Street.

Pole mounted voltage regulation technology has now improved, and this project will conduct desktop analysis to determine whether the application of CVR is cost beneficial for overhead networks including an assessment of the available voltage regulation equipment.

If benefits can be realised, Smart Street Rural will scope a testing methodology for a small-scale network trial to be carried out in a potential future project.

What have we learned?

We have learned that an iterative modelling approach provides a robust foundation for assessing CVR opportunities before wider rollout.

The analysis confirmed sufficient voltage headroom across substations, with no constraints, indicating CVR can be implemented without reinforcement.

Among the technologies tested, PMT OLTCs delivered the most consistent and effective performance, providing the greatest voltage and energy reductions alongside network losses benefits.

Targeting one-third of the highest loaded transformers offers the most impactful deployment strategy.

Additionally, modelling multiple CVR factors helped account for load uncertainty, with 0.75 identified as the most realistic assumption for forecasting demand reduction.

What are the next steps?

The modelling outputs will be extrapolated across the wider SP ENW network and the other networks across GB.

Final selection of demonstrator sites will be completed following validation from policy and operational teams.

Talks with the procurement team have commenced to secure the required equipment.

The Cost Benefit Analysis (CBA) will be updated to support investment decisions, incorporating updated assumptions where necessary.

This project will carry out the groundwork for a phase II, where the voltage control equipment will be trialled on the network to ensure it delivers the expected benefits, and to understand the operation changes needed to implement it into BaU.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: EPRI

Smart ReStart

Total Project Cost:
£265,581

Timescale:
August 2025 – March 2026

What is Smart ReStart?

Smart Restart is focused on helping electricity networks safely recover following prolonged outages in a future with high levels of low carbon technologies.

As electric vehicles and heat pumps increase demand, restoring power after an outage can trigger large spikes in demand, known as cold load pickup.

Building on earlier research, Smart Restart uses existing smart meter functionality to stagger and control the return of demand. By gradually ramping loads back on, it aims to reduce network stress, avoid costly reinforcement, and improve reliability.

The project combines analysis and simulation to develop a scalable, low-cost solution for managing demand following cold load pickup.

What have we learned?

The project confirmed that cold load pickup is a growing and credible risk as low carbon technologies increase.

While SMETS2 smart meters offer relevant functionality, such as staggered reconnection, their practical application is constrained by latency, limited control authority, and inconsistent device behaviour.

Regulatory review showed no fundamental barriers, but key enablers—such as DNO access to control commands, customer consent, and clear governance are not yet in place.

Operationally, restoration processes are not currently designed for granular demand control, meaning any solution would rely on pre-configured behaviour.

What are the next steps?

The project did not identify a simple solution to the problem using smart metres. Further work is needed to create a coordinated industry response, which could include enabling DNO access to smart meter controls and establishing clear consent, regulatory, and governance arrangements.

More detailed simulation and modelling could be undertaken to validate performance across diverse network conditions and LCT penetration levels.

There is also a need to improve visibility of low carbon technologies on the LV network and define operational processes for their management.

The outcomes of this project and future solutions will be revisited in ED3.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: LCP Delta

Visual Overhead Line Tracking (VOLT)

Total Project Cost:
£31,973

Timescale:
October 2025 – August 2026

What is VOLT?

The VOLT project focuses on enabling Beyond Visual Line of Sight (BVLOS) drone operations to improve the monitoring and maintenance of DNO networks.

By using drones, VOLT aims to rapidly identify faults across extensive overhead line networks, reducing reliance on slow, manual inspections.

This approach supports quicker fault detection, targeted repairs, and faster power restoration, particularly benefiting vulnerable and remote customers.

Additionally, VOLT promotes proactive maintenance by identifying risks such as vegetation encroachment before failures occur.

The project aims to enhance grid resilience, operational efficiency, and service continuity, especially during severe weather events that increase the likelihood of outages.

What have we learned?

The project highlighted the technical feasibility of BVLOS Drone operations across a section of the SP ENW network, showing that most overhead line assets can be accessed under current Civil Aviation Authority (CAA) regulatory and operational constraints, with up to 67% of the network potentially serviceable from substation-based drone deployment.

Based on the report assumptions, drones could significantly improve operational response times, reducing fault identification time, this indicates that drone-enabled workflows could materially improve network performance and reduce customer impact.

What are the next steps?

The formal outcomes and next steps for this project are expected during the next reporting period, however the findings and lessons learned from VOLT Phase 1 will be evaluated through a new Phase 2 consisting of a live Proof of Concept (PoC) trial. The trial will assess the feasibility and effectiveness of BVLOS drone operations in supporting fault response and post-storm inspections under real-world conditions.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: Skyports INFRASTRUCTURE

Transforming Heating Into Storage for Local Energy Systems (THISTLES)

Total Project Cost:
£744,665

Timescale:
February 2026 – January 2027

What is THISTLES?

The THISTLES project explores the use of heat battery (HB) technology as an alternative low carbon heating solution to support the decarbonisation of domestic heat.

It focuses on homes that are unsuitable for traditional options like heat pumps or heat networks, helping ensure no customers are left behind in the Net Zero transition.

By storing heat during off peak periods and releasing it when needed, HBs can reduce peak electricity demand and improve network flexibility.

THISTLES assesses the technical, commercial, and operational viability of this approach, aiming to enhance network resilience, defer reinforcement, lower costs, and support more efficient integration of renewable energy.

What have we learned?

The learnings for this project are expected to be generated during the next reporting period.

What are the next steps?

The outcomes and next steps for this project are expected during the next reporting period.

Due to delays finalising the necessary innovation contracts, the project has yet to start. These contracts are in the final stages of negotiation, work will commence as soon as they are signed with the original project aims, objectives and success criteria unchanged. These changes have been reflected in the relevant registration documentation and in the Smarter Network Portal.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: tepeo, LCP Delta, University of Strathclyde PNDC

Network Innovation Competition (NIC)

Alongside our work on NIA and SIF projects, we also have two NIC projects: QUEST, which ended in December 2025, and BiTraDER, which is due to end in July 2026.

QUEST

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The £9m QUEST project builds on our highly successful CLASS and Smart Street projects by looking to create a whole system voltage optimisation system to further drive the efficient running of our network.

The new holistic voltage control methodology will:

- ensure the network operates as efficiently as possible by optimising system voltage and minimising losses.
- further boost the value delivered by existing voltage management techniques.
- facilitate greater connection and use of low carbon technologies.
- maximise benefits for all customers through demand reduction at both High Voltage (HV) and Low Voltage (LV).
- explore how reactive power absorption could support future National Energy System Operator (NESO) flexibility services.

QUEST demonstrated that system wide voltage control can effectively remove constraints, defer reinforcement, and support greater Low Carbon Technology (LCT) uptake while reducing energy consumption and losses without customers perceiving any change.

The project showed that multiple voltage management techniques can be optimised together to maximise benefits and avoid conflicts, while also improving NESO's visibility of Distributed Energy Resources (DER), thus strengthening emergency DR capability.

Furthermore, QUEST proved its ability to integrate with third party Active Network Management (ANM) systems to adapt optimisation as priorities change and reconfigure voltage management during wider system stress.

BiTraDER

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BiTraDER is an £8.4m four-year project that is looking to explore the operation and desire for a bilateral trading market through which connected customers can trade their position in the merit order stack.

This creates flexibility in how they meet their curtailment obligations during network constraints, and the additional revenue stream facilitates the connection of flexibility to the network.

The trials phase of the project concluded in December 2025. The results of which indicated a strong interest in the market and local peer-to-peer flexibility trading. As expected, the trials did have limitations due to low liquidity of trading assets, however, this is expected to increase as the market matures in Business as Usual (BAU).

The project is currently reaching its conclusion with the learning outcomes being generated, along with the quantifiable benefits to be shown in a final Cost Benefit Analysis (CBA). These outcomes will be disseminated within a final closedown report due in July 2026.

QUEST

Total Project Cost:
£9,674,900

Timescale:
June 2021 – December 2025

What is QUEST?

QUEST builds upon SP ENW's successful CLASS and Smart Street initiatives.

It develops the technology in use at the 33kV/HV and HV/LV transforming interfaces and adds similar functionality to the 132kV/33kV transformer interface providing the ability to control the voltage on our network at all levels between the transmission network and our smallest customers from our control centre.

The QUEST software combines the single voltage level controls in daily use by SP ENW and wraps it with a single optimisation system that can be set for different optimisation challenges for different times of day to calculate, and implement, different optimum voltage settings across the network.

The system will optimise to resolve conflicts between voltage levels, whilst also maximising outcomes for network consumers.

What have we learned?

QUEST has successfully demonstrated the value of a coordinated approach to voltage control across the SP ENW network.

The trials demonstrated that QUEST could enable more efficient use of existing assets, optimising their operation and supporting increased connection of LCTs while deferring expensive network reinforcement.

QUEST has proven its ability to dynamically balance competing objectives, such as losses reduction, demand management, and network constraints at different times of day.

By optimising voltages across the network, it has delivered measurable energy and carbon benefits, while maintaining customer compliance and ensuring that voltage changes remain unnoticeable to end users.

The project has also enhanced visibility of DERs for NESO and demonstrated the potential for more refined system support, including improved demand response and emergency operation.

Integration with third-party systems, including ANM platforms, confirmed that coordinated control can be achieved without conflict.

QUEST has validated its core hypotheses: that coordinated voltage optimisation can unlock additional network capacity, maximise benefits from existing techniques, and operate within current infrastructure, providing a scalable pathway for future network management.

What are the next steps?

The project has now ended, and we are looking to transition QUEST into the BaU Network Management System during ED3. All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: nationalgridESO, IMPACT FROM INSIGHT TO INFLUENCE, Schneider Electric, smarter grid solutions, Fundamentals

BiTraDER

Total Project Cost:
£8,367,858

Timescale:
May 2022 – July 2026

What is BiTraDER?

BiTraDER will investigate, design, build and trial a brand new and highly innovative market allowing resources connected to the distribution network to trade their curtailment obligation bilaterally.

The project will assess current and future customers' appetite for bilateral trading, determine the data requirements to support operation of the market, design the interfaces needed to present all necessary information to the trading platform, develop the bilateral market trading rules determining what is and isn't a valid trade, explore the market's ability to operate in near real-time, and determine the functionality required to return the output of the market to the DNO and NESO systems for execution in real time.

BiTraDER is designed to facilitate independent trading, therefore SP ENW will provide the necessary information to the market and receive the output of the market after close of trading. The project will examine the role of the market administrator and propose who might be best placed to operate the market in BAU.

What have we learned?

The trials phase of the project was undertaken in stages to amend or upgrade the functionality in line with customer recommendations.

Prior to the market being build, a Mini Trials workshop tested the boundaries of the newly developed trading rules. Customers greatly preferred two-part pricing and raised their concerns on liquidity, given the fact the market was heavily locational specific.

The functionality was then built and embedded within the existing ElectronConnect platform, which SP ENW also use for their Flexible Services Market.

The Simulation Trials enabled testing of the platform interface for the first time. Users found it intuitive and easy to work through.

Whilst participants understood how to trade and what the market was aiming to achieve, the outcomes were slightly unrealistic due to the fabricated nature of the background market conditions and assets.

Hence, the progression to the Live Network Trials was necessary to test the market with real network conditions, real assets and actual money changing hands.

Following the trials phase, participants expressed a desire to see BiTraDER progress to BAU and understood how it could improve the business case for curtailable connections.

What are the next steps?

The project is ending in July 2026, and the team are finalising the functional requirements and preparing the closedown report. All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: ELECTRON, AFRY AF PÖYRY, LCPDelta

Strategic Innovation Fund (SIF)

Since the beginning of RIIO-ED2, we have been awarded £8.35 million to deliver nine projects, set out in table 1.

These address both a number of our innovation themes and also the challenges set down by Ofgem in their funding rounds.

We have also collaboarated on four projects led by the other energy networks.

Project	Strategy Theme	Discovery	Alpha	Beta
Rewire	Whole Energy Systems	Round 2		
Retro Meter	Net Zero and the Energy System Transition	Round 2		
Retro Meter	Flexibility and Commercial Evolution		Round 2	
Net Zero Terrace	Net Zero and the Energy System Transition	Round 2		
Net Zero Terrace	Net Zero and the Energy System Transition		Round 2	
LDES Node	Net Zero and the Energy System Transition	Round 3		
Cool Down	Net Zero and the Energy System Transition	Round 3		
Cool Down	Flexibility and Commercial Evolution		Round 3	
Cool Down	Net Zero and the Energy System Transition			Round 3

Further detail on these projects are as follows:

- **Residential Whole System Integrated Resilience (Rewire)** explored the technical viability and economic benefit of integrating vector conversion and energy storage technology at a domestic level to increase whole system resilience. This project did not progress past discovery.
- **RetroMeter** aimed to provide and demonstrate a consistent methodology to accurately meter the energy and cost savings of retrofit energy efficiency measures. This project did not progress past alpha.
- **Long Duration Energy Storage (LDES) Node** developed a methodology to inform the optimal locations of LDES to help alleviate localised constraints and maximise the output of renewable generation. This project did not progress past discovery.

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- **Net Zero Terrace** is developing a smart local energy system for disadvantaged communities of terraced streets to decarbonise their household energy usage and supply. Following alpha, the NIA project was commenced to further develop the system architecture. It is anticipated in the future that a beta demonstrator project will be undertaken.

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- **CoolDown** is investigating the impact of Demand Response (DR) from Space Cooling (SC) as the temperature increases due to climate change. This project has now received £5.5 million of funding for the beta phase and is developing novel DR programmes and a first of its kind SC demand forecasting tool.

Partner Projects

- **NGET – Whole Energy System Resilience Vulnerability Assessment (WELLNESS)** aims to develop a clear, evidence-based framework to assess resilience against growing climate risks, enabling stakeholders to make informed investment decisions.
- **UKPN – Smart Heat and Intelligent Energy in Low-Income Districts (SHIELD)** is developing innovative low-carbon heating and energy solutions to support a fair energy transition by improving affordability, scalability, and adoption among vulnerable households. This project is currently at beta.
- **NPG – Fractal Flow** is developing a vendor-agnostic tool to improve network visibility and data integration, enabling DNOs to unlock capacity and accelerate net zero targets despite current system and information constraints.
- **SSE – Innovating Losses Analysis and Detection (I-LAD)** uses AI-driven analytics and secure data sharing to accurately detect and address non-technical losses, improving safety, reducing costs and carbon impact, and enabling fair, targeted interventions.

nationalgrid

UK Power Networks

NORTHERN POWERGRID

Scottish & Southern Electricity Networks

Net Zero Terrace Alpha

Total Project Cost: **£578,866**

Total SIF Funding: **£494,502**

Timescale: **October 2023 – April 2024**

What is Net Zero Terrace?

Net Zero Terrace aims to solve the problem of decarbonising mixed-tenure terraced streets where space and noise constraints restrict access to air source heat pumps. The solution will use a Smart Local Energy System (SLES) that is integrated to the distribution network, affordable to customers and easily replicable across GB.

What have we learned?

The majority of sub-systems are readily available and early-stage inter-operability testing has shown no significant issues. However, further development is needed, particularly to enable optimisation for comfort and costs.

The techno-economic model showed that there are challenges to make it “affordable” and showed where future development must focus to meet affordability criteria.

Integrating the SLES into a DNO network is achievable but certain local network conditions may necessitate active network management which is not used at LV currently and could significantly add to the costs reducing the benefits.

The Net Zero Terrace solution is the lowest cost option for decarbonising terraced streets. The counterfactual, an electric boiler, requires 3 times more demand than the Net Zero Terrace solution. The high-level CBA demonstrated that the 20-year NPV could be up to £17.06m. The benefits change depending on whether an ANM solution is required and the penetration rate of the new SLES.

The community-owned PV, included in the SLES, can provide benefits for the local community by allowing residents to purchase shares and receive interest payments; using any profit from operating the PV to invest in the local area; subsidising the cost of electricity for the local community.

What are the next steps?

There is further development required to de-risk the solution before we proceed to a Beta phase demonstrator project. This is being done through the NIA project to conduct further testing and develop the tools for the customer journey.

We are applying for SIF Beta funding in June 2026 to demonstrate the solution on our network.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal. The SP ENW website also contains the outputs from the preceding Discovery phase.

Partners: RV Energy, Northern Powergrid, UrbanChain, University of Salford Manchester, Rossendale Borough Council, Buro Happold, Kensa, CEE Centre for Energy Equality, UK Power Networks

CoolDown Beta

Total Project Cost: **£5,447,459**

Total SIF Funding: **£4,901,162**

Timescale: **October 2025 – May 2028**

What is CoolDown?

As Britain warms due to climate change, electrification of heat will mean increasing customer access to space cooling, leading to increased summer peak demands. In current distribution network planning, cooling demand is poorly accounted for and based on limited high-level modelling. Additionally, the potential of cooling to provide flexibility during periods of network stress has not been considered.

CoolDown will produce tools to enable network operators to understand the impact of SC at a local level. Trials of SC-tailored flexibility products will enable networks to mitigate adverse impacts, reduce network reinforcement requirements and optimise value for customers.

What have we learned?

CoolDown Alpha conducted detailed modelling of SC uptake and found that by 2050, 39% of all buildings in our license area will overheat and 30% of them will install SC.

This is a marked increase on 2023 where only 9% overheated and 5% had SC installed. While SC is already prevalent in commercial buildings, customer research conducted in CoolDown Alpha revealed a growing domestic trend with 20% of households considering installing SC in the next two years.

CoolDown Alpha found that SC growth accelerates the need for substation reinforcements with a marked increase in reinforcements triggered by peak summer load. SC growth could lead to more significant network reinforcement requirements, increasing customer electricity bills and delaying project connections critical to wider net zero targets.

What are the next steps?

CoolDown Beta will focus on advancing the modelling developed during the alpha phase into a practical forecasting capability for SC. This tool will allow DNOs to directly incorporate projected demand increases into their Distribution Future Energy Scenarios (DFES), improving planning accuracy and visibility of future network constraints.

Building on insights from the Celsius NIC project, the programme will also assess how climate change affects substation asset performance, including derating, reinforcement needs, and associated DR requirements.

In parallel, CoolDown Beta will also design and trial innovative demand response schemes that utilise flexibility from domestic and commercial SC assets, helping to unlock new flexibility markets while supporting network stability.

Where can I find more information?

All the reports and deliverables for the project can be found on the SP ENW website and the ENA Smarter Networks portal.

Partners: Guidehouse, UCLC Consulting with Experts

Awards

We are very proud of our track record for being shortlisted and winning awards for our Innovation Projects, the 2025/26 awards are as follows:

This is Manchester Awards 2025 –
Digital Innovator of the Year – shortlisted

edie Net-Zero Awards 2025 - Smart Systems and Flexibility Project of the Year – BiTraDER – Finalist

The Electrical Industry Awards 2025 – Project of the Year award winner for Net Zero Terrace

The Heating & Ventilation Awards – Project of the Year – CoolDown - shortlisted

edie Energy Awards 2025
Net Zero Terrace winner of the Energy Distribution or Industrial Breakthrough Award, finalist for Energy Project of the Year - Residential

Collaborate To Innovate (C2I) – The Engineer magazine **Shortlisted Energy & Environment Award for Net Zero Terrace**

Events

We have attended a number of events over 2025/26 to speak to stakeholders, industry partners, other innovators and students. Our highlights include the ENA Basecamp in Twickenham, Ben Ingham speaking at the University of Manchester and Neil McClymont speaking at the Manchester Metropolitan University. We presented Net Zero Terrace at Northern Sustainability Summit in Manchester and VOLT at the Scottish Power Innovation Forum in Glasgow. We held the QUEST Beta Dissemination Day in December, with over 40 attendees learning more about the successful conclusion of the project. And of course, the Energy Innovation Summit 2025 in Glasgow, with our first joint SP Electricity North West and SP Energy Networks stand.

SP Electricity North West

Key takeaways

Innovation continues to play a critical role in helping SP Electricity North West respond to the challenges of the energy system transition while delivering tangible benefits for customers today.

During ED2, we secured more than £20.5 million of innovation funding, progressed a diverse portfolio of NIA, SIF and NIC projects, and continued the deployment of proven innovations that have already attracted over £100 million of business-as-usual investment funding. Collectively, these initiatives are expected to deliver more than £325 million of financial benefits for customers while supporting a smarter, more resilient and lower-carbon electricity network.

Across the portfolio, we have explored solutions that support our strategic objectives of Net Zero, network resilience, affordability and improved customer outcomes. Projects such as Net Zero Terrace, THISTLES and Smart Street Rural are helping us understand how the transition to a low-carbon energy system can be delivered fairly and inclusively, ensuring that customers and communities remain at the heart of innovation. At the same time, projects including QUEST, LV Futures, Delta Detect, VOLT and BiTraDER are developing the operational tools, digital capabilities and market arrangements needed to manage future network challenges and make better use of existing assets.

The success of our innovation programme is built on collaboration. During the year, we worked alongside academic institutions, technology providers, community organisations, industry experts and fellow network operators to develop, test and refine new solutions. These partnerships strengthen the quality of our innovation activity, accelerate learning and help ensure that the benefits of innovation are shared as widely as possible across Great Britain. Through open dissemination and active participation in industry forums, we remain committed to sharing both successes and challenges so that the entire sector can benefit from the knowledge generated through innovation funding.

Perhaps most importantly, our innovation programme is not only delivering project-specific outcomes; it is helping to build the capabilities that will shape the future business. The portfolio is strengthening our expertise in digitalisation, forecasting, whole-system planning, flexibility services, advanced network management and customer engagement. These capabilities will be critical as we prepare for ED3 and beyond, enabling us to turn innovation learning into business-as-usual practice and future investment decisions.

As we look ahead, we remain committed to developing innovative solutions that provide lasting value for customers, support resilient and affordable networks, and accelerate progress towards Net Zero. By combining strong partnerships, a clear strategic focus and a commitment to sharing learning, SP Electricity North West is helping to shape the electricity network of the future—one that is smarter, more flexible and better equipped to meet the evolving needs of the customers and communities we serve.

SP Electricity North West

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