Innovation Summary Report

31st July 2025

1 Foreword

Welcome to our Innovation Summary Report for the second year of RIIO-ED2. In this document we set out all our innovation projects from this regulatory period, along with relevant ED1 projects, and share their learning outcomes, benefits and proposed implementation.

This report draws out those innovation activities from reporting period 1 April 2024 to 31 March 2025 for the Electricity North West license area.

We seek to innovate every day across all our business activities to ensure that we can respond to the evolving needs and expectations of our customers in an increasingly uncertain energy future. Over ED2 we will look to deliver projects that support a just transition to net zero, whilst ensuring that none of our customers get left behind.

1.1 NIA

Our NIA activities are centred around the early-stage technology development, application of research and network demonstration trials. We received £8.4m to spend across ED2, with a review to be carried out in 2026. This funding is in line with ED1 funding levels, and lines up with our commitment to continuing innovation.

The reporting period saw us kick off four new NIA projects, which will provide significant learnings and the accelerated benefits to customers. These projects are as follows:

- *DeltaDetect* looks to extend our fault detection and prediction capabilities to the high voltage network. This will improve the reliability of our network.
- *LV Predict II* builds on our successful RIIO-ED1 LV Predict project and looks to utilise probabilistic modelling techniques to determine the condition of LV cable assets from available data sources
- *Smart St Rural* phase one looks to carry out an assessment of the benefits of extending our industry leading Smart St system to rural networks. This will be followed by a second phase to carry out live trials of the selected equipment to fully quantify the benefits.
- *LV Futures* is exploring short term LV forecasting and understanding the changing nature of loads on our network. The outputs of this project will feed into our asset management process, including that developed under LV Predict II to better facilitate the uptake of LCTs.

We recognise how collaboration can be a key ingredient in successful innovation, and we remain committed to continuing and increasing third-party contributions to our Innovation programme. Over the ED1 period we ran eight calls for innovation, either standalone or in conjunction with the ENA, with the last call receiving 27 responses from 15 organisations. We took forward from this several ideas and they formed two new projects in 2022: Hyperspectral Imaging and A Statistical Model for Determining Cut-Out Failures. We have made a commitment in our ED2 business plan to continue this pro-active approach to sourcing ideas and partners.

Across the NIA portfolio our work with third parties is an essential component of innovation at Electricity North West and we consider it central to the successful delivery of our projects. Third parties are actively involved in all our innovation projects, either as a partner or a supplier, and are selected for their expertise or via competitive tender.

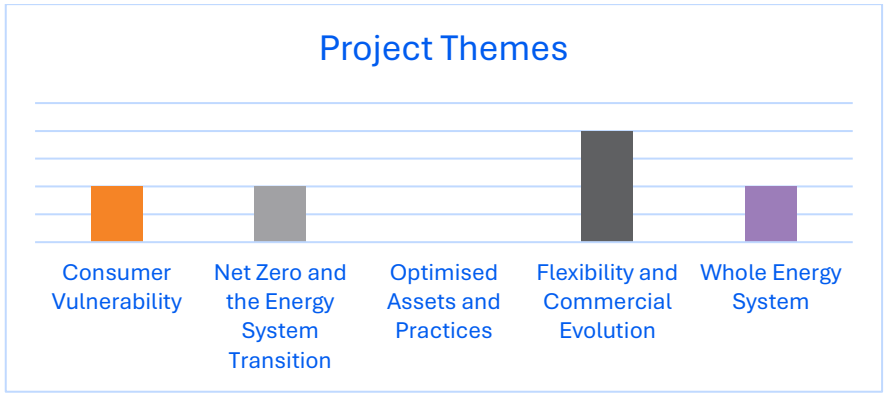
In the coming year we look forward to growing our ED2 innovation programme. At the core of our ED2 business plan is our commitment to net zero, innovation and efficiency, and we will focus our innovation ambitions on the key areas of net zero system transition and supporting

vulnerable customers. Gathering new ideas, wider collaboration and stakeholder feedback will be crucial to the success in ED2 and we will continue to update on our progress of NIA projects throughout.

1.2 SIF

Since the beginning of RIIO-ED2 we have been awarded **£2.2million** to deliver **8 projects** addressing a number of our innovation themes. We have also collaboarated on 5 projects led by other energy networks.

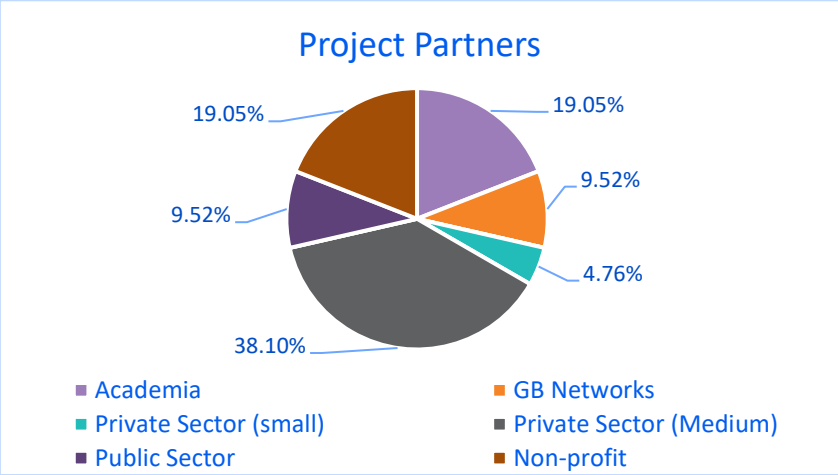
Figure 1: SIF Projects split by theme.



We select projects to meet the challenges set down by Ofgem as well as addressing our innovation themes and figure 1 demonstrates the split of our RIIO-ED2 projects by theme. Classifying projects in this manner ensures we deliver a balanced portfolio.

In line with the principles of innovation funding, these projects are collaborative in nature and involve a range of partners from academia, public and private sectors as well as other network licensees. When selecting partners, we consider the company's expertise and relevance to the challenge and the proposed solution. So far, in RIIO-ED2 we have partnered with 21 different organisations across a range of categories as shown in figure 2.

Figure 2: Project Partners split by theme.



1.3 NIC

Alongside our work on NIA and SIF projects we also have two ongoing NIC projects in QUEST and BiTraDER. 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. In addition, the new holistic voltage control methodology will:

- Ensure the network operates as efficiently as possible, optimising the system voltage to connected customers and minimising losses.

- Further boost the benefits available from existing voltage management techniques.
- Facilitate the increased connection and use of LCTs.
- Maximise benefits to all customers through demand reduction at High Voltage (HV) and Low Voltage (LV).
- Explore the potential of reactive power absorb in supporting NG flexible services.

The project has entered the live trial phase where we will prove the viability of the system on our network. Despite some challenges around the IT design following a change in the cybersecurity environment early in the project we are on track to close down the project by November 2025.

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 allows them flexibility in how they meet their curtailment obligations during network constraints, and the additional revenue steam facilitates the connection of flexibility to the network.

Currently, we are developing the components that have been designed be built into a working model to enable customers to trade in BiTraDER

We will also continue to conduct further customer engagement and recruitment to ensure we have the right mix of customers for the live network trials. The project remains on track to complete on schedule in 2026.

2 Key Facts

8 ENW SIF projects delivered and 5 supported

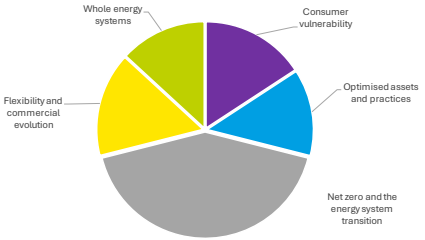
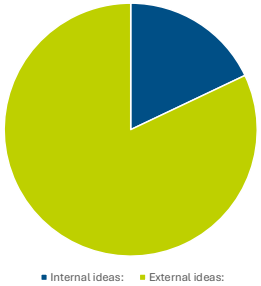
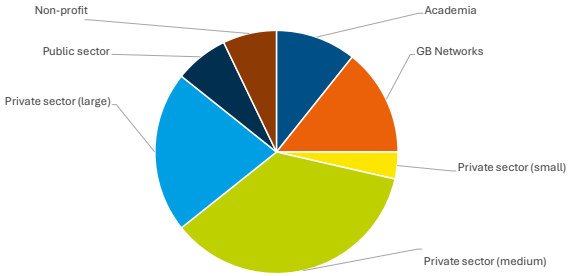
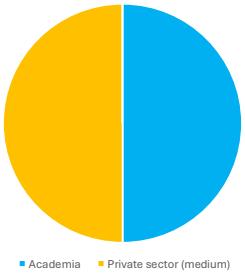
£5m of innovation funding allocated to projects

Over 50 partners and suppliers engaged of which 17 are new to ENWL

4 projects transitioned to BaU

Over £8.4m NIA funding to invest over the price control

3 Nine Box Model

	Initiation & Evaluation	Demonstration, Iteration & Learning	Deployment & Optimisation
Strategy & Vision (SV)	**Our Innovation Strategy** https://www.enwl.co.uk/globalassets/about-us/regulatory-information/riio2/december-final-submission/annexes-final/annex-24-innovation-delivery-plan.pdf	**Average stakeholder & customer satisfaction score** N/A	**Primary and Secondary Strategy Themes** 
Organisation & Culture (OC)	**39** Innovative ideas generated	**Percentage of projects and spend by TRL** TRL number 1 2 3 4 5 6 7 8 Cost percentage 8.37% 10.81% 0.75% 5.83% 2.51% 32.83% 38.91% 0.00% Project number percentage 31.58% 10.53% 5.26% 21.05% 10.53% 15.79% 5.26% 0.00%	**28.21%** Percentage of innovation ideas taken forward to projects
Capability & Technology (CT)	**Innovation Ideas Source** 	**Project partners** 	**Project supporters** 
Results and Outcomes (RO)	**26.32%** % projects lead to another project **16.67%** Projects failed fast	**12** FTEs working on Innovation Projects **8.00%** network company funding in innovation projects	Net benefits delivered **£9,987,345**

4 Innovation Strategy

Our Innovation strategy sets out the focus areas for our programme of works across the price control, which reflect the challenges of the industry and the company. It is linked to the ENA national strategy to ensure that we support the GB networks as a whole, but which is also tailored to our unique challenges. Following an update to the ENA document we will be updating our strategy to ensure that we remain aligned to the national priorities.

Our strategy originally formed part of our ED1 business plan and was a living document throughout the price control, being updated to reflect changes in the national picture along with learnings developed through our projects. This provided a foundation for us to build on in our focus areas for ED2, where we will continue to follow the same philosophy.

Figure 3: Our challenges

Core to the principles of the RIIO framework of electricity regulation, is that network operators must continue to provide and 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 presents several challenges right across the organisation, and it's in these areas that we aim to focus our innovation efforts.

For ED2, innovation can be categorised into three areas:

- *Embedded innovation* – proven innovation which is considered the default solution to a problem.
- *Business-as-usual innovation* – short-term, lower risk innovation funded by our base revenue allowance.
- *Ofgem innovation stimulus* – innovation funded by our customers under a mechanism agreed by Ofgem, which demonstrates long-term value for customers with a focus on energy system transition and customer vulnerability.

Taking innovation into BAU is considered essential to our undertaking a project. After all, it's only when the innovation has been adopted across our business (i.e., embedded and considered the default solution) that our customers realise the benefits. To ensure a consistent approach and, crucially, a smooth and successful transition to BAU, all innovation projects follow our innovation lifecycle.

4.1 Our innovation lifecycle

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 a 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.

Figure 4: Innovation lifecycle

5 NIA Over View

5.1 Live Projects

The following section sets out details for our four live ED2 NIA projects and highlights any key learnings that have are or are expected to be generated by them.

Our current live projects are:

- LV Predict II – Probabilistic modelling to assess LV cable condition
- Delta Detect – HV Fault detection
- LV Futures - short Term LV Forecasting
- Smart Street Rural phase 1 – benefits assessment of applying the Smart Street methodology to overhead networks.

5.2 LV Predict II

Total Project Cost: £558,338
Timescale: October 2024 – April 2025

5.2.1 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.

5.2.2 What have we learned?

The LV Predict 2 work has successfully built on the initial research and proof-of-concept methodology. The physical modelling has been expanded to cover PILC cables, which represent ENWL's oldest assets and are potential strong candidates for proactive replacement with newer technology. The assumptions from the initial research have been revisited and improved upon with new datasets and invaluable insights from a visit to the ENWL Training Academy, with a focus on linking back to the underlying damage mechanism and contributing factors. The statistical models have been improved by introducing smarter sampling techniques, allowing for much bigger input datasets to be used without a detrimental impact on computing time.

The agile 6-sprint to this R&D project has been a major success. It has allowed the flexibility to pursue development directions as they arise, and make valuable model improvements even if they weren't planned at the start of project.

5.2.3 What are the next steps?

The final two sprints of this project will focus on implementing and utilising the updated model developed during the sprints so far. This will combine Frazer-Nash's improved physical modelling with TNEI's updated statistical frameworks to generate predictions of the highest risk LV cables and joints. These results will be interpreted by a cost-benefit analysis, comparing proactive replacement options to the existing, more reactive approach. This will support ENW's business case for the upcoming ED3.

5.2.4 Where can I find more information?

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

5.3 Delta Detect

Total Project Cost: £558,338
Timescale: October 2024 – April 2025

5.3.1 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 faults to be proactively detected, located, and repaired reducing downtime and leading to improved reliability and customer satisfaction.

5.3.2 What have we learned?

During the reporting period, the project has entered the mobilisation phase. Our partner has assembled a dedicated project team and identified the key data sources needed for the initial development of the fault detection algorithm. We are currently collaborating with both partners to review and validate these data requirements.

5.3.3 What are the next steps?

Once the data sources have been finalised and shared with the project partners they will begin development of the fault detection algorithm. In parallel the project will create a test plan to determine the effectiveness of the algorithm in both simulation and real word scenarios.

5.3.4 Where can I find more information?

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

5.4 LV Futures

Total Project Cost: £1,537,000
Timescale: February 2025 – September 2026

5.4.1 What is LV Futures?

The energy system transition will have the greatest impact on LV demand and capacity due to the mass adoption of LCTs. Understanding this impact on demand, available capacity and investment required requires granular long term forecasting for LV feeders.

LV Futures will analyse data from recently deployed LV monitoring and smart meters along with trends on LCT uptake to produce power flow and feeder load allocation for LV feeders. The outputs of this analysis will provide relevant information to inform interventions such as reinforcement or flexible services requirements.

5.4.2 What have we learned?

During the reporting period, the project has entered the mobilisation phase. Our partner has assembled a dedicated project team and identified the key data sources needed for the initial development of the fault detection algorithm. We are currently collaborating with both partners to review and validate these data requirements.

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Once the data sources have been finalised and shared with the project partners they will begin development of the fault detection algorithm. In parallel the project will create a test plan to determine the effectiveness of the algorithm in both simulation and real word scenarios.

5.4.4 Where can I find more information?

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

5.5 Smart Street Rural

Total Project Cost: £185,000
Timescale: October 2024 – July 2025

5.5.1 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 matured 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.

5.5.2 What have we learned?

Work has begun on building the network models to carry out the initial assessment of the Smart Street benefits when the technique is applied to overhead networks. The outputs of this are expected shortly, which will inform the decision on whether to proceed with the follow on project.

5.5.3 What are the next steps?

Once the initial CBA has been completed a decision will be made on whether to register a follow on project to trial the technology in the field. This project will continue to assess the network impact and extrapolate the projected benefits to the whole of Electricity North West's overhead network.

5.5.4 Where can I find more information?

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

6 NIC Project Highlights

6.1 QUEST

Project Overview

QUEST builds upon ENWL's successful CLASS and Smart Street Innovation. 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 voltage levels between the national grid and our smallest customers from our control centre.

The QUEST software combines the single voltage level controls in daily use by ENWL 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 resolving conflicts between voltage levels at source considering the real time state of the network it is optimising.

Changing network voltage has an impact on all connected customers and may initiate behaviour that contradict the desired QUEST outcome. QUEST will therefore also test interfaces with ANM systems demonstrate coherent control across a number of network needs.

Progress

Since the project award in December 2020 there have been some significant global changes that have had an impact on the project, especially relating to Cyber Security. In response to an enhanced threat level the project has experienced a redesign of the underlying IT infrastructure required to interface the innovation project into our critical real time network management system. These changes plus the major industry focus shift to IT as critical national infrastructure has been an underlying reason for a series of delays to the project. The core idea and focus of the project has however not changed.

Successes

The project has delivered new and improved network equipment, be that additional HV/LV distribution transformers with on load tap changers, revised 33kV/HV primary AVC relay software, and the roll out of similar AVC equipment to out 132kV/33kV BSP (bulk supply point) transformers.

The project has delivered the QUEST optimisation software, tested in both the suppliers and ENWL TEST systems, and two commercial ANM systems onto project hardware within and connected to ENWL real time control systems.

Figure 5: QUEST optimisation software

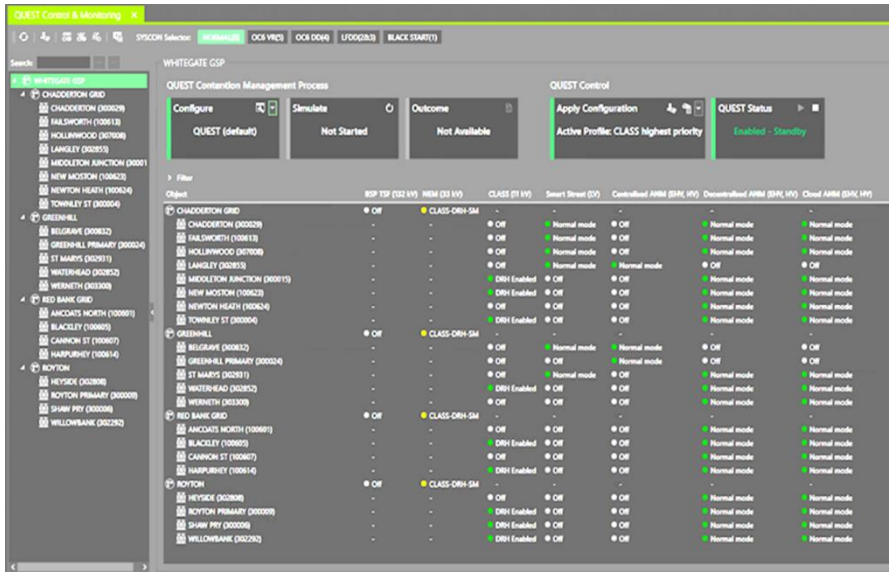
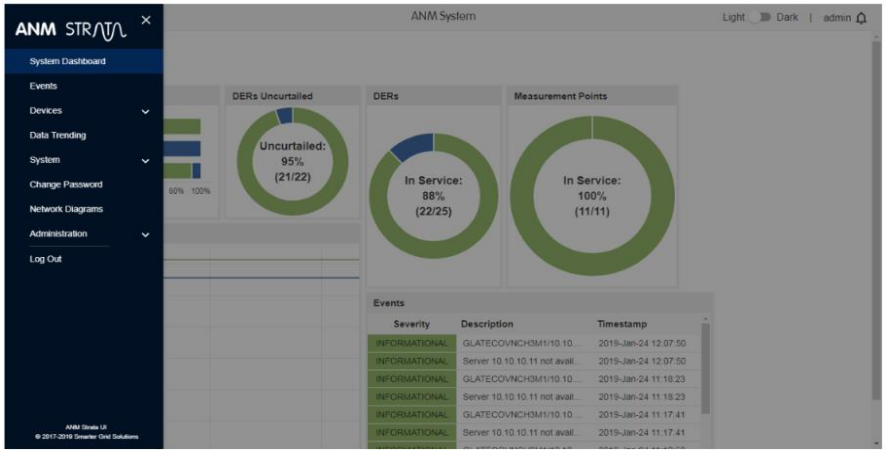


Figure 6 Commercial ANM Platform

We have developed a dashboard to display the benefits of the decisions taken by the QUEST software.

Figure 7 QUEST benefits dashboard

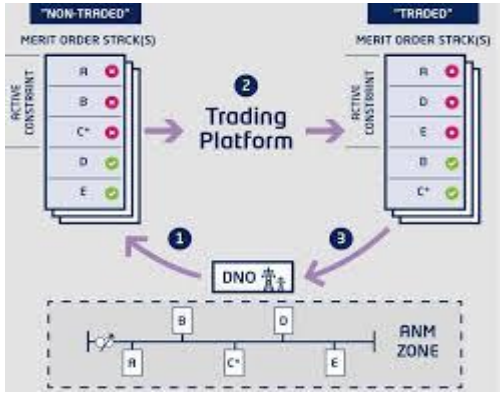


The project has also engaged with Domestic customers, to create a pretest baseline, and targeted grouped of HV and EHV consumers who could potentially benefit from the widespread use of QUEST technologies, or new “voltage managed” connection contracts.

7 BiTraDER

The BiTraDER project officially started on 15th December 2021 upon issue of the Project Direction by Ofgem and is due to be completed in July 2026.

It will investigate and trial a new innovative method introducing a transparent trading market for connected resources to trade curtailment obligations bilaterally, within regionally aggregated stacks.



The project will include the development of a market platform for peer-to-peer trading, integration with our Active Network Management (ANM) system, and development of functionality to send dispatch instructions to connected customers, with either curtailable or non-curtailable connections.

The period during the 2024/2025 financial year has seen the completion of two deliverables. The third deliverable, 'Trading platform design' and fourth deliverable 'Architecture build lessons learned report' have both been completed.

Deliverable 3

February 2024

Trading platform design.

Deliverable 4

December 2024

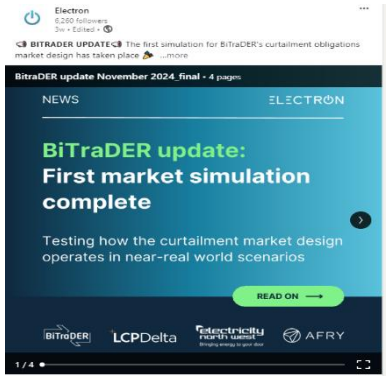
Architecture build lessons learned report.

The third deliverable report outlines the key aspects and design of the entities responsible for enabling the system's operation and explains how they integrate to ensure its functionality. An updated overview of the trials is also shown with a particular focus on the mini trials workshop held in January 2024 and the feedback that was received.

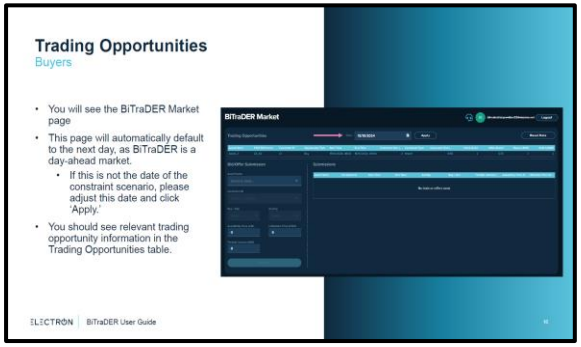
The fourth deliverable report focuses on the methods to implement, build and test the designed solution along with the associated lessons learned throughout the process. The tasks completed during this deliverable have enabled a functional prototype of the BiTraDER system to be developed in time to commence the simulation trials.

ENWL attended and presented on BiTraDER at the 2024 Energy Innovation Summit (EIS). BiTraDER was presented as part of the 'Growing flexibility and services to make it more accessible, fair and beneficial session'.

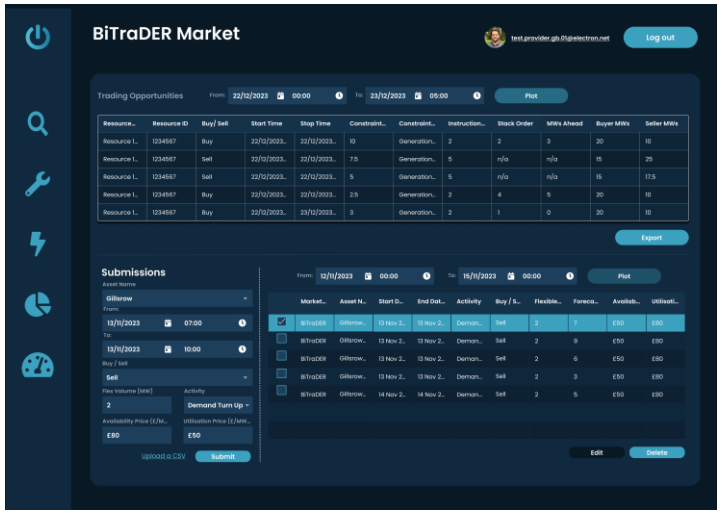
ENWL also presented on BiTraDER at Utility Week Live. BiTraDER was presented on the energy flexibility stage under 'Developing new flexibility products & innovations' and provided an overview of the project and benefits it will bring to the industry.



The simulation trials have now started and will be running from October 2024 to May 2025. As a result of ongoing successful customer engagement, a group of key stakeholders including asset owners, operators and aggregators have agreed to participate in the trials and will be liaising closely with the project team to undertake simulated trading opportunities, whilst providing useful learnings to feed into development of the project.



The simulation trials enabled the project team to test for the first time the user interface of the BiTraDER trading platform. Participants were instructed to register onto the platform and submit trades in response to simulated constraint notifications.



The feedback gained at this stage was that users found the platform simple and intuitive to use.

8 SIF Project Highlights

The following section details our SIF projects, setting out the learning generated across the portfolio. We have led on eight SIF projects covering a range of innovation themes and supported a further five projects led by other network operators.

8.1 RetroMeter Alpha

Total Project Cost: £537,937
Total SIF Funding: £483,934
Timescale: October 2023 – April 2024

8.1.1 What is RetroMeter?

RetroMeter investigated whether a consistent methodology to accurately meter the energy and cost savings of retrofit energy efficiency measures could be provided and demonstrated. Having this methodology could unlocking pay-for-performance financing, increasing uptake and leading to reduced costs for consumers and additional flexible services for the DNO.

The project focused on the most common retrofit use case in the UK - fabric upgrades to homes with gas heating pre-intervention and evaluated three core methodologies: an existing open-source methodology, OpenEEmeter; a comparison-based methodology and physics-based modelling.

We also developed a business model to provide a clear understating of the needs and roles of the different actors in the market and assess the value of the market to each of them.

8.1.2 What have we learned?

The OpenEEmeter methodology alone was not accurate enough as it does not account for changes in energy prices or associated behavioural changes. Using the comparison methodology improved the accuracy but this relied on continued access to comparator homes which had not undergone retrofit. The physics-based modelling allowed us to estimate comfort take-back (where customers use the financial savings to boost the comfort in their home by turning heating up) but further validation is required.

Aggregating the methodologies across a small number of homes (approximately 10) improves the accuracy further but there are significant challenges around accessing quality smart meter data.

When considering a large-scale rollout of retrofit energy efficiency measures it is important to engage early with householders and retrofit providers.

The values assessment demonstrated clear benefits across the different actors but the most value sits with actors other than the DNO. This weakens the case for DNOs to lead the development of the methodology.

8.1.3 What are the next steps?

Given the weakened benefits case for DNOs, ENWL will not be taking this project forward to a Beta phase. However, we see value in the methodology, and should others wish to pursue it we would wish to be involved.

8.1.4 Where can I find more information?

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

8.2 Net Zero Terrace Alpha

Total Project Cost: £578,866
Total SIF Funding: £494,502
Timescale: October 2023 – April 2024

8.2.1 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.

8.2.2 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 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 showed that they 20-year NPV ranges from £17.06m up to £16.95m. 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 electricty for the local community.

8.2.3 What are the next steps?

There is further development required to de-risk the solution before we proceed to a Beta phase demonstrator project. Therefore, we have registered an NIA project to conduct further testing and develop the tools for the customer journey.

Following successful completion of the NIA we are proposing to apply for SIF Beta funding to demonstrate the solution on our network.

8.2.4 Where can I find more information?

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

8.3 LDES-NODE Discovery

Total Project Cost: £165,968
Total SIF Funding: £145,963
Timescale: March 2024 – April 2024

8.3.1 What is LDES-NODE?

To maximise the benefits of Long Duration Energy Storage (LDES) it is important that deployment occurs strategically across local electricity distribution networks. LDES NODE (Long Duration Energy Storage for Network Optimisation, Decarbonisation and Efficiency) developed a comprehensive methodology and tool to inform the optimal geographical location for LDES technologies when deployed on electricity distribution networks.

8.3.2 What have we learned?

The LDES NODE tool appropriately maps the technologies, accounting for their specifications, network conditions, and geographical constraints in our region. The tool uses the levelised cost of storage to compare different LDES technologies along with a new framework which uses LDES data in conjunction with a DNO network model to identify where LDES can meet network needs. The tool creates outputs in different formats to make them accessible to a range of users, regardless of prior knowledge of LDES, e.g. visual outputs show how the results relate to local authorities.

Using LDES-NODE, DNOs can improve their understanding of locations where LDES are more likely to connect and optimise network investment. It also allows DNOs to assess the potential for longer-term flexibility services to defer traditional reinforcement.

We could use the LDES-NODE tool to integrate with Local Area Energy Plans (LAEP) and proactively engage with local authorities to reduce the network investment required to facilitate their plans.

8.3.3 What are the next steps?

This Discovery project produced a tool which mapped the possible locations of different LDES technologies across the ENWL network. This allows us to engage proactively with developers, owners and operators of LDES technologies to ensure that the LDES is installed in a mutually beneficial location.

Given LDES-NODE Discovery achieved the prescribed outcome, we decided not to proceed with any future research or development and the project was closed at this point.

8.3.4 Where can I find more information?

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

8.4 CoolDown Discovery

Total Project Cost: £168,743
Total SIF Funding: £149,996
Timescale: March 2024 – May -2024

8.4.1 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 explored the impact of space cooling on network capacity by producing improved uptake and demand projections as well as developing novel commercial models to incentivise and unlock flexibility.

8.4.2 What have we learned?

Cooling uptake is potentially much bigger than is currently accounted for. From an initial sample of 36 distribution substations, 27 are predicted to need reinforcement before 2050 due to increased cooling demand.

The innovative modelling methodology developed highlighted the benefit of modelling at a distribution substation level.

Using demand response can significantly reduce peak cooling load without resulting in overheating buildings and defer or avoid the need for summer-peaking substations to be reinforced.

The high-level CBA estimated that up to £35m cumulative benefit could be achieved by 2035. The CBA used a detailed view of 36 distribution substations, scaled across the 17,000 substations in ENWL and assumed 50% of buildings that overheat provided flexibility.

8.4.3 What are the next steps?

Following the successful completion of the Discovery phase we applied for Alpha phase funding to further enhance the network modelling and develop the demand response programmes ahead of trials in a Beta phase.

8.4.4 Where can I find more information?

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

8.5 CoolDown Alpha

Total Project Cost: £558,338
Total SIF Funding: £499,888
Timescale: October 2024 – April 2025

8.5.1 What is CoolDown?

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

CoolDown Alpha built on the Discovery project by making significant enhancements to the network model to provide a scalable and representative assessment of the impact of cooling to inform network reinforcement decisions and customer flexibility requirements. We also designed cooling specific demand response programmes.

8.5.2 What have we learned?

Cooling is poorly understood amongst DNOs, FSPs, and customers and the innovative modelling suggests that DFES have vastly underestimated the amount of cooling demand that could be added to the network. The detailed modelling found that by 2050, 39% of all buildings in ENWL will overheat and 30% of them will install cooling. This growth in cooling NIA Project Highlights accelerates the need for substation reinforcement with a marked increase in reinforcements triggered by peak summer load.

Customer surveys conducted found a large variation in when and how customers use cooling. Overall, we found that cooling assets are used differently to other assets and embedding them into existing markets would risk inefficient flexibility delivery. Therefore, we designed four new cooling demand response programmes, suitable for domestic and commercial customers, to unlock flexibility and optimise its value.

The detailed cost benefit analysis showed that the use of cooling demand response could unlock up to £81m in cumulative net benefits GB-wide by 2050 depending on the DFES scenario used.

8.5.3 What are the next steps?

The research has shown that the uptake of cooling will have a significant impact on the electricity distribution network, but further work and demonstration is required.

We intend to apply for SIF funding for a Beta phase to trial the demand response programmes to ensure they are suitable for business as usual. We will also look to further enhance the modelling to produce a forecasting tool which can be used by DNOs in network planning.

8.5.4 Where can I find more information?

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

9 Other Projects

The following pages contain high level details of other recently completed innovation projects.

ENWL006: Sentinel

NIA

The project will trial new fault location techniques on overhead networks. By developing novel fault location sensors which enable earlier detection and response to broken or damaged conductors, Sentinel will improve the quality of supply for customers and improve safety on the network.

Consumer vulnerability | Net zero & energy system transition | Optimised assets and practices | Flexibility and commercial evolution | Whole energy system

Benefits

- More precise fault location
- Detects emerging faults
- Detects high impedance faults
- Reduction in CMLs
- Real time condition monitoring

Timescales

Start: **Sep 2015**

End: **Mar 2024** (BUSINESS AS USUAL)

What next

The fault location sensors are being deployed as part of BaU and are providing notifications to our Control Room.We have successfully shown that the system can automatically generate incidents in response to triggers.

http://www.enwl.co.uk/nia

ENWL027: Enhanced LFDD

NIA

This project will explore the use of SuperTAPP SG relays, currently installed at the majority of ENWL's primary substations, to provide a more granular LFDD service. In addition, by using the relays in conjunction with measuring equipment the direction of the power flows can be taken into account, allowing net exporters to remain connected.


Consumer vulnerability


Net zero & energy system transition


Optimised assets and practices


Flexibility and commercial evolution


Whole energy system

Benefits

- Economic solution
- Improved usage of existing assets
- Allows rapid wide scale deployment
- Low cost
- Better utilises distributed generation

Timescales

Start: **Jun 2021**

End: **Mar 2024**

What next

The Project successfully demonstrated that the SuperTAPP SG relay can deliver frequency based tripping, as well as discriminating based on load levels. There is further development required to ensure that it performs in line with the OC6 specification.

www.enwl.co.uk/nia

ENWL028: LV Predict

NIA

This project will develop a probabilistic framework which predicts the current state of the LV assets across a representative part of the network, most likely as a probability distribution of times to failure, or equivalently the probability of failur e in a specific time interval.

Consumer vulnerability

Net zero & energy system transition

Optimised assets and practices

Flexibility and commercial evolution

Whole energy system

Benefits

- Low cost
- Easily deployable
- New probabilistic framework
- Better targeted investment
- Improved cable health prediction

Timescales

Start: **Jul 2022**

End: **Jan 2023**

What next

The project has been completed successfully,and has lead to a follow-on project in ED2 to further refine the technique

www.enwl.co.uk/nia

ENWL031: Automated Transformer Monitoring System (ATMS) NIA

This project will see the upgrade of a number of Totus units and look to integrate the data gathered into ENWL's Chime database, which is used for management of our assets.

Consumer vulnerability | Net zero & energy system transition | Optimised assets and practices | Flexibility and commercial evolution | Whole energy system

Benefits

- Enhancement of existing assets
- Targeted data collection
- Better visibility of asset condition
- Improved system resilience
- Extension of asset life leading to customer savings

Timescales

Start: **Apr 2022**

End: **Mar 2024**

PROJECT COMPLETE

What next

The Portal has been made available to the asset management team and is being integrated into our IT systems as part of the BaU transition. We are continuing to monitor the captured data, especially from the TFC units, in order to optimise its use.

www.enwl.co.uk/nia

ENWL029: Statistical Model forCutout Failure

NIA

This project carriedout a combination of literature review and data analysis around modes of cutout failure to generate a condition assessment model which allows targeted replacement of cutouts in a controlled manner.

Consumer vulnerability | Net zero & energy system transition | Optimised assets and practices | Flexibility and commercial evolution | Whole energy system

Benefits

- More resilient network
- Improved understanding of cutout failure modes
- Improved customer service
- Informed asset replacement strategy
- Easily transferable to other DNOs

Timescales

Start: **Dec 2021**

End: **Jun 2023**

PROJECT COMPLETE

Key Learnings

Housing stock analysis showed links to cut out types

Model built shows usefulness of the approach

To be taken to the ENA for next steps

ENWL032: Needs Based Segmentation of LIV Customers

NIA

The RIIO-ED2 challenge group raised a concern that the needs of Low Income and Vulnerable (LIV) customers are not well understood by DNOs. This project will objectively appraise how best to classify LIV customers and identify their energy needs through customer engagement to determine how best to support them in adopting net zero activities.


Consumer vulnerability


Net zero & energy system transition


Optimised assets and practices


Flexibility and commercial evolution


Whole energy system

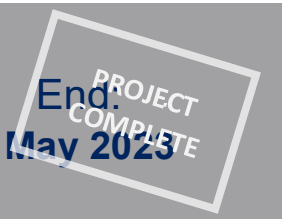
Benefits

- Improved understanding of customer needs
- Consistent definitions of different customer types
- Support to increase adoption of net-zero activities
- Expansion of “living lab” resource
- More efficient, targeted services enabled consistently across country

Timescales

Start: **Sept 2022**

End: **May 2023**



What next

This project is newly underway, beginning with development of the research programme. Part 1 of the programme will focus on the development of a common “lens” or “lenses” through which DNOs and Ofgem should view the needs of LIV customers, whilst part 2 will undertake nationally representative customer engagement with LIV customers.

www.enwl.co.uk/nia