

NIA Annual Summary Report

31 July 2023



Foreword

Welcome to our summary report of Network Innovation Allowance (NIA) for RIIO-ED1. In this document we set out all our NIA projects from this regulatory period and share their learning outcomes, benefits and proposed implementation.

We also draw out those NIA activities from reporting period 1 April 2022 to 31 March 2023 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. All our innovation projects from ED1 have been aligned with our innovation strategy – to address the challenges of energy system transition, while maintaining a safe, efficient, and reliable network and ensuring that the most vulnerable in our communities can benefit from changes, we make elsewhere in the energy industry.

Our NIA activities are centred around the early-stage technology development, application of research and network demonstration trials. During ED1, we received £24m of NIA funding – 7% of our base allowance. This funding covers 90% of the cost of our projects; the remaining 10% comes from ENWL. The ED1 period has seen us deliver a portfolio of 31 projects, providing significant learnings and the accelerated benefits to customers with 13 notable projects being deployed rapidly into BAU. A further ten projects have led to further work either as part of a NIC project or a subsequent NIA project for ED2. Four projects have provided successful learning outcomes which we will continue to review and consider emerging requirements in ED2.

Some notable projects from our ED1 portfolio are expanded on below:

Our Sentinel project provided key learnings on improving the safety of our overhead network by providing additional visibility and the ability to remotely detect faults. The deployment of the Sentinel equipment formed a key part of our ED2 business plan as the bespoke deliverable, Linesight.

Our work on Oil Regeneration has led to an improvement in our asset management strategy by enabling us to extend the operational lifetime of a transformer without impacting its performance.

The Cable Health Assessment for Low Voltage Cables project delivered significant learnings on best practice for monitoring assets to detect the signs of developing faults. The disseminated learnings from this project were picked up by manufacturers and contributed to the development of the PreSense monitoring device, which will be rolled out across our network in ED2.

Smart Heat explored the potential impacts of heat decarbonisation on our network and provided valuable insights into the possible changes our network will see. The learnings from this project have fed into our ongoing innovation in the form of a new NIA project, Cool Running, which will be carried out during ED2.

ATLAS created our ‘one version of the truth’ methodology for a bottom-up and time-series forecasting of demand and generation across the whole of our network. ATLAS built on previous works including our Demand Scenarios NIA project, by providing a holistic forecasting methodology. Subsets of ATLAS outputs are published in our Distribution Future Electricity Scenarios, Long Term Development Statement and whole system Future Energy Scenario building block submissions to inform the ESO Future Energy Scenarios.

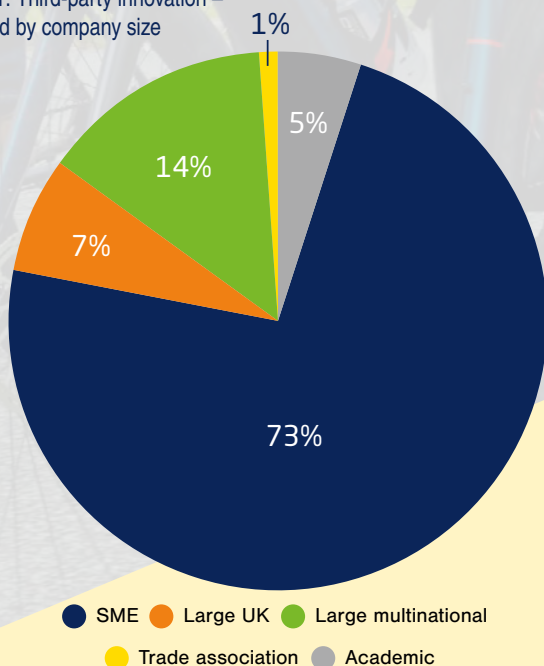


In the final year of ED1 we have continued to deliver a wide range of projects that demonstrate the value of NIA innovation activities. Key among those projects were the following:

- A Needs Based Segmentation of Low Income and Vulnerable Customers is a project that explored how we classify and understand the needs of various groups of customers such that we can better tailor services to help with the transition to net zero.
- LV Predict took a probabilistic approach to modelling LV cable condition accounting for both electrical factors, such as loading, and environmental factors. The project created a model which demonstrated the degree of impact for these factors on cable condition and potential failure rates.
- A Statistical Model for Determining Cut-Out Failures created a methodology for assigning a risk of failure to cut-outs, which has become more important as the rise in smart meter usage means many of these are no longer checked by customers or meter readers. The outputs of this project are going to be taken to the NARMS Electricity Distribution Working Group shortly to look to steer the industry approach to managing these assets.

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 have run eight calls for innovation, either standalone or in conjunction with the ENA, with the most recent call receiving 27 responses from 15 organisations. We took forward from

Figure 1: Third-party innovation – % spend by company size



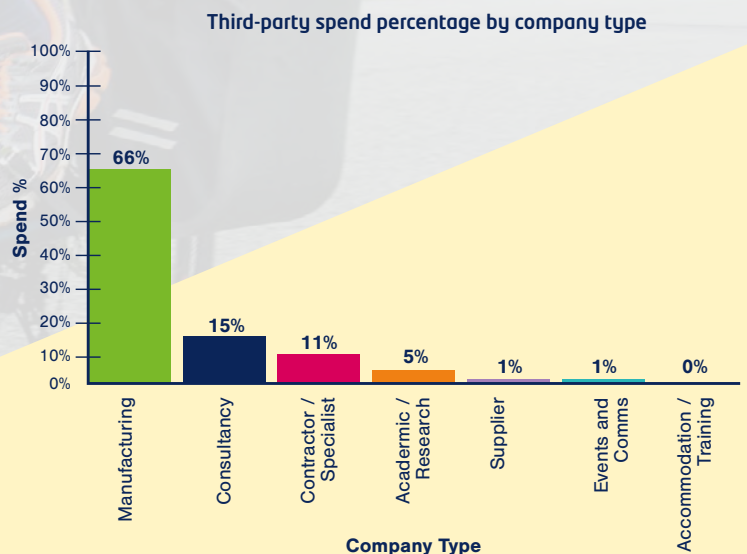
this several ideas and they formed two new projects in 2022: Hyperspectral Imaging and A Statistical Model for Determining Cut-Out Failures.

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.

NIA funding has facilitated our collaboration with a range of organisations outside of Electricity North West. For example, large multinational companies, such as Schneider Electric; large United Kingdom (UK)-based companies, such as Nortech Management Ltd; Small to Medium Enterprises (SMEs), such as Impact Research; and other specialist consultancies, as well as academia and trade associations. Figures 1 and 2 below show our third-party innovation spend by company size and type, respectively. As can be seen in figure 1 73% of the NIA spend was SME's, covering over one hundred different organisations.

In the coming year we look forward to initiating 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.

Figure 2: Third-party innovation - % spend by company type



2. Key facts

31

NIA projects
delivered

100%

of allowance
spent

23

projects
transitioned to
BaU or further
development
work

Over
£24m

invested to
date

Over
90

partners and
suppliers
engaged

£2.4m

spent in
FY23

3. 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.

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

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.

Figure 3: Our challenges



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.

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.

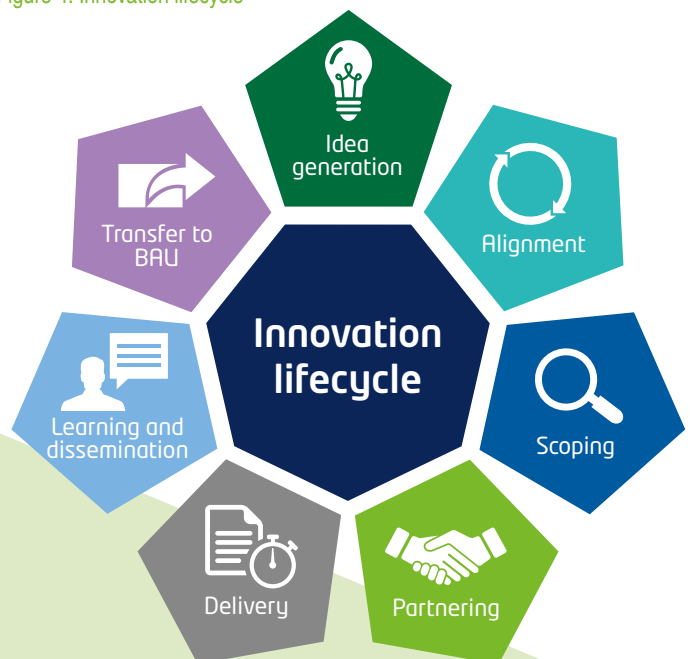
An idea will not be taken forward unless the value for customers is clear and there are appropriate linkages to at least one of our innovation themes.

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



4. Project highlights

ENWL028: LV Predict













This project developed 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 failure in a specific time interval.

 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets and practices	 Flexibility and commercial evolution	 Whole energy system
Benefits		 Timescales	START: JULY 2022	
	Low cost			
	Easily deployable			
	New probabilistic framework		<p>Probabilistic modelling methodology easily applicable to other DNOs.</p> <p>Cable temperature and soil thermal conductivity key factors.</p> <p>Follow on project to further develop the methodology.</p>	
	Better targeted investment			
	Improved cable health prediction			
		 Key Learning		

4. Project highlights

ENWL032: Needs Based Segmentation of LIV Customers

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		 Timescales	START: SEPT 2022		
	Improved understanding of customer needs				
	Consistent definitions of different customer types				
	Support to increase adoption of net zero activities		Key Learning		
	Expansion of 'living lab' resource				Identified five lenses to view vulnerability through, to best quantify the needs of DNO customers.
	More efficient, targeted services enabled consistently across country	Recommended a best practice approach for defining vulnerability. Final report due following the last set of field work.			


5. Overview

Project	Funding	Themes					Status
		 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets & practices	 Flexibility & commercial evolution	 Whole energy system	
Celsius	NIC						COMPLETE
Capacity to Customers	LCNF 2						BAU
CLASS	LCNF 2						BAU
Smart Street	LCNF 2						BAU
Respond	LCNF 2						BAU
Quest	NIC						IN PROGRESS
BiTraDER	NIC						IN PROGRESS
ENWL001: Demand Scenarios with Electric Heat & Commercial Capacity Options	NIA						BAU

5. Overview

Project	Funding	Themes					Status
		 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets & practices	 Flexibility & commercial evolution	 Whole energy system	
ENWL002: Distribution Asset Thermal Modelling	NIA						COMPLETE
ENWL003: P2/6 Rewrite	NIA						BAU
ENWL004: Combined Online Transformer Monitoring	NIA						COMPLETE
ENWL005: Asset Risk Optimisation	NIA						BAU
ENWL006: Sentinel	NIA						BAU
ENWL007: Reliable Low Cost Earth Fault Detection For Radial OHL Systems	NIA						BAU
ENWL008: ATLAS	NIA						BAU
ENWL009: Cable Health Assessment	NIA						COMPLETE










5. Overview

Project	Funding	Themes					Status
		 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets & practices	 Flexibility & commercial evolution	 Whole energy system	
ENWLO10: Value Of Lost Load (VoLL)	NIA						COMPLETE
ENWLO11: Enhanced Voltage Control	NIA						COMPLETE
ENWLO12: Investigation Of Switchgear Ratings	NIA						BAU
ENWLO13: Detection of Islands	NIA						COMPLETE
ENWLO14: Optimisation of Oil Regeneration	NIA						COMPLETE
ENWLO15: Tapchanger Monitoring	NIA						COMPLETE
ENWLO16: Future Network Modelling Functions	NIA						COMPLETE
ENWLO17: Electricity and Heat	NIA						COMPLETE
ENWLO18: Avatar	NIA						COMPLETE

5. Overview

Project	Funding	Themes					Status
		 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets & practices	 Flexibility & commercial evolution	 Whole energy system	
ENWL019: Interface	NIA						COMPLETE
ENWL020: Artificial Intelligence & Machine Learning	NIA						COMPLETE
ENWL021: VoLL 2	NIA						COMPLETE
ENWL022: Reflect	NIA						BAU
ENWL023: Intelligent Network Meshing Switch	NIA						BAU
ENWL024: Smart Heat	NIA						COMPLETE
ENWL025: On-Line Assessment Of Neutral Conductor Integrity	NIA						IN PROGRESS
ENWL027: Enhanced LFDD	NIA						IN PROGRESS
ENWL028: LV Predict	NIA						COMPLETE

5. Overview

Project	Funding	Themes					Status
		 Consumer vulnerability	 Net zero & energy system transition	 Optimised assets & practices	 Flexibility & commercial evolution	 Whole energy system	
ENWL029: A Statistical Model for determining cut out failures	NIA						COMPLETE
ENWL030: Hyperspectral Imaging	NIA						IN PROGRESS
ENWL032: A needs based segmentation of low income and vulnerable customers	NIA						IN PROGRESS





**Electricity
North West**

Borron Street
Portwood
Stockport
SK1 2JD

www.enwl.co.uk

